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ABSTRACT

Training in the motor vehicle repair and sales sector in Germany was examined in a study that included the following approaches: review of the sector's structure/characteristics, institutional and social context, employment practices/trends, changes in the type of work and employment/training requirements, and available initial and continuing vocational education and training; in-depth case studies of five auto repair shops and dealerships; and identification of economic, employment, and training trends. It was discovered that, although the motor industry remains the most important industry in Germany's economy, it will not likely experience any more growth. Vehicle sales are declining; however, the volume of repairs is likely to increase as cars become older. Higher qualifications are being demanded of repair shop employees because of new environmental/safety standards and technological advances. Only about 7% of the sector's employees have no relevant vocational qualification, and one in every five employees is engaged in vocational training. Nearly all employees in aftersales departments and repair shops participate regularly in in-house continuing training and/or courses provided by manufacturers, importers, suppliers, or chambers of trades; however, many people in positions of responsibility within the sector still do not consider the available training activities sufficient. (Contains 63 tables/figures and 33 references.) (MN)

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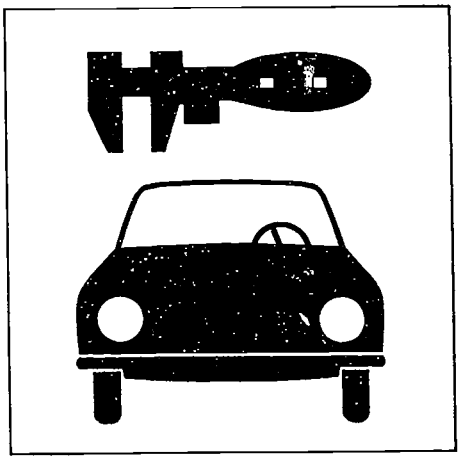
European Commission

GERMANY
REPORT

MOTOR VEHICLE REPAIR AND SALES SECTOR



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Drawn up by ITB and SFS, coordinated by ITB, DTI and CEDEFOP.
TASK FORCE - Human Resources Education Training and Youth

MOTOR VEHICLE REPAIR AND SALES SECTOR

TRAINING IN THE MOTOR VEHICLE REPAIR AND SALES SECTOR IN GERMANY

REPORT FOR THE FORCE PROGRAMME

drawn up by
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under the responsibility of Felix Rauner, ITB – Bremen and in close collaboration with Tina Bertzeletou, CEDEFOP.

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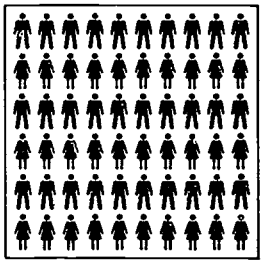

1. Repair and sales in the motor vehicle sector: an overview
2. Structure and characteristics of the motor vehicle sector
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4. Employment trends
5. Changes in the type of work and its influence on requirements and training
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1. REPAIR AND SALES IN THE MOTOR VEHICLE SECTOR: AN OVERVIEW

1.1 Definition and delimitation of the sector

The motor vehicle industry is more than ever the key sector influencing international economic competition. In manufacturing countries such as the U.S.A., Japan, Germany, Italy and France, it is the decisive factor in employment and economic prosperity. A MIT study on the superiority of the Japanese lean production concept (Womack i.a. 1991) has hit Germany like a thunderbolt and prompted people to turn their attention to the development, manufacture, sales and servicing of cars. The message of the authors is clear: unless manufacturers here approach the high productivity levels achieved by Japanese manufacturers (with Toyota topping the league table in lean production) they will lose their ability to compete on the world market. This diagnosis pointed out to us at the beginning of the 1990s the first of two major problems within the motor industry: cost-effective manufacturing.

The second major problem – which the MIT study also refers to – is the successful marketing of the car, the design of the relationship between the car dealer, his servicing and repair facilities and the customer. It is these factors that influence the customer's decision to buy a particular car and determines whether he is satisfied with the after-sales (servicing and repair) provided by his make of car. As long as the no-maintenance car remains a dream, the strategic position of the motor vehicle repair and sales sector will not change. 80% of a dealership's business is accounted for by selling cars. Nevertheless, repair and servicing remain of central importance to the motor vehicle sector. More than ever before, car manufacturers rely on the servicing and repair provided by dealerships and their ability to rapidly diagnose and rectify defects. In the interplay between flexible manufacture and the electronification of cars, a wide range of complex automotive technology has been developed which, if it is to be truly mastered by the service and maintenance sector, demands an extremely high quality of diagnosis and repair techniques.

Experts believe that dealers today have a greater significance than at the beginning of the eighties for the added value in motor businesses. However, a good repair shop is essential to ensure that a customer remains loyal to one make of car. One of the car manufacturers' rules of thumb is: "The dealer sells the first car, the mechanic the subsequent ones." (Hamann 1992).

The importance of after-sales can be seen in Germany by the fact that there is hardly a (new) car dealer without a service and repair department. There are, however, a relatively high number of, often smaller, firms, which are in the service and repair business only. According to Rühl et al. (1984, p. 49), these accounted for approximately 20% in 1983. Surveys carried out for 1987 by the ZDK show that "service and repair only" businesses linked to a particular manufacturer account for 18.3% (of a total of 25,000).

In addition to these service outlets, there are a considerable number of so-called "independent dealerships", usually small businesses (over 16,000, i.e. almost 40% of all businesses). Independent dealerships are not linked to manufacturers or binding agreements of any kind. They act entirely in their own interest and on their own account. A link to a particular make may be formed but this is not necessarily the case.

This outlines briefly the industry dealt with in this study: the subject of investigation are car dealers and firms involved in servicing and repairing cars, which are subordinate to the motor industry but are equally essential for the functioning of the whole motor traffic system. Exactly how close the links to the car manufacturers are can be seen in the fact that the main distinction made between these businesses is whether they are linked to a manufacturer or not: authorized firms and independent dealerships. The sector is thus closely linked to developments in the motor industry, it is hard to conceive of it as an independent sector, but similarly the car manufacturers could hardly market their products without these firms.

Firms such as bodyworkers, used-car dealers and filling stations are not counted as belonging to this sector if they operate independently without links to the above-mentioned firms. Many car repair shops do, however, have their own bodywork departments, a used-car business and filling station. We have counted these cases since they are not specifically identified in the statistics.

1.2 Trends within the motor vehicle repair and sales sector

If the manufacture of cars in the factory and their use by the customer are recognized as the two decisive factors in the motor industry then the particular position of the servicing and repairs sector becomes clear.

A dealership is first and foremost a qualified specialist dealer which owes its existence to the fact that the car is (so far) not a product which can be sold in a department store or any other kind of retail outlet selling a range of goods. In this function it stands alone because there is no other product approaching comparable economic significance, which is sold exclusively and so widely in specialist outlets.

The reason for the special position of the dealership is obvious. More than any other product the

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car needs specialist care, which can obviously only be provided by a large number of specialist dealers with associated after-sales facilities and qualified, highly-skilled personnel. The car is a product which, by virtue of its importance to the individual and within society, its life expectancy, its value and above all its mass distribution and complex technology, automatically excludes the possibility of simply being sold and means that a dense network of service and repair businesses is required. This in turn forces the manufacturer to organize the contact to the customer in a special way within a carefully designed marketing strategy. The customer service area is therefore another special feature of the car manufacturing business. (Rauner/Zeymer 1991, p. 26).

1.3 The role of the dealership as an intermediary

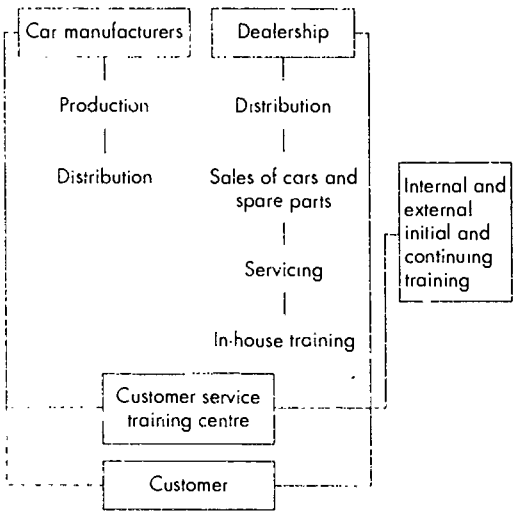
The activities in the dealership have become increasingly more distinct as its dependency on the manufacturer has increased over the years. This process of differentiation did not simply follow the principle of Taylorist separation and integration of work processes. It was influenced far more by the stipulations of manufacturers (cf. fig. 1.1).

The question of division of labour, particularly that which follows the Taylorist principle and would mean that the dealership is relieved of any kind of process planning activity, which is central to the development of qualification structures, can only properly be taken into account for the dealership if the "division of labour" between the car manufacturers and the dealership is also examined. A mere cursory glance at the job processing in an authorized dealership shows the customer that service, maintenance and repair of the car are carried out according to fixed standards and costs stipulated, and thus justified, by the manufacturer. The work of the dealership is thus comparable to that of a repair shop which is integrated into a factory: prepared in detail, planned both in terms of what work is to be carried out and how it is to be done, including which tools are to be used and what time limits are acceptable for each job.

This is a special feature of the motor vehicle repair and sales sector. The services stipulated in the contracts drawn up with dealers and the work entailed is specified in great detail. For example, firms linked to manufacturers are obliged to use testing systems and software specified by the manufacturer. They can thus carry out only those test routines specified by the manufacturer. There are similar stipulations governing which tools must be bought and how they are to be used.

Only if the no-maintenance car became reality – the dream of every manufacturer – if the car could be sold like other mass-produced products, would the motor vehicle repair and sales sector in its present form have the carpet pulled from under its feet. The whole of the motor vehicle repair and

Figure 1.1 – Manufacture – Dealership – Customer (today)



sales sector rests on the necessity of cars to be serviced and repaired and their mass distribution. As long as the dealership continues to play the necessary role of intermediary between the manufacturer and the customer, the car manufacturers are bound to be interested in optimizing this intermediary role of the dealership:

1. by developing technology which is as free from defects and needs as little maintenance as possible, and

2. by designing this intermediary task in a way which will encourage sales.

This interest of the manufacturers is, of course, identical to that of the customer because the idea of owning a technically high-quality and faultless product is linked to the expectation that this product is cared for in a special way – and this places more obligations on the intermediary than is usual in other fields (cf. Rauner/Zeymer 1991, p. 26ff).

1.4 The manufacturers distribution network

The motor vehicle sector in Germany is closely linked to the motor industry. Over 60% of dealers/repair shops are under contract to car manufacturers/importers. These authorized dealerships employ 85% of all people working in this sector. Brand-new vehicles and parts are sold via this selective system:

"The car manufacturers/importers work with the selected dealers and repair shops to create an after-sales service specially tailored to the vehicle. In this the vast majority of dealers represent one make only (exclusive-make policy). For reasons of capacity and profitability alone this kind of co-operation cannot be extended to an unlimited

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number of dealers and repair shops." (Rühl et al. 1984, vol. 2, p. 99).

Dealers appointed by vehicle manufacturers/ importers have to fulfil certain qualification criteria. In addition to this, the existence of fully functional service and repair facilities and a showroom plays an important part.

The basis for the legal relationship between the manufacturer/importer and the dealer is the contract (dealers contract). According to the organizational structure of the sales network various types of contract are drawn up for direct dealers, representatives, authorized repair shops, sub-agents and branches of the direct dealers. Regardless of whether they are integrated into a sales network the dealers – apart from a few exceptions – carry out their business transactions under their own name and for their own account. The exceptions are Daimler-Benz and MAN: here the dealers invoice in the name of and for the account of the manufacturers (agents). In addition to this there are also businesses which work as commission agents in their own name but for the account of a third party (cf. Rühl et al. 1984, vol. 2, p. 100).

The items covered in these detailed dealers contracts include:

- Contractual territory
- Scope of the dealer's activities
- Activities for other makes of vehicle,
- Sales to other dealers and third parties for re-sale
- Business operations
- Advertising and trademarks
- Dealer-support from the manufacturer,
- Duration of contract/performance of contract
- Guidelines for guarantees and accommodation
- Settlement of accounts between dealer and manufacturer
- Continuing training in customer service training centres (partly)
- Extent of training and eligible participants

In the case of some manufacturers, the contracts also specify working clothes and forms of work organization to be employed such as team work or work in groups.

Tables 1.1 and 1.2 place businesses within the motor vehicle sector into the categories of distribution centres, business establishments, branches of business establishments, dealers and branches of dealers, operating branches and lorry repair shops and repair shops. The vast majority of businesses are dealers which also have service stations and repair facilities.

The following information can be deduced from Tables 1.1 and 1.2:

a. BMW, Daimler-Benz and, to some extent, Peugeot have similar sales networks. The dealers have close links to the manufacturers (high number of firms in categories A and B). BMW seems to avoid dealerships with low-level involvement (category D) and gives preference to a tightly organized network of dealers. Daimler-Benz practises to some extent a policy of tight links and to some extent lower-level links with its dealers (categories A and B comprise approximately 50% and D1 the other 50%).

b. V.A.G. has a sales network which is distinctly different from that of all other companies. The 12 firms in category A are sales centres, some of which are directly linked to the manufacturer, some of which, however, belong to private companies or are independent, private limited companies with a strong link to the manufacturer. The manufacturer himself has no direct influence on the dealers/repair shops. (It was not possible to determine whether MAN practises the same policy as V.A.G. The proportion of branch operations is, however, very high).

c. Opel concentrates on dealers/repair shops of type C and D and has a small number of direct dealers (type B: 171). It can be assumed that there is a "graduated" link to the direct dealers. The aim is presumably to establish an extensive network of dealers/repair shops which, depending on regional significance, have tighter or more flexible links to the manufacturer.

It is striking that since 1987 Opel has increased the number of dealers/repair shops by around 300, decreased the number of direct dealers (type B) by around 1000 and at the same time increased the number of sub-agents (type C) by around 1,350. Opel notched up very good sales figures during this period. This step can be interpreted as a move to "loosen" the tie to the manufacturer.

d. Ford and Chrysler have no branch operations at all. Ford has an extensive network of direct dealers and authorized repair shops. Chrysler works mainly with direct dealers.

The US controlled firms seem to tie "their" dealers/repair shops less tightly to the manufacturer. There are parallels with V.A.G.'s practices.

e It is noteworthy that the Japanese manufacturers operate exclusively with direct dealers (category B) and sub-agents (category C) Category A firms are sales centres. This indicates that the Japanese controlled firms have a simple sales structure with virtually no graduation. It would only be possible to analyze how intense the link between the dealers/repair shops and the

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Table 1.1 – Distribution networks of the manufacturers/importers *(cars and commercial vehicles)*
As of: 31.12.1987

Manufacturer/Importer	A	B	C	D1	Total
Alfa Romeo	1	196	82	–	279
Austin Rover	–	157	15	17	189
BMW	18	637	246	–	901
Citroën	5	431	306	–	742
DAF	1	24	–	68	93
Daihatsu	–	464	34	–	498
Daimler-Benz	95	451	–	590	1,136
Fiat	2	656	558	–	1,216
– Lancia	2	326	37	–	358
Ford	–	807	–	1,278	2,085
Honda	–	472	–	–	472
Iveco-Magirus	25	140	–	314	479
Jaguar	1	108	–	–	109
Lada	1	435	54	–	490
MAN	40	7	–	285	332
Mazda	-	762	244	–	1,006
Mitsubishi (Cars)	1	836	83	–	920
– Lorries	–	33	–	–	33
Nissan	2	724	–	–	726
Opel	1	1,200	–	1,063	2,264
Peugeot/Talbot	15	731	230	133	1,109
Porsche	–	88	121	–	209
Renault (Cars)	4	516	777	–	1,297
– Lorries	4	24	–	74	102
Saab	5	181	29	–	215
Scania	–	39	–	58	97
Seat	–	339	–	–	339
Skoda	1	226	74	95	396
Subaru	–	242	286	–	528
Suzuki	–	395	35	–	430
Toyota	–	742	83	–	825
V.A.G.	12	–	1,661	1,622	3,295
Volvo (Cars)	2	355	26	9	392
– Lorries	2	45	–	31	78
Total					23,640
Independent repair shops			D2	16,972	–

Source. VDA/VDIK
(Explanations before Table 1.1)

Explanations to Tables 1.1 and 1.2:

A: Business establishment of the manufacturer or distribution centre
B: Direct dealers including their branches
C: Sub-agents (sales on behalf of the direct dealer – main activity repairs)
D1: Repair shops appointed by a dealer (category B) or manufacturer
D2: Independent repair shops
E: Dealers (in these tables always listed in categories A, B, C)
F. Repair shops specializing in components, individual systems etc. (no figures available)

manufacturer is by actually looking at the details of the contracts.

f. Other foreign manufacturers, such as Fiat, Citroën, DAF, Lada, Rover, Saab, Scania and Volvo, have sales structures which are comparable to those of German manufacturers. These structures are deeper and more hierarchical than the Japanese ones and the manufacturers' dominance is stronger.

In summary, it can be said of the distribution structures that the European manufacturers demonstrate distinct differences from the Japanese ones. The Japanese favour a less graduated, less hierarchically-structured network. The Europeans

Table 1.2 – Distribution networks of the manufacturers/importers *(cars and commercial vehicles)*
As of: 31.12.1991

Manufacturer/ Importer	A	B	C	D1	Total 1991	Of these in eastern Germany
Alfa Romeo	1	195	–	–	196	20
Automot	–	15	–	–	15	15
BMW	29	668	200	–	897	90
Chrysler	–	165	9	–	174	11
Citroën	6	362	462	–	830	202
DAF	2	101	121	–	224	93
Daihatsu	–	401	14	–	415	48
Fiat	3	849	555	–	1,407	235
– Lancia	3	345	29	–	377	23
Ford	–	990	–	1,294	2,284	195
Honda	–	512	–	–	512	67
Hyundi	–	–	–	–	174	59
Iveco-Magirus	19	126	–	347	492	78
Jaguar	–	58	–	3	61	–
Lada	2	651	35	–	688	218
MAN	42	–	4	333	379	45
Mercedes-Benz	102	510	–	629	1,241	120
Mazda	–	897	130	–	1,027	108
Mitsubishi	1	1,060	3	9	1,115	227
Nissan	1	874	–	–	875	118
Opel	1	171	1,356	1,012	2,540	377
Peugeot	17	822	272	65	1,176	248
Porsche	–	82	–	–	82	4
Renault (Cars)	5	651	965	–	1,621	310
– Lorries	3	79	–	84	166	32
Rover	–	135	9	33	177	21
Saab	7	136	27	–	170	6
Scania	1	41	–	78	120	18
Seat	–	699	–	–	699	218
Skoda	–	196	–	–	196	107
Subaru	1	302	207	–	510	65
Suzuki	–	590	13	–	603	81
Toyota	–	667	199	–	866	64
V.A.G.	12	–	2,088	1,545	3,650	435
Volvo (Cars)	–	283	50	10	343	16
– Lorries	–	47	–	73	120	34
Yugo	–	292	–	–	292	77
Total					26,714	
Independent repair shops	–	–	–	D2 16,223	–	–

Source: VDA/VDIK
(Explanations see Table 1.1)

go in for multi-levelled hierarchies and various forms of links to the agents. The networks of US controlled firms are similar to those of the Japanese.

No significant shifts in structures can be observed in the period between 1987 and 1991 (Tables 1.1 and 1.2). In absolute terms the number of independent dealerships and dealerships linked to a particular make of vehicle rose slightly (from 40,617 to 42,937). The increase in dealerships for Japanese makes (1991: 5,395; 1987: 4,932) is, at 10%, higher in relative terms but within the trend of the increase in other major national and international makes of car. 20% of all dealers linked to a particular manufacturer were linked to Japanese manufacturers whereas the share of the market held by Japanese vehicles was around 13.5% in 1991 (cf. Table 1.3). This means that the Japanese have a network of (presumably smaller) dealerships which is relatively dense compared to their share of the new car market.

No perceptible reduction in the number of dealers could be observed by any of the larger manufacturers. If one excludes Porsche as a special case

which has suffered slumps in its market in recent years, there is only one German manufacturer (BMW) which has been showing a contrary trend for some time, that is a slight tendency to concentration. The overall number of BMW firms has decreased. Particularly affected are the sub-agents. Two reasons are given for this development:

- The costs per workplace have hit the DM 100,000 level. Given the further increase in the variety of models a rise in these costs can be expected. These costs affect the small and very small firms more severely than the branch operations and large firms.

- The greater variety of models and the increased complexity and variability of automotive technology demand a division of labour in the repair shop. This in turn requires a certain size of firm.

For German companies the category A dealers (branch operations or sales centres) have increased. It can be assumed that this is due to the establishment of a network of dealers in former East Germany.

According to ZDK 42,937 businesses (not including those specialized solely in automotive electronics) in 1991 were independent, in other words not tied to a manufacturer or particular make. This means that their proportion (37.8%) has barely changed since 1987 when it was 38.4%[1]. This means that, despite the rapid development of more modern and more complex vehicle and diagnosis systems, the independent dealerships cannot be said to be "dying out". Their share – measured against the number of firms – has remained more or less constant and the slight relative drop is probably due to the fact that the dealers linked to particular makes were able to expand more quickly in eastern Germany. The independent dealerships are thus still a relatively stable factor in the motor vehicle repair and sales sector.

In terms of the size of firms the increase is due mainly to the small firms (size category II). Their share increased from 37% in 1983 to over 50% in 1991, an expression of the fact that many new firms were set up during this time. This would suggest that, despite the fact that automotive technology is becoming more complex, small firms still feel they have a good chance in the market for service and repairs.

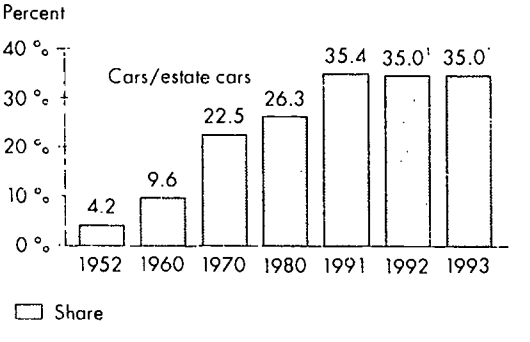
1.5 Market shares

Another reason for changes in the motor vehicle repair and sales sector is the change in the market shares of the manufacturers, in particular the arrival of newcomers such as Hyundi, Skoda or Yugo.

If one looks at the registration figures for new cars and estate cars between 1989 and 1991 (Table 1.3) some particular features are striking: in absolute terms the number of registrations in this period rose both for German and foreign makes. Percentually, however, the share of German makes dropped from 67.6% to 64.9% whilst the share of foreign makes rose steadily from 32.4% to 35.1%. This trend continued into the first half of 1992, and the share of foreign vehicles has already reached 38%. It is striking that there was an increase in the number of French makes and a slight drop in the number of Japanese vehicles.

The continual increase in the number of foreign vehicles being registered in Germany can also be observed in Fig. 1.2. In 1991 both cars and lorries peaked at 35.4% and 35.3% respectively. The estimated figures for 1992 and 1993 assume a stagnation for cars and a further increase for lorries. Overall, the trend, which began in the fifties, towards an increasing market share for foreign vehicles, continued, albeit to a slightly lesser degree, and this trend is currently being underpinned by the 50% market share occupied

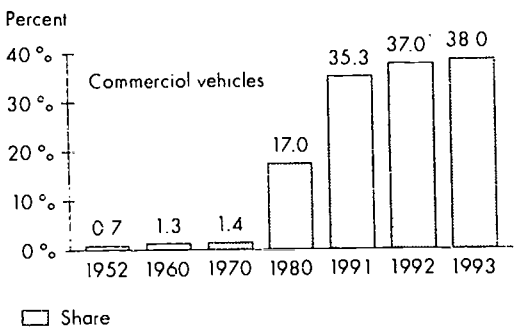
Figure 1.2 – Market shares of total registrations held by importers



Year	Total registrations	Proportion of imports
1952	195,492	8,142
1960	970,268	92,722
1970	2,107,123	473,718
1980	2,246,187	638,984
1991	4,158,674	1,463,053
1992[1]	3,700,000	
1993[1]	3,400,000	

[1] Estimate
Source VDIK

[1] Various ZDK publications give a different figure for the share of the independent garages, putting the share at 42%. Our own investigations confirm the figure of approximately 38%



Year	Total registrations	Proportion of imports
1952	75,007	558
1960	107,258	1,402
1970	138,555	5,651
1980	143,741	24,414
1991	332,304	117 303
1992[1]	320,000	
1993[1]	280,000	

[1] Estimate
Source: VDIK

in eastern Germany. The possibility of a levelling off can therefore not be excluded.

It is significant here that all foreign companies are trying to set up a performance-orientated network of dealers and service centres with blanket coverage. This is not only reflected in the 15,300 dealer support centres – 2,800 of which are in eastern Germany – but also in the qualified training and further training of dealers/sales personnel and mechanics. This is reaffirmed by recent activities of companies such as Toyota, who have built a modern training centre in Cologne, or Fiat with their new marketing strategy, which focuses on after-sales orientated concepts such as customer satisfaction and social responsibility. Optimal and continual qualification is seen as one of a number of important elements in this.

Table 1.3 – Registrations of brand new cars in West Germany from 1989 to 1991 by manufacturer

Manufacturer	Number			Percentage share			Change in % 1990 to 1991 from 1989 to 1990	
	1989	1990	1991	1989	1990	1991		
German manufacturers								
Alpina	296	287	293	0.0	0.0	0.0	-3.0	+2.1
Audi	158,072	167,548	203,648	5.6	5.5	6.0	+6.0	+21.5
BMW	190,730	190,665	222,266	6.7	6.3	6.5	0.0	+16.6
Ford	277,388	292,394	323,499	9.8	8.4	9.4	+5.4	+10.6
Mercedes-Benz	255,636	256,780	275,413	9.0	9.6	8.0	+0.4	+7.3
Opel	404,254	455,590	500,815	14.3	15.0	14.6	+12.7	+9.9
Porsche	8,582	9,292	9,738	0.3	0.3	0.3	+8.3	+4.8
Sachsenring (Trabant)	3	25	553	0.0	0.0	0.0	–	–
Volkswagen	619,053	609,521	687,484	21.9	20.1	20.1	-1.5	+12.8
Misc.	646	661	809	0.0	0.0	0.0	+5.7	+22.4
Sub-total	1,914,660	1,982,763	2,224,518	67.6	65.2	64.9	+3.6	+12.2
Foreign manufacturers								
Alfa, Lancia I	21,115	26,592	31,584	0.7	0.9	0.9	+25.9	+18.8
Alpine F	231	118	83	0.0	0.0	0.0	-48.9	–
AZNP-Skoda CS	2,598	1,961	3,072	0.1	0.1	0.1	-24.5	+56.7
Bertone I	165	85	113	0.0	0.0	0.0	–	–
Cami CDN	–	–	3,153	–	–	0.1	–	–
Citroën F	40,396	46,545	45,702	1.4	1.5	1.3	+15.2	-1.8
Chrysler CDN/USA	5,755	5,864	11,945	0.2	0.2	0.3	+1.9	+103.7
DAF NL	79	322	734	0.0	0.0	0.0	–	+128.0
Daihatsu J	13,983	12,611	15,686	0.5	0.4	0.5	-9.8	+24.4
Ferrari I	414	435	533	0.0	0.0	0.0	+5.1	+22.5
Fiat I	115,810	124,528	130,724	4.1	4.1	3.8	+7.5	+5.0
Ford CDN/GB/USA	260	338	6,123	0.0	0.0	0.2	+30.0	+1,711.5
Ford E	7,400	6,697	22,594	0.3	0.2	0.7	-9.5	+237.4
Fuji Heavy Subaru J	13,589	13,791	15,886	0.5	0.5	0.5	+1.5	+15.2
GMC CDN/U S	1,455	2,163	2,374	0.1	0.1	0.1	+48.7	+9.8
General Motors E	51,417	65,784	81,283	1.8	2.2	2.4	+27.9	+23.6
AC Truck USA	216	693	1,537	0.0	0.0	0.0	+220.8	+121.8

Table 1.3 – Continued

Manufacturer		Number			Percentage share			Change in % 1990 to 1991 from 1989 to 1990	
		1989	1990	1991	1989	1990	1991		
Foreign manufacturers									
Honda	J	45,549	54,340	51,586	1.6	1.8	1.5	+19.3	-5.1
Honda	USA	1	5	1,703	0.0	0.0	0.0	–	–
Hyundai	ROK	–	–	1,188	–	–	0.0	–	–
IBC Vehicles	GB	1,145	1,082	1,652	0.0	0.0	0.0	-5.5	+52.7
Isuzu	J	6,139	7,220	6,289	0.2	0.2	0.2	+17.6	-12.9
Jaguar	GB	2,391	2,353	2,130	0.1	0.1	0.1	-1.6	-9.5
Jeep, AMC	CDN/USA	4,602	3,915	2,543	0.2	0.1	0.1	-14.9	-35.0
Matra	F	4,980	6,454	7,984	0.2	0.2	0.2	+29.6	+23.7
Mazda	J	91,045	100,542	97,269	3.2	3.3	2.8	+10.4	-3 3
Mercedes-Benz	E	4,008	4,618	6,136	0.1	0.1	0.2	+15.2	+32.9
Mitsubishi	J	67,269	73,845	63,689	2.4	2.4	1.9	+9.8	-13.8
Nissan	E	736	1,594	2,808	0.0	0.1	0.1	+116.6	+76.2
Nissan	GB	7,027	12,749	22,639	0.3	0.4	0.7	+81.4	+77.6
Nissan	J	75,503	78,168	93,101	2.7	2.6	2.7	+3.5	+19.1
Peugeot	F	62.047	84,830	96,802	2.2	2.8	2.8	+36.7	+14.1
Renault		91,597	100,375	139,484	3.2	3.3	4.1	+9.6	+39 0
Rover, Austin, Land Rover	GB	6,882	8,006	12,724	0.2	0.3	0.4	+16.3	+58.9
Saab-Scania	S	6,138	5,837	5,688	0.2	0.2	0.2	-4.9	-2.6
Seat	E	23,778	43,111	56,677	0.8	1.4	1.7	+81.3	+31.5
Suzuki	J	27,087	32,556	28,994	1.0	1.1	0.8	+20.2	-10.9
Toyota	J	81,448	94,758	89,127	2.9	3.1	2.6	+16.3	-5.9
Vaz-Lada	CIS	12,631	12,836	12,463	0.4	0.4	0.4	+1.6	-2.9
Volvo	NL	7,311	7,706	8,166	0.3	0.3	0.2	+5.4	+6.0
Volvo	S	10,895	9,880	14,069	0.4	0.3	0.4	-9.3	+42.4
Zastava	YU	5	551	1,426	0.0	0.0	0.0	–	+158.8
Misc.		1,983	2,162	4,620	0.1	0.1	0.1	+9.0	+113.7
Sub-total		917,080	1,058,020	1,204,083	32.4	34.8	35.1	+15.4	+13.8
Total		2,831,740	3,040,783	3,428,601	100.0	100.0	100.0	+7.4	+12.8
Of these vehicles made by foreign manufacturers with headquarters in:									
France		199,304	238,364	290,062	7.0	7.8	8.5	+19.6	+21.7
Great Britain		17,722	24,427	39,620	0.6	0.8	1.1	+37.8	+62.2
Italy		137,683	151,880	163,221	4.9	5.0	4.8	+10.3	+7.5
Japan		421,626	467,862	461.715	14.9	15.4	13.5	+11.0	-1.3
The Netherlands		7,390	8,028	8,900	0.3	0.3	0.3	+8.6	+10.9
Eastern Blac[1]		15,290	15,377	17,015	0.5	0 5	0.5	+0.6	+10.7
Sweden		17,033	15,717	19,757	0.6	0.5	0.6	-7.7	+25.7
Spain		87,339	121,809	169,510	3.1	4.0	4.9	+39.5	+39.2
USA		10,356	12,477	25,625	0.4	0.4	0.7	+20.5	+105.4
Misc. foreign cauntries		3,337	2,079	8,658	0 1	0.1	0.2	-37.7	+316.5
Sub-total		917,080	1,058,020	1,204,083	32.4	34 8	35.1	+15.4	+13.8

[1] Including former Yugoslavia

Source Federal Motor Office

2. STRUCTURE AND CHARACTERISTICS OF THE MOTOR VEHICLE SECTOR

2.1 Historical development[2]

The motor vehicle repair sector in Germany is rooted in the metal industry and as such is classed itself a craft trade. At its core, however, it is part of the sector set up by industrial manufacturing: the motor industry created the motor sector, just as it was only as a result of research in the electrical industry that the trade of electrical engineering was born. The motor vehicle repair sector is thus fundamentally industrial in nature – paradoxical as that may sound. Since the 1920s the motor vehicle has been an industrially manufactured product. However, the motor repair sector has no direct influence on the design of automotive technology. This means that an important characteristic of the classical craft trades is missing here: its capacity to participate in the design of manufactured goods. In automotive technology the development process depends on science and technology not craftsmanship – apart from during the initial phase in the manufacture of motor vehicles.

Until the beginning of the century there were hardly any businesses which specialized in servicing and repairing motor vehicles, because:

- the metalworking trade did not have the machine tools required to produce large numbers of spare parts to a satisfactory degree of precision;
- there were no details on manufacturing tolerances to be adhered to, since the manufacturers mostly kept them secret (standardized machine fitting systems were not introduced until after the First World War);
- the necessary materials and manufacturing stages did not exist or were unknown;
- only a small number of craftsmen recognized the significance of the evolving motorization and were prepared to take on the risks and changes involved, partly due to conservatism, partly due to lack of capital.

In the case of Daimler, for instance, it was not until 1908 when new models were introduced that mass-produced spare parts were also manufactured. Previously the spare part department had been attached to their own repairs department. After this the "spare parts and mail order" department became independent in an attempt to boost sales and with them production levels. Complicated repairs to cars which the owners or their chauffeurs were not able to do themselves were carried out in the repair shop belonging to the manufacturer. This meant that shortly after the turn of the century the geographical distribution of the makes was at least limited and, looking through car catalogues of the time, it is noticeable that there was a car manufacturer in practically every large city.

Daimler's repair shop, writes Schumann (1911,22) "is quite separate, on the other side of a public street, in a shed 65 metres long and 66 metres wide. These repair shops and their sheds virtually form a small car factory in its own right with an office and waiting room, turnery, milling shop, forge, test room with over 60 machine tools of all kinds, blowers, presses, hardening furnaces etc." Schumann points out that the repair shop was a place where "responsible work was carried out by mostly competent workers with training in the trade."

From a description by Stapelmann it becomes clear that in the early days of motor mechanics the tasks and work in the field of car repair hardly differed from those in metalworking and mechanical engineering.

"New pistons were rarely used, people usually improvised by adding rings. If, however, new ones were necessary a model was made and cast. If possible they also acquired them from the works. The cast pistons were worked on a lathe. Even the piston pin holes were drilled on the lathe. After the piston pins were finished the surface of the whole thing was hardened using potassium. Then the cylinders were ground. After the pistons had been tightly fitted they were coated with oil and emery and, using a handle they had made themselves, they were pushed up and down until they ran smoothly and with suction. This work needed a delicate touch. After the piston had been ground, the piston rings were fitted and the residues on the cylinder walls were removed with petrol. If the piston pin bushing was also fitted the engine could be assembled.

The control wheels were sometimes exposed and sometimes enclosed. They were greased in the engine casing if they were not completely separate. They normally had to be changed after 10,000–20,000 kilometres. If the valves had to be replaced they made these themselves, because the valve stem had to be stronger since the valve stem bushes had been made round, i.e. they had been reamed. Adjustable rams had not yet been invented and so the valves were fitted with a 0.5–1 mm play, after having been previously re-seated." (Stapelmann, quoted in Krupka 1976, p. 32).

Thus, it was mainly metalworking firms which took on car repairs and sales of accessories and spare parts before the First World War. On the one hand, they had suitable equipment and on the other hand, close contact with the customer which

[2] Cf. for this section Rauner/Zeymer, 1992, 46–49.

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inspired confidence. However, due to the fact that stores of spares required high capital investment, repair shops were from the very beginning forced to commit themselves to the manufacturers, and in fact to as few as possible.

Using the example of how other metalworking firms developed, features which are specific to this sector can be identified. They are listed below in a summarized form:

- The development of the firms was given a special kind of dynamics by the metalworking trade, because this trade concentrated on the work created on the periphery of industrialization.
- This trade tended to have several strings to its bow and several areas it focused on, which could be replaced as industrialization advanced (plumbing, bridge building etc. on the one hand and selling and repairing sewing machines, bicycles or cars on the other).
- The sale and repair of motor vehicles was not incorporated into the firms until relatively late but then the development was rapid and far-reaching.
- The move to concentration was a two-stage process: the first stage was in the mid-1920s and the second was in the early 1960s when it became exclusive (the other "strings to the bow", such as filling stations are included in this).
- The boom in business went hand in hand with the link to a large manufacturer.

These characteristics are important for an understanding of vocational training in the motor vehicle sector.

2.2 Change in functions and tasks in the dealership

The question needs to be addressed as to how modern vehicles have affected the motor vehicle repair and sales sector and changed the work of the dealership and furthermore how dealers and service and repair outlets in conjunction with the manufacturers are coping with these changes.

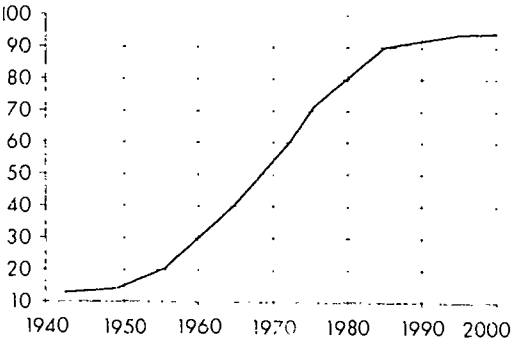
Despite the exponential increase in new technology and the range of vehicles on the market, the length of time a car spends in the garage – an indication of its need for repair and service – has not increased, on the contrary it has decreased significantly (Fig. 2.1). This fact demonstrates the drastic change in the work carried out in dealerships over the course of the last 40 years.

Since 1949 the number of vehicles on the road in Germany has increased six times more than the number of people working in the motor vehicle repair and sales sector. In 1949 there were 14 vehicles for every person in the motor vehicle sector, around 40 in 1965 and today the figure is closer to 100. If manufacturers succeed in introducing sensor-aided individual servicing, this figure will rise to well above 100. The future development of this growth curve is a central indicator for the competitive strength of car manufacturers. Figure 2.1 uses the increase in manufacturing costs for automotive electronics to show that the trend towards electronification of motor vehicles and with it the increase of complexity is more likely to increase than decrease.

The task facing car manufacturers and the motor vehicle repair sector consists of mastering the ever-accelerating increase in the complexity of automotive technology so that the intervals between servicing become longer, the car's repair needs can be further reduced and the repair shop can carry out the remaining tasks swiftly, safely and cost-effectively. These requirements of automobile maintenance would seem to constitute squaring the circle. The motor vehicle sector is responding to the demands with three instruments:

1. Further and continuing training by manufacturers;
2. Reduction in the complexity of the work by use of complex systems technology;
3. Intelligent maintenance and service.

Figure 2.1 - "Higher production levels" in the repair shop
Number of vehicles per person employed

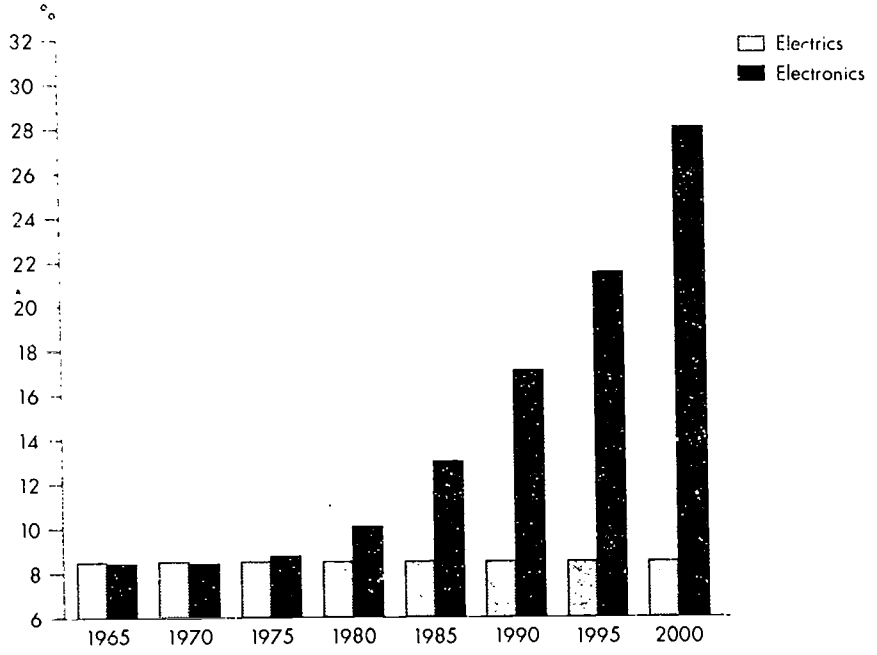


From 1990 expert estimate
Source: Rauner, Zeymer 1991, p 45

2.3 The importance of the motor vehicle sector to the German economy

The motor vehicle sector, including the manufacturing industry and the repair and sales sector is one of Germany's most important economic sectors. It is without doubt the manufacturers who are dominant but the prosperity of this industry is dependent on sales figures and above all their rate of increase.

Figure 2 2 – Percentage of production costs accounted for by electrics and electronics in the vehicle, in %



The economic importance of the motor industry in Germany will be demonstrated with some figures for 1991 (cf. Table 2.1). No less than 13% of the turnover of German industry is accounted for by this sector and every 6th employee is dependent on developments in this sector. In this the significance of commercial vehicles striking: their share in the value added in the German motor industry is over a quarter, their share in turnover just under a quarter. With exports worth over 115 thousand million DM, the motor industry was Germany's largest exporter in 1991. The export surplus was DM 45 thousand million.

The number of people working in the motor industry was on average 779,000 in 1991, peaking at 787,000. In September 1992 this figure had already dropped to 765,000 and a further shedding of jobs has been announced.

In 1991 in what was formerly West Germany (before 3 October 1990) over 5 million motor vehicles of all types were manufactured for the first, and probably last, time for some years to come (Table 2.2). Of this, 4.66 million were cars and estate cars which corresponds to the production volume of 1990. The manufacture of commercial vehicles rose by 12%.

This trend was reflected in the production levels of German companies abroad. There the number of motor vehicles manufactured rose by 2% to 1.88 million in 1991. Here again the increase is due to the increase in the manufacture of commercial vehicles, whereas the production levels for cars/estate cars stagnated.

A little under half the cars/estate cars produced in western Germany in 1991 were exported – 2.2 of 4.6 million, although this is somewhat less than in previous years. There was a clear drop of 16% from 1990 to 1991 in the number of cars/estate cars. The drop amounts to 20% of the export figures of 2.72 million reached in 1989, the highest export figures to date. (Cf. Table 2.2).

Table 2 1 – The economic significance of the German motor industry in 1991

	Total Billion DM/ Number	Cars		Commercial vehicles	
		Absolute	Proportion	Absolute	Proportion
Turnover (in billion DM)	223 0	169 5	76 0%	53 5	24 0%
Value added (in billion DM)	74 0	54 5	73 6%	19.5	26 4%
Employees (1,000)	779	565	72 5%	214	27 5%
Exports (in billion DM)	115 5	92 3	79 9%	23 2	20 1%

Table 2.2 – Production and export of motor vehicles in the Federal Republic of Germany (within the boundaries valid before 3 10.1990)

Type of vehicle	1989	1990	1991[1]	±% 91/92
Car/estate car	4,563,673	4,660,657	4,659,480	± 0
of which exports	2,721,829	2,597,722	2,184,560	
Commercial vehicle	287,974	314,895	355,523	+ 12.5
of which exports	175,876	167,923	162,154	
Cars and commercial vehicles produced	4,851,647	4,976,552	5,015,003	+ 0.8

Vehicles produced abroad by German manufacturers in joint-venture arrangements

Type of vehicle	1989	1990	1991[2]	±% 91/92
Cars/estate cars	1,519,287	1,638,304	1,640,000	± 0
Commercial vehicles	204,164	205,148	240,000	+ 17
Together:	1,723,451	1,843,452	1,880,000	± 2

Source: VDA statistics

[1] Provisional figures
[2] Estimate

There was an above-average drop in exports to France (–27%), Great Britain (–45%), the U.S.A. (–40%) and Japan (–19%). Less severe were the export losses to the Benelux countries (–6%) and Switzerland (–5%). There was an increase in exports to the Eastern bloc states and Austria (+10%). The motor industry reports that falling trends have been clearly noticed since mid-1992. All orders lagged behind the levels of the previous year, sometimes dramatically. It is assumed that the car market in Germany is saturated (cf. Figure 2.3).

Of the 4.6 million cars/estate cars manufactured in western Germany in 1991, approximately 60,000 were assembled in eastern Germany Production of traditional East German makes came to an almost complete halt. In 1991, 730,000 brand new cars and estate cars were put into circulation in the former East Germany (cf. Table 2.3). This meant that the number of cars/estate cars on the road in eastern Germany had risen by the end of 1991 to 6.3 million. In 1991 the share of the market held by foreign makes in eastern Germany was 53%, which is considerably higher than in western Germany where it has remained steady at 34% for the past three years.

In previous years there had been a sharp increase in the number of vehicles on the domestic market. This is true for all categories of vehicle in western Germany with the exception of buses and tractors. Statistics have only been kept in eastern Germany since the end of 1991.

The total number of vehicles registered in western Germany amounted to 36 5 million on 1.1.1992 and 46.2 million in the whole of Germany (cf. Table 2.4).

Table 2.3 – The car market in eastern Germany
Cars/estate cars

	Existing fleet	New registrations (by make)				Production in eastern Germany
		East German	West German	Foreign	Total	
1988	3 744,00	149,000	20,000		169,000	218.000
1989	3,8 .9,900	163,000	24,000		187,000	217,000
1990	4,817,000	52,7000	128,000	102 0	284,000	152,000
1991	6,3000.000	4,000	347,000	379,000	730,000	76.500
1992		0	350,000	300,000	650,000	85,000

Table 2.4 – Trends in motor vehicles registered in western Germany and number of motor vehicles registered in eastern Germany on 1 January 1991 (including vehicles temporarily not registered)

Type of vehicle	western Germany				eastern Germany	Whole of Germany
	1.1.1989	1.1.1990	1.1.1991	1.1.1992	1.1.1992	1.1.1992
Motor cycles	1,322,769	1,348,498	1,396,083	1,481,561	1,355,425	2,836,986
Cars & estate cars	29,190,322	30,152,399	30.695,082	31,309,165	7,305,897	38,615,062
Buses	70,186	70,478	70,258	69,710	79,259	148,969
Lorries	1,327,638	1,364,918	1,408,952	1,499,748	418,369	1,918,117
Tractors	1,742,802	1,751,949	1,755,032	1,749,161	309,383	2,058,544
Other motor vehicles	388,664	416,327	444,000	472,923	190,373	663,296
All motor vehicles	34,042,381	35,104,569	35,749,407	36,582,268	9,658,706	46,240,974

[1] As of 30.09.1990 (details provided by the People's Police Department of the Ministry of the Interior) and the vehicles registered in the central vehicle register on 1.1 1992.

Source: Federal Motor Office

Figure 2.3 – Trends in the number of inhabitants per motor vehicle (includes cars/estate cars and lorries)

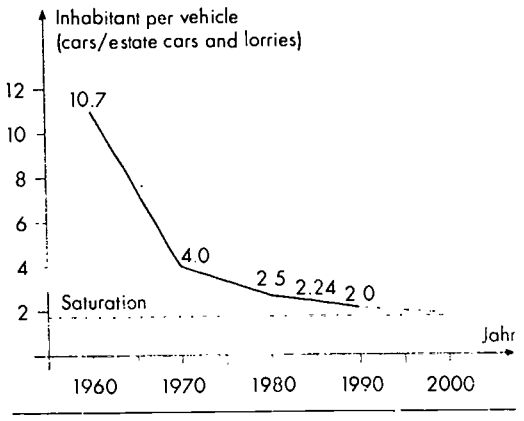


Figure 2.3 correlates the number of vehicles registered against the number of inhabitants. It shows that in 1990 there were two inhabitants for every motor vehicle, whereas in 1960 there had been 10.7 inhabitants per vehicle, if only the main categories cars/estate cars and lorries are taken into account. If all motor vehicles are included there is a parallel curve at a slightly lower level (1970: 3.6; 1990: 1.8).

Two areas of this curve are of particular significance. Between 1960 and 1970 the density of vehicles increased clearly from 10.7 to 4.0 inhabitants per vehicle. From 1980 the curve begins to flatten and reaches a high density in 1990 with two inhabitants per vehicle. Nevertheless, it can be assumed that saturation point has not yet quite been reached. It is expected at around 1.6 to 1.8 inhabitants per vehicle. Demand on the domestic market will concentrate less on first time buyers and more on replacing existing cars.

The following conclusions can be drawn from these figures:

a. The rise seen since 1984 in the number of people employed in the West German motor industry probably exceeded its peak in 1991. The fall in employment levels has already begun and will intensify in the near future.

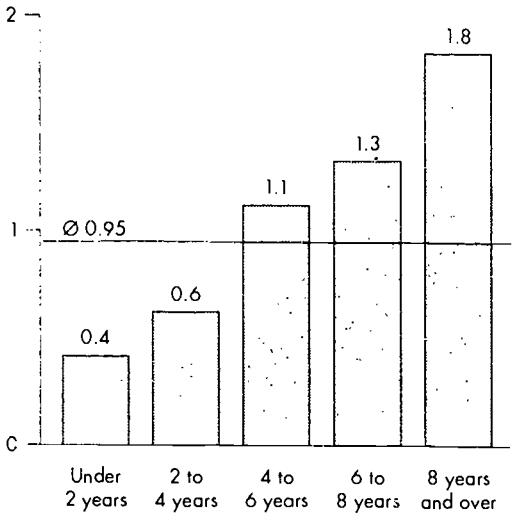
b. A slack in domestic demand for new cars could revive the second-hand car market. Due to the higher probability of their requiring repair and the ever-increasing number of vehicles on the road this could have positive effects on business in the repair sector. The frequency of repair as a function of age is shown in Figure 2.4. A perceptible increase can be detected in vehicles from their fourth year of operation onwards. At the same time the link to the authorized dealership decreases visibly.

c. The German motor industry is approaching saturation level on the domestic market. The demand for new cars in Germany has already dropped and exports too have been dropping for years.

d. The motor industry in Germany will have to face radical reorganization measures if it is to survive on the world market. This affects both the way production in the factories is organized, the product itself – the car, and the relationships between manufacturer, dealership and customer. For example, more and more motor management systems and systems to aid active safety are being developed which repair and service outlets will have to master.

The demands placed on car dealers and repair shops are changing as a result of shorter innovation cycles, a marked increase in the range of models available and a generally

Figure 2.4 – Repair as a function of age of vehicle in 1991
Number of repairs per car per year



Source: DAT – Customer service report, 1992

increased orientation to customer needs. This in turn leads to different qualification demands being placed on the motor vehicle repair and sales sector and on continuing training which takes this into account.

2.4 The internal structure of the motor vehicle repair and sales sector

In the following section we shall concentrate on the vehicle repair and distribution sector in the narrower definition of the FORCE project. Table 2.5 shows a slight but steady increase in the number of motor firms since 1979. The increase is clearly a result of the increase in firms specialized in motor mechanics. In the case of firms specializing in automotive electrics there has been a slight decrease in numbers since 1988. This is probably due to the integration of mechanical and electronic systems in vehicles. Businesses carrying out servicing and repairs of motor vehicles have to be able to deal with these integrated systems. This has caused firms specialized in automotive electronics to lose significance. While in 1965 there was one firm dealing with automotive electronics for every 17 businesses carrying out general servicing and repairs, the ratio today is 1 to 21. That means that despite the dramatic expansion of automotive electronics in the motor vehicle sector the proportion of firms working in automotive electronics has dropped. It will be particularly difficult for the independent electrics firms to hold their ground against the authorized dealerships which are becoming increasingly competent and qualified and are now dealing with automotive electronics as a matter of course. The general service and repair firms with their comprehensive range of jobs tailored to one particular make of vehicle have extended their market position.

If one takes into account that the firms mentioned specialized in automotive electronics include approximately 900 Bosch partners the number of remaining electrics firms is only 2% of the overall figure, in other words negligible.

There are approximately 350 specialized firms (1/2/3-Autoservice, PIT-STOP, Fahr-Well, tyre specialists etc.) on the market in Germany. They thus have carried no particular weight to date and have no great influence on specialization trends.

The distribution of the firms into the size categories is shown in Table 2.6. It can be seen that the

Table 2.5 – Number of firms in the motor vehicle sector *(change from previous year in italics)*

Western Germany	Motor vehicle repair sector (Repair shops belonging to authorized dealers and independent repair shops)		Automotive electrics sector		Motor vehicle repair sector overall	
1979	31,745	*+ 3.1%*	1,651	*+ 2.2%*	33,396	*+ 3.0%*
1981	32,775	*+ 3.2%*	1,686	*+ 2.1%*	34,461	*+ 3.0%*
1982	33,747	*+ 3.0%*	1,733	*+ 2.8%*	35,480	*+ 3.0%*
1983	34,704	*+ 2.8%*	1,775	*+ 2.4%*	36,479	*+ 2.8%*
1984	36,020	*+ 3.8%*	1,776	*+ 0.0%*	37,796	*+ 3.6%*
1985	37,226	*+ 3.4%*	1,823	*+ 2.7%*	39,049	*+ 3.3%*
1986	38,998	*+ 4.8%*	1,901	*+ 4.3%*	40,899	*+ 4.7%*
1987	39,968	*+ 2.5%*	1,927	*+ 1.4%*	41,895	*+ 2.4%*
1988	40,617	*+ 1.6%*	1,918	*- 0.5%*	42,535	*+ 1.5%*
1989	41,453	*+ 2.1%*	1,927	*+ 0.5%*	43,380	*+ 2.0%*
1990	42,209	*+ 1.8%*	1,946	*+ 1.0%*	44,155	*+ 1.8%*
1991	42,588	*+ 0.9%*	1,914	*- 1.6%*	44,502	*+ 0.8%*
	42,937	*+ 0.9%*	1,910	*- 0.2%*	44,847	*+ 0.8%*
Eastern Germany[1]	7,031		852		7,883	

[1] Recorded for the first time in 1991
Source ZDK As of 1 3 1992

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proportion of medium-sized firms is small, in the category 20 to 49 employees a downward trend can be seen, while the number of smaller firms is increasing: small firms in category I increased from 37% in 1983 to 51.2% in 1991. The increase in small firms can be explained by the fact that many young people who have just gained their master mechanics qualifications cannot find a suitable job in the companies they trained in and therefore set up their own business. In the business it is known as "the flight to self-employment". They do not normally achieve instant recognition by a manufacturer, which also explains the fact that only a small proportion of these firms also sell cars, as seen in Table 2.7. However, another factor in the establishment of these new businesses is without doubt the fact that new companies such as Hyundi and Yugo, which are now pushing their way onto the market, support young newly-qualified master mechanics and help them to set up their businesses, as do petrol companies which offer them low interest loans.

Approximately 20% of firms do not sell cars (cf. Table 2.7). Surveys carried out for 1987 by the ZDK show that 18.3% of businesses linked to factories were a service and repair shop only. The proportion of small firms which also sell cars dropped by approximately 6% between 1981 and 1983. A similar trend, though not as severe, can be seen in the medium-sized firms. Only in larger firms (over 50 employees) did the proportion rise by around 2%.

Differences in structure from one size category to another can also be identified. In 1983 less than two-thirds of firms in category I also sold cars, in class II there were 84% and in categories III to V well over 90%.

The smaller proportion of dealers in category I is explained by the high proportion of independent dealerships – cf. Table 2.8 – in this category (71% in 1987, more recent statistics are not available). These firms are often family businesses or belong to the young master mechanics who have set themselves up in business but, for reasons described above, have not yet started to sell cars. Large firms in categories IV and V play virtually no part amongst the "independents". Independent dealerships are not bound by contracts with manufacturers. A concentration on one make of vehicle can result but must not necessarily do so. This happens in around 30% of firms in categories II and II; in other categories the figure is nearer 10%.

Table 2.8 – Independent firms by number of employees *including owners and family members employed and apprentices*

Size category		1987
I	1 – 4 employees	71 %
II	5 – 9 employees	23.4%
III	10 – 19 employees	4.4%
IV	20 – 49 employees	0.8%
V	Over 50 employees	0.4%

Source. ZDK 1987

Table 2.6 – Firms categorized by number of employees *(including owners and family members employed and apprentices)*

Size category		Eastern Germany			
		1983	1989	1991[1]	1991
I	1 – 4 Employees	37%	39 %	51.2%	30.2%
II	5 – 9	27%	29 %	28.2%	33.7%
III	10 – 19	18%	19 %	13.5%	22.1%
IV	20 – 49	13%	5.8%	5.8%	8.5%
V	Over 50	5%	5 %	1.3%	5.5%

Source ZDK

[1] The question of whether the ZDK used a different method for data collection remains open

Table 2.7 – Share of firms in the motor vehicle sector which sell cars (in percentage)

Number of Employees	I 1–4	II 5–9	III 10–19	IV 20–49	V › 50	All firms
1981	69.9	90.5	95.4	93.5	94.9	88.3
1982	61.1	85.4	93.5	94.6	96.6	80.4
1983	61.4	84.0	91.5	95.2	93.3	79.5

Source Ruhl et al., 1984, p. 49

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1.

It was not possible to determine how many of these firms only work "after hours" but are nevertheless on the Crafts Register (for instance, in order to be able to carry out exhaust emission testing). Experts estimate that the figure is somewhere between 3 and 15%. The new exhaust emission test, AU II, due to enter into force on 1.12.1993, will further reduce this percentage.

Despite the increase in the number of firms, the number of people employed in the sector is dropping. In 1980 there were 32,775 firms employing 493,900 people; in 1991 there were 42,937 firms employing only 357,000 people (cf. Table 4.1).

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3. INSTITUTIONAL AND SOCIAL CONTEXT

3.1 The role of management and labour

Negotiating parties on an industry-wide level

The most important association of employers in the motor vehicle repair and distribution sector is the Zentralverband des Deutschen Kraftfahrzeughandwerks – ZDK (Central Association of the German Motor Trade). It represents the social and economic interests of companies in the motor vehicle sector.

Two trade unions are largely responsible for people working in this sector: the Industriegewerkschaft Metall – IGM (Metalworkers' Union) which is one of the unions constituting the Deutscher Gewerkschaftsbund – DGB (the German Trade Union Federation) and the Deutsche Angestellten-Gewerkschaft – DAG (German Union of Salaried Employees). IGM is the largest union in this sector with a membership within the trade in West Germany of 30%. In the East the percentage of workers and employees in the trade union is somewhat higher. For firms exclusively involved in sales, and to some extent for the sales departments of general motor firms, the union Handel, Banken und Versicherungen – HBV (Commerce, Banking and Insurance Union), which is part of the DGB, and the DAG are also responsible.

For details on the influence of trade unions and employers' associations on vocational training in Germany see below (Chapter 6).

Labour/management relations within firms

In firms employing more than five people, the employees have the right to elect a staff committee to represent their interests and rights within the firm. The number of representatives on the council and arrangements about time allowed during working hours to carry out committee work depend on the number of employees. The staff committee is elected for a four-year term of office.

The Youth and Trainee Council (JAV) is responsible for young people (up to the age of 18) and trainees (up to the age of 25); it is elected every two years. The JAV has no decision-making power in the firm. Its task consists mainly in "Applying to the staff committee for certain measures" and passing on suggestions to it which are of particular interest to their constituency and "specifically ... on issues of vocational training"; in addition to this it also has monitoring functions" (Article 70, BetrVG).

The Works Constitution Act (BetrVG) sets out relatively far-reaching possibilities for the staff committee to participate in the area of initial and continuing training within the firm: it has both advisory functions, such as in the "establishment and equipping of in-house facilities for vocational training", the "introduction of vocational training measures in the firm" and the "participation in vocational training schemes outside the firm" (Article 97), as well as explicit co-determination rights as set out in Article 98, which regulates the "implementation of training possibilities within the firm." Amongst other things, it stipulates that the staff committee can, in certain circumstances, "oppose the appointment of a person who has been given responsibility for carrying out the vocational training within the firm or ask for their dismissal" (paragraph 2) and that it can "make suggestions concerning the participation of employees or groups of employees in the firm in vocational training schemes" (paragraph 3).

The firm is also obliged to "provide the staff committee in good time with comprehensive information on current and future personnel needs and on the personnel measures resulting from that and schemes for vocational training" (Article 98). Furthermore there is the general obligation for "employers and the staff committee" to be involved in the "promotion of vocational training" (Article 96).

To regulate these questions, employers and staff committee can reach agreements which are applicable throughout the works or the whole firm. They have the function of establishing binding agreements at firm level which have not been covered for the whole sector by the collective agreements drawn up between the trade unions and employer's organizations. In-house agreements of this kind, particularly in large companies, have been increasingly drawn up in recent years in various fields including in-house continuing training.

3.2 Collective agreements

Relations between labour and management in this sector are laid down in a series of collective agreements. These agreements primarily contain regulations which have been reached about economic and social working conditions.

Collective framework agreements regulate, for example:

- the content of the employee's contract
- basic pay and bonuses
- protection against rationalization schemes and provision for old age
- working hours, emergency duty
- holidays and special leave

Collective agreements on wages and salaries regulate:

- levels of wages, salaries and remuneration for trainees
- age increments in the various wage and salary categories
- piece-work rates

In addition to these, there are a number of special collective agreements, for example on:

- payment of Christmas bonuses
- profit sharing
- employee asset formation scheme

In the motor vehicle repair and sales sector the collective agreements are negotiated on a federal state level by the Association of Guilds for the motor vehicle repair and sales sector and the district leadership of the metalworkers' union (and any other union involved).

The most important points of discussion in recent years were working hours and holidays. Since 1991, the average working week in West Germany has been 37 hours, the same hours for white and blue-collar workers employed by car manufacturers or dealerships. The working hours are basically from Monday to Friday – although there are now a number of deviations from this in particular companies (e.g. four-day weeks with nine hours worked each day . It is expected that working hours will be further reduced over the next few years. In 1991 the average annual working time in the German motor vehicle sector was 1,643 hours, whereas in other countries far more hours are worked (in Japan, for example, it was 2,119 hours a year). Whether all the hours worked in a firm were really included in this calculation remains open to question. For example, at weekends some repair shops have set up an emergency service and during the week too overtime is worked in many firms and often paid "on the side". Furthermore, in this sector there are often many owners and members of their families who work in the business and whose working hours are, as a rule, not properly recorded.

The length of annual holidays is arranged on a national level by representatives of labour and management. It is 30 working days a year for older employees. Extra holiday money, set at 50% of a monthly salary, has also been agreed.

Another important element is the collective wage/salary agreements re-negotiated each year by labour and management. At present the levels set for hourly rates or monthly salaries in the collective agreements on wages and salaries differ from one federal state to the next (cf. Table 3.1).

3.2.1 Binding force of the collective agreement

If an owner of a motor business belongs to the relevant guild the business is obliged to apply the collective agreement in force. The motor mechanic must then, for example, be paid a minimum according to the current collective agreement on wages and salaries. In some firms the sales department belongs to the guild of automobile dealers in which case the negotiating partner is the HBV union or the DAG.

Table 3.1 – Negotiated standard wage rates in the motor vehicle repair and sales sector,[1] June 1992
Evaluation for firms in the motor vehicle sector working on a time-wages basis

	Wage categories for employees over 18 without increments or deductions for age										
	Unskilled		Semi-skilled		In the 1st journeyman's year		Figures in italics mean: standard wage or 100% wage				
	From	To	From	To							
Bavaria	13.85	–	15.23	–	15 58	16.27	16.96	*17.30*	19.38	20 77	–
Berlin	13.08	–	13.97	14.96	17.03	*17.88*	19.71	21.42	–	–	–
Bremen	12.34	15.92	13.36	16.73	15.59	17.27	*18 96*	–	–	–	–
Bremerhaven	11 11	14.33	12.04	15.07	14.51	15.36	*17.07*	–	–	–	–
Hamburg	13.93	15.76	14 49	16.56	16.34	16.68	*17 42*	19.19	20.32	–	–
Hesse	2,06.	–	2,193	2,326	2,340	2,547	2,673	2,823	3,070	3,198	–
Lower Saxony	11.86	13.97	13.17	15.49	15 81	*17.20*	18.49	19.78	–	–	–
North Rhine-Westphalia	14 16	–	15 41	–	15.43	16.56	17.64	19.08	19.26	20.31	20 50
North Württemberg/ North Baden	–	–	1[illegible] 37	16 20	17 03	17 88	19.71	21.53	23 26	–	–
South Württemberg-Hohenzollern			14 39	15 17	*16 72*	18.37	19 98	21 54	–	–	–
Lower Palatinate	12 81		15,51	–	16 37	*17 18*	17 97	18.78	19 62	–	–
Rhineland-Rhinehessen	14 70	–	13 76	–	15 39	*16.18*	17.82	18 62	19 42	–	–
Saarland	12 96	–	13 97	15 62	15 43	16 31	*17 42*	17.69	19 97	–	–
Schleswig-Holstein	13 07	14.75	16 02	17 10	16.58	17.88	19.60	21.39	23.20	–	–
South Baden	16 02	–									

[1] Taken from the brochure "IG Metall - Daten, Fakten, Informationen 1992"
[2] Monthly wage
As of: June 1992

If the employer does not belong to any professional association he is not bound by the collective agreement. This is the case, for example, in firms which are not in the regional Association of Guilds. On the other hand, employees who are not members of a trade union nevertheless have a right to the wage collectively agreed if the employer is bound by the agreement.

There are several possibilities to ensure in law that collective agreement on wages and salaries are adhered to by employers and employees who are not members of professional associations or trade unions respectively:

1. Employers and employees can agree to incorporate the collective agreement (e.g. the one negotiated by the regional Association of Guilds for the motor vehicle sector) into the contract of employment. In this case it is permissible to take only the collective agreement on wages and salaries into account.

2. The Federal Minister of Labour may declare the collective agreement to be generally binding. If this happens the collective agreements acquire the character of a law applicable to all employment contracts. Adherence to the collective agreement is then compulsory. It is of no matter whether employer and employee belong to their respective professional organizations. This option is, however, rarely put into practice.

3. If neither case 1 nor case 2 is put into practice there may still be tacit application of the provisions of the collective agreement, giving it a binding character.

Sometimes, however, there are also independent, sometimes verbal, agreements between companies and employees to simply use the collective agreement as a guideline or even deviate from it considerably.

3.3 Legal basis

The most important instruments in "crafts law" are the following:

3.3.1 The Handwerksordnung – HWo (Craft Trades Code) of 1953

The Craft Trades Code determines the organization of the craft (trade) and thus the organization of the Chambers of Trades as statutory corporations under public law. These Chambers are obliged to keep the Craft Trades Register, the inventory of self-employed craftsmen and craftsmen licensed to train apprentices, the register of apprentices and the list of registered apprenticeships.

The Craft Trades Code contains stipulations on:

a. Requirements to be fulfilled by master mechanics wishing to set up in business and employ people in a profession which is classed as a craft trade (Annex A and B to the Craft Trades Code)

- vocational training in the craft trade
- examination as a journeyman and master mechanic
- reporting obligations:

in order to become self-employed the craft tradesman must register with

- the Chamber of Trades with an application to be entered on the Craft Trades Register (membership of the Chamber of Trades is obligatory),
- the local authority in the area where his business is (factory inspectorate duties are carried out by the local authorities)
- the local tax office responsible
- the Berufsgenossenschaft – BG (trade co-operative association). Depending on its Articles of Association the owner of a business which is classed as a craft trade) may be liable to join the statutory Occupational Accident Insurance Scheme or may be able to choose a voluntary scheme.

Membership in the relevant guild is voluntary.

3.3.2 Craft Trades Register

The Chamber of Trades keeps several registers:

- the Craft Trades Register which is the list of all independently run firms practising craft trades within the area of jurisdiction of the Chamber of Trades;
- the register of businesses which are similar to crafts;
- the register of apprenticeships to record all existing apprenticeships.

It is not possible to set up a firm carrying out a craft trade without being registered on the Craft Trades Register. This in turn is not possible without having passed the master mechanic examinations ("Higher Certificate of Competency"). Passing this exam entitles the craftsman to train apprentices. Exceptions are possible under certain circumstances. Engineering examinations may, for instance, replace the master mechanic examinations if a journeyman's qualification was gained in the relevant craft trade.

The motor trade guild unites all the firms in the motor vehicle sector in a particular region. Although membership is technically speaking voluntary it is in effect compulsory if a firm seeks professional recognition. For example, certain work, such as exhaust emission testing, may only be carried out by members of the guild. There are only very few exceptions to this.

1.

Only members of the guild are allowed to display the sign: "Company member of the motor trade guild with qualified master mechanics" (cf. 3.2.5).

The guilds are partners in the collective bargaining process and are therefore bound by the collective agreements negotiated. The grouping of workers into the valid wage categories is therefore unequivocally regulated. Furthermore the guilds actively carry out extensive public relations work (for example, organizing information weeks), run numerous continuing training facilities (e.g. schools to train master mechanics) and hold the examinations for journeymen. Member firms profit from all these activities. Non-members have to pay high fees to use these services. The guilds ultimately dominate and regulate their particular field. This ensures the high membership levels with an average of 93% of firms registered on the Craft Trades Register. Approximately 6% are classified as so-called "casual firms" or "after hours firms" which do not gain any benefit from being members of the guilds and 1% are firms which due to lack of professional qualifications were not accepted by the guilds.

The individual guilds are organized in Regional Associations of Guilds and these in turn are represented in the Federal Association of Guilds. The latter is the professional association proper of the motor vehicle repair and sales sector. In addition to this there are the professional associations of the motor vehicle repair and sales sector organized at regional level. The umbrella organization of both professional associations is the Zentralverband Deutsches Kraftfahrzeuggewerbe e.V. – ZDK (Central Federation of the German Motor Vehicle Trade).

3.3.3 Industrial code as applicable to craft trades

The industrial code regulates amongst other things:

- the obligation to register with the local authority when opening a commercial enterprise (factory inspectorate)
- the use of a title or name for the enterprise which corresponds to the nature of business
- requirements to be fulfilled when operating a plant which is dangerous and subject to monitoring
- stipulations to prevent the exploitation of employees

3.3.4 Legal provisions governing continuing training

Article 42 of the Craft Trades Code stipulates that the Chamber of Trades can regulate vocational continuing training. It can hold examinations which correspond to the requirements of vocational adult education. The Chamber of Trades regulates the content, aims, requirements and organization of these examinations, the entrance requirements and sets up examining boards.

Article 42 (2) of the Craft Trades Code stipulates:

"As the basis for a correct and uniform further vocational training and in order to adapt it to the technological, economic and social requirements and their development the German Minister for Education and Science may, having heard the German Committee on Vocational Training, issue regulations to determine ... the content, aim, examination requirements, organization of the examination as well as entrance requirements and the title of the qualification. The regulations may furthermore make provision for the further vocational training to be followed by distance study."

This means that the Chambers of Trades are able to organize further vocational training independently of the regulations of the federal states and have it recognized at federal level. Articles 46 and 49 of the Act on Vocational Training create the basis for the recognition of vocational training schemes and the recognition of vocational training professions without taking into account the regulations of the federal state or state-run continuing training facilities.

The Craft Trades Code (Article 42) and the Act on Vocational Training (Articles 46 and 49) create the legal framework, so that, for example, the continuing training to service technician introduced by the motor vehicle repair and sales sector in September 1992 will eventually be recognized by the German Ministry. This approach ought to meet with the support of the trade unions since they are not represented in state-run schools and continuing training facilities.

3.3.5 Miscellaneous regulations

Regulations not limited to this sector alone

Further regulations and requirements which motor firms have to fulfil can be found in the Regulations on Accident Prevention and the guidelines issued by the co-operative trade association. The regulations and stipulations which are important to the motor vehicles firm are summarized in the Appendix to this report (Appendix 1 and 2).

The Act on Shop Opening Hours, which bans, for example, sales after 6.30 p.m. and on Sundays and public holidays, applies to dealers.

Arbitration bodies

In addition to the Act on Consumer Protection, the motor trade guilds have also set up "impartial" arbitration bodies to protect the customer. In the case of dispute with a firm the motorist can contact free of charge:

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a. an arbitration body of the motor vehicle repair and sales sector (of which there are 90) or
b. an arbitration body for second-hand car dealers (of which there are 38).

Firms which agree to be bound by the judgement of the arbitration bodies display the sign "Company member of the motor trade guild with qualified master mechanics". In 1991, exactly 12,606 applications were submitted to the 90 arbitration bodies of the motor vehicle repair and sales sector; in the previous year the figure was 11,772. Over 96% of these cases were dealt with by the arbitration bodies in the same year.

The most frequent grounds for complaint were:

- Over-charging
- Inadequate workmanship/faults not rectified
- Work carried out which had not been requested.

In 1991 4,134 applications were made to the arbitration body for used car dealers.

Technical regulations

To ensure that the vehicle itself adheres to certain technical standards (e.g. brakes, exhaust fumes) there are numerous regulations and standards which are set out in the:

- Road Traffic Act
- Road Traffic Registration Act
- FAKRA Manual (standards)
- ECE/EEC regulations or the European ECN standard on reducing exhaust fumes from 1993 (the AU II exhaust emission testing will become law on 1.12.1993).

To ensure that statutory regulations are adhered to, testing procedures and bodies have been set up and will assume a monitoring function. There is not enough space to go into further detail here about the individual regulations.

The German Ministry of the Environment is currently preparing regulations on "the avoidance, reduction and recycling of waste arising from the disposal of motor vehicles". The main thrust of these regulations is that:

1. Manufacturers of motor vehicles will be obliged to take back used vehicles and recycle as much of them as possible;

2. The following recycling rates should be achieved:

Material	Recycling in % by weight	
	1996	2000
Steel	100	100
Non-ferrous metals	85	90
Plastics	20	50
Tyres	40	50
Other elastomers	20	30
Glass	30	50

It is assumed that this regulation will enter into force in mid-1993. This will require not only the development of a recycling industry but also a change in the materials used in the motor vehicles in order to ensure their suitability for recycling. The repair shops must be prepared to use other materials and ensure recyclability of the materials during repairs.

This entails extensive continuing training schemes. A license to carry out the exhaust emission testing which will become law on 1.12.1993 for virtually all motor vehicles will only be granted to firms with qualified master mechanics, that is employing at least one master mechanic, and if the master mechanic responsible has taken part in a system-specific training course. Training must be repeated every three years.

The competent application of these regulations and standards and their extension as a consequence of European integration has had a considerable influence on the size of firms in the small firm category. Category 1 firms will probably not be able in future to operate as fully-fledged motor vehicle enterprises.

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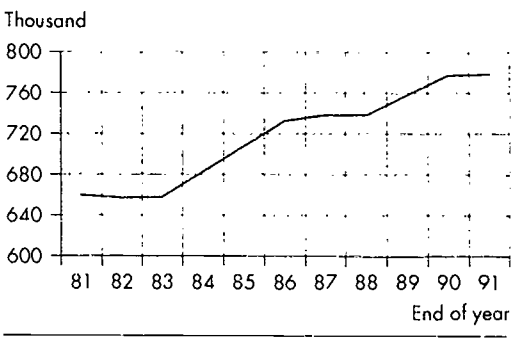
4. EMPLOYMENT TRENDS

4.1 The motor vehicle industry

In the last ten years the number of employees has risen continually (cf. Figure 4.1), i.e. the motor industry in West Germany was not able to meet production growth simply by increasing productivity levels but had to make recourse to extra staff. In 1990 it reached a temporary peak at 780,000 employees and dropped again to 777,000 at the end of 1991. This downwards trend continued in 1992 (September 1992: 765,000) employees, that is 15,000 fewer than a year earlier). In many quarters this is being seen as more than simply the result of the economic situation; many see it as the beginning of a structural crisis in the German motor vehicle industry.

Figure 4.1 – Employees in the motor vehicle industry



Source: VDA

Of these, 765,000 people employed in the German motor industry 27.5% alone work in the area of commercial vehicles. Of these, 85,000 are directly employed in the commercial vehicle industry, 51,000 are in the trailer and aggregates industry and a further 78,000 in companies supplying parts and accessories.

The significance of the commercial vehicle for employment is, however, far greater than these 214,000 jobs directly associated with the commercial vehicle would suggest. Due to the close-knit links within the commercial vehicle industry, another 190,000 people are employed in the areas upstream of commercial vehicle production. In addition to that, there are 200,000 employees who owe their jobs to distribution and sales of commercial vehicles and the knock-on effects of investments in the commercial vehicle industry. Over 600,000 people in Germany thus have something to do with the production of commercial vehicles in the broadest sense of the term production.

The use of these products (repair and servicing, fuel supply, insurance, road construction, traffic control etc.) creates a further 300,000 jobs. Added to that are another 1.6 million people employed by operators of commercial vehicles. With a figure of some 2.5 million people employed – currently almost 8% of the working population of Germany – one in eleven jobs depends on the commercial vehicle industry.

At the same time employment in the East German motor industry has hit an all-time low. By the end of 1990 the number of people employed had already dropped from 127,000 (1989) to approximately 86,000. Factory closures and lower production levels caused further drops in these figures in the months which followed. Despite the fact that West German manufacturers with new works there plan to produce twice as many vehicles as in the former GDR factories, only a little over 40,000 people will be employed in the motor vehicle industry in eastern Germany in the future.

4.2 The motor vehicle repair and sales sector

Numbers employed and size of firms

The number of people employed in the motor vehicle repair and sales sector has dropped from its maximum of 403,900 in 1980 to 357,000 in 1991 (cf. Table 4.1). The lowest point was 335,400 in 1984 and since then the number of employees has risen again slightly. During this time the number of firms rose continually from 34,461 in 1980 to 44,847 in 1991. Thus the average firm size – number of employees per firm – is tending to drop and was 8 people in 1991 and only 7.8 in 1992.

A comparison of the number of firms with the number of employees per firm between 1975 and 1991 reveals opposite trends. The number of firms in this period rose by 52.3% from 29,448 to 44,847 whereas the number of employees per firm dropped by 34.5% from 12.2 to 8.0 – which reflects, amongst other things, the fact that newly set-up businesses are smaller.

A comparison of the number of motor vehicles on the road with the number of people employed in the motor vehicle repair and sales sector shows that since 1949 the figure for the former has increased six times more than the figure for the latter. It is thus no surprise that although the number of vehicles registered is continuing to rise, albeit more slowly, the number of people working in the sector is stagnating and could even drop (cf. Figure 4.2).

As it can be assumed that the number of motor vehicles on the road in Germany has more or less reached saturation point and that car manufacturers are aiming for a further reduction in repair and maintenance work and in costs, a further reduction in the number of people employed is inevitable. BMW estimates are based on an increase in intervals between services for their new models following the introduction of "individual servicing" to an average of 40,000 kilometres. If this goal is attained and if – after a

Table 4.1 – Number of employees *(including owners and trainees)* and average size of business in the motor vehicle sector

Year	No. of employees in 1000s	No of businesses[1]	Average size of business Employees per business
1975	360.1	29,448	12.22
1976	359.9	30,133	11.90
1977	367.9	31,244	11.80
1978	384.0	32,410	11.84
1979	400.9	33,500	11.96
1980	403.9	34,461	11.72
1981	393.9	35,480	11.10
1982	357.5	36,479	9.80
1983	337.1	38,558	8.74
1984	335.4	39,049	8.59
1985	337.7	40,899	8.20
1986	341.0	41,895	8.10
1987	351.5	42,535	8.30
1988	348.8	43,380	8.10
1989	353.4	44,155	8.00
1990	350.9	44,502	7.90
1991[2]	357.0	44,847	8.00

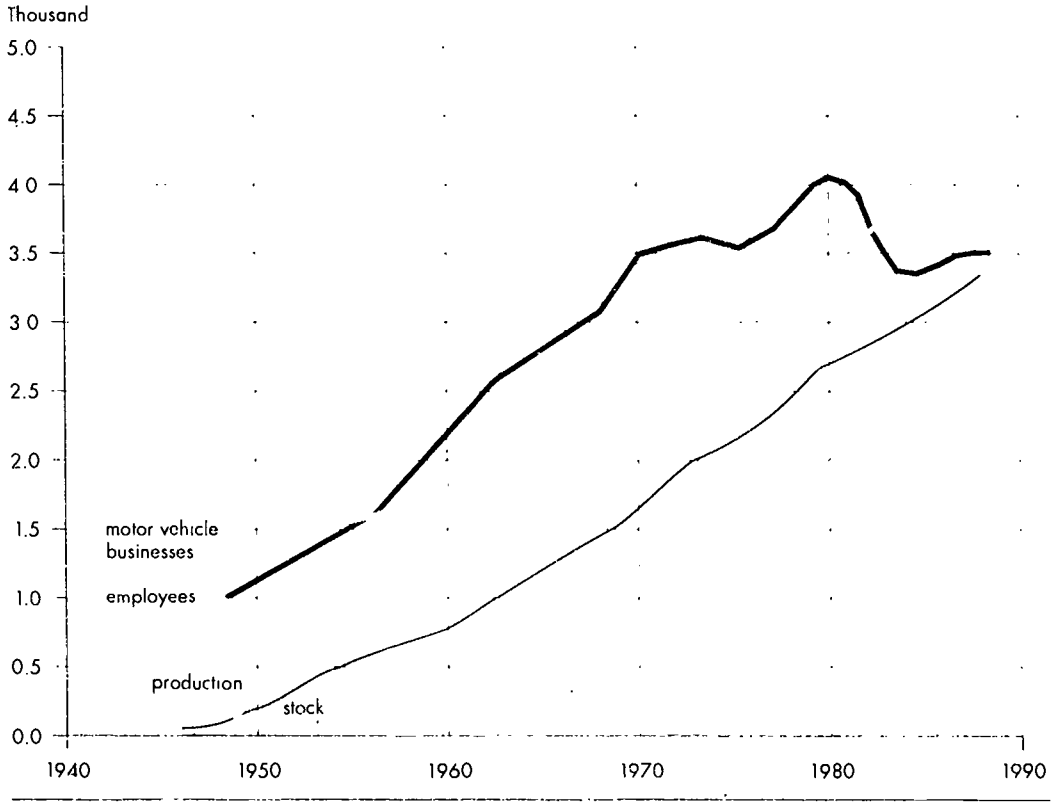
[1] Authorized dealerships/repair shops and independent repair shops including those specializing in automotive electronics. The latter account for approximately 5% of all businesses.
[2] Provisional figures, as of: 1.3 1992
Source: ZDK

corresponding change in the used car market – it affects automotive technology in general, some 30 to 40% fewer people will be employed in the motor vehicle repair and sales sector by the turn of the millennium.

These quantitative trends which have occurred since 1950 reflect qualitative changes in the relation of automotive technology to the work normally carried out on motor vehicles. However, it is not possible to predict precisely at what average size of firm the trend towards smaller firms will stop. The necessary capital investment for equipment does, however, place limits on this. Table 4.1 would suggest a stabilization of the trend at just less than 8 people per firm; a firm which is too small will barely be able to offer a comprehensive range of services which customers on the whole expect: they do not want to have to go with each problem to a different firm. The adherence to an increasing number of regulations and the obligatory participation in training courses in order to be entitled to carry out certain jobs in the repair shop, such as exhaust tests, testing of compressed air brakes, also make a certain size of firm inevitable.

A clear division of work between large and small firms does, however, exist in the field of bodywork firms and paintshops. Smaller firms come up

Figure 4.2 – Trends. automobile production, fleet, firms and employees



cf. Bauner/Zeymer 1991, p. 47

against limits due to the high cost of equipment needed in these fields. For example, 100% of the firms in category V (over 50 employees) and only 10% of firms in categories I and II (up to 9 employees) carry out bodywork which requires special straightening equipment. Rühl et al. (1984) point out that "in the case of difficult mechanical repairs, to aggregates for example, the larger firms still carry out a wider range of services."

On the other hand, the small firms are enjoying a certain popularity with owners of old or used cars. The field of used car repair is tending to expand and the lower overheads which smaller firms have to pay makes it possible for them to constantly step in and fill a gap in the market. For instance, for some 20 years it has not been customary and to some extent it was not allowed for authorized dealerships to carry out engine repairs because the costs of repairs under the terms of the guarantee were clearly higher than the costs of replacing the engine. On the other hand, engine repairs to old and used cars still represent a large part of the work of independent dealerships. Due to the low overheads of the smaller and independent dealerships and the possibility of individual order processing, they have a flexibility which ensures them a considerable share of the market. It is therefore probable that there will be an increased division of labour between the large and small authorized dealerships and the independent dealerships.

Groups of employees

The social structure of the employees in the motor repair sector, which always includes distribution, (age distribution, sex, qualifications, nationality) can only be determined using the National Insurance statistics. These figures necessarily differ from all other figures in this report because not all employees are required by law to pay National Insurance contributions, e.g. self-employed owners or part-time employees or family members with low incomes, i.e. at present less than DM 500 (cf. Table 4.2).

The relatively high proportion of women employed and the clearly rising trend (1991: 18.1%) is striking. They are mainly office workers and wives of the owners of small businesses who carry out administrative but also management tasks; only a small number of women are motor mechanics.

It is also striking that in the period under observation the proportion of unskilled workers has increased considerably (by 37.5%). Thus people in this group are probably employed to clean cars or carry out other menial tasks. This polarization trend – if it continues – will be highly problematic because it reduces the chances of being able to introduce modern organizational concepts (such as the team concept).

The proportion of foreigners employed is relatively low (1991: 5.6%). It will, however, rise in the future because the percentage of foreign apprentices has almost doubled since 1987 (cf. Table 4.3). Between 1987 and 1991 the absolute number increased by a disproportionate 33%. Their integration into initial and continuing vocational training is of particular significance in order to ensure that this group of employees does not increase the proportion of unskilled workers.

The sharp drop in the overall number of apprentices is also striking. This is without doubt due to the general shortage of apprentices, particularly in technical occupations and trades, and the competition on the training market. This trend

Table 4.2 – Employees in the motor repair sector liable for National Insurance contributions

Age group	Total	Women	Foreigners	Engaged in vocational training	Unskilled workers
Under 20	48,427	5,573	4,749	42,970	875
20 – 24	66,318	11,594	3,565	17,677	4,181
25 – 29	48,968	8,535	2,422	1,537	4,228
30 – 34	39,567	6,525	2,039	395	3,225
35 – 39	31,206	5,935	1,621	130	2,441
40 – 44	28,828	6,252	1,539	78	2,095
45 – 49	22,294	5,453	989	57	1,723
50 – 54	21,294	5,273	748	45	2,222
55 – 59	11,436	2,629	415	23	1,608
60 – 64	3,554	515	110	8	474
over 64	875	213	21	1	266
Total 1991	322,767	58,397	18,218	62,923	23,338
Total 1987	299,141	49,120	13,668	73,178	16,968

Source: Federal Institute of Employment
As of 30.6.1987 and 1991

Table 4 3 – Training of foreigners in the motor mechanic trade

	No. of foreign apprentices		
	1987	1989	1991
Total Number	6,125	7,891	9,701
Proportion of total no. of motor mechanic apprentices	7.8%	11.3%	14%

Source: KHKT/ZDK

can to a certain extent be countered by an upgrading of qualified skilled work, by the introduction of the job of service engineer and the opportunities for promotion provided by it (cf. 6.3.4).

More precise figures about the percentage of women motor mechanics are not available. It is, however, very low and is probably less than 1%. The proportion of female trainees in the technical trades has doubled – at a low level – since 1984: from 0.76% (absolute number: 625) in 1984 to 1.55% (absolute number: 996) in 1990. The number of commercial trainees in the motor vehicle sector are available to us but not broken down according to sex. The proportion of female trainees is probably higher (cf. overall figures in Table 4.4).

Table 4.4 – Total number of commercial trainees

Year[1]	Number	Change in %
1984	20,747	– 2
1986	21,027	– 10
1988	18,000	– 14
1989	18,200	+ 1
1990	18,700	+ 3
1991	19,500	+ 4

[1] Data collected in February/March of each year

Source. ZDK

Bearing in mind that the proportion of trainees amongst the under 24-year olds is high, Table 4.2 shows that the work in the motor repairs sector, especially in the mechanics trade, is carried out predominantly by the under 40 age group (on average 13% per age group).

The trade organizations in the motor vehicle repair and sales sector give as the reason for this the high demands and the need for constant continuing training due to rapid technological changes which young people can cope with better. Rauner/ Zeymer (1991) come to the conclusion that professional knowledge has to be completely revised every six years, proof of the high dynamics in this sector. The permanently changing procedures for problem-solving place high demands on the abilities of employees. There are only a small number of repetitive jobs. Older employees do not want to continually have to deal with this situation. We have no answer to the question as to where older employees will be employed in future and what type of work they will do.

People who are familiar with this sector estimate a particularly high fluctuation amongst 25–30 year olds (up to 50%). This concurs with the figures in Table 4.2 which show a marked reduction in the number of employees over 30. Other fields of work which are popular with motor mechanics include stockkeeper, invoice office, driver, used car salesman, fireman, caretaker and in the case of master mechanics, official vehicle inspectors or independent assessors.

In the study, which is now slightly out of date, Rühl et al. (1984, p. 69) categorize staff by professional qualification. This clearly shows the distribution of technical and commercial staff in the sector. The proportion of white-collar workers increases in relation to the size of the firm, whereas no similar increase in technical staff can be identified (cf. Table 4.5).

Table 4.5 – Qualification of personnel by vocational training completed

Number of employees	Master mechanic	Journeymen	Commercial/ technical white-collar workers	Apprentices learning a trade	Trainees in commercial occupations	Other staff
I: 1 – 4	32	32	18	14	–	4
II. 5 – 9	17	36	19	25	1	2
III: 10 – 19	10	36	23	22	4	5
IV. 20 – 49	8	33	25	22	5	7
V: over 50	8	39	27	14	6	6
all firms	11	36	24	19	4	6

Source: Rühl et al., 1984, vol. 2, p 69

5. CHANGES IN THE TYPE OF WORK AND ITS INFLUENCE ON REQUIREMENTS AND TRAINING

The wide-spread introduction of new technical systems into the motor vehicle since the mid-1970s and the rapidly growing variety of models, sparked off by quality-driven competition and an intense customer-based approach, have resulted in a change in the work carried out in the motor vehicle repair and sales sector. This change is described on the basis of the investigation carried out by Rauner/Zeymer (1991) and the findings of our case studies.

5.1 Changes in the work carried out in the motor vehicle repair sector

Table 5.1 shows the distribution of work into four main areas in the firms investigated by Rauner/Zeymer (1991, p. 62f):

- Service, maintenance and repairs in the field of:
- motor mechanics
- automotive electric systems/electronics
- bodywork

The field of motor mechanics was further divided into six areas of work:

- Brakes
- Bumpers
- Exhaust systems
- Gear transmissions
- Engines and engine transmissions
- Clutches

A division into areas of work of this kind permits cross-reference to other studies which have been carried out on the subject of structural change within the motor vehicle repair and sales sector. The further division of work within the area of motor mechanics further facilitates a detailed investigation of the changes which have taken place in skilled specialist work over a long period of time.

If one compares the distribution of work in the dealerships studied, as documented in Table 5.1, with the way the work has developed over the last 30 years it is possible to identify some characteristic trends (Fig. 5.1). It was not until the 1980s that the area of "motor mechanics" dropped to second place (35%) behind the now largest area of work which is servicing (37%).

The shift in emphasis has taken place despite the fact that the intervals between servicing have become longer and the length of time spent on a service shorter due to low-maintenance technology and efficient diagnosis technology. That means that even greater improvements can be expected in the area of motor mechanics and repairs. In the major areas of work: service and maintenance, motor mechanics, automotive electrical systems/electronics and bodywork there has been a shift in workload to servicing and bodywork. The classical emphasis on motor mechanics and automotive electrical systems and electronics has, on the other hand, lost significance.

If this trend is observed over a longer period of time it becomes clear that there has been a fundamental shift in the main type of work carried out in the dealership – even if the specific nature of the work carried out in the four areas is ignored for the moment (Fig. 5.1). The area of motor mechanics, which dominated all others until the 1960s and which at the beginning of this century, in the early days of repair shops for motor vehicles, accounted for 80% of the total range of work, will finally lose its position of dominance in the 1990s. On the other hand, that area of work which was the last to be born, in fact did not emerge until the 1930s, will clearly dominate: servicing as a preventive measure for vehicle maintenance. It is striking, and in the first instance surprising, that growth in the area of automotive electrical systems and electronics in the early decades of automotive technology has been slowing down slightly since the 1960s, although the proportion of electronic components in cars is growing exponentially. The relatively low rationalization potential in the area of bodywork, the number of accidents and the relative rise in the used-car market are the essential reasons for the steady growth of the bodywork field of activities.

If the dealerships studied are compared in terms of size it is noticeable that hardly any of the differences in the range of work carried out have anything to do with size of firm. Striking deviations in the range of work are linked to the make of vehicle or the particular specialization of the firm.

Only when a large random sample was used to investigate differences in the range of work as a function of size of firm were some characteristic differences between small and large firms revealed (fig. 5.2). Motor mechanics is the only field of work carried out by firms of all sizes. In all other areas there is a trend, applicable to a greater or lesser extent, indicating that the larger the firm the more likely it is to offer the full range of maintenance and repair services performed by skilled workers specially assigned to that job. The most evident shift is in the area of body painting. The small firms employing fewer than 9 people carry out this kind of work in less than 10% of cases.

It is particularly interesting that the larger the firm the more likely it is that the area of automotive electrical systems and electronics will be represented but that only 60% of large dealerships employ specialists in this field. A tendency for repair shops to specialize either in motor mechanics or automotive electrical systems and electronics cannot, however, be detected. The fact that not all dealerships have specialists for servicing and maintenance and that here too

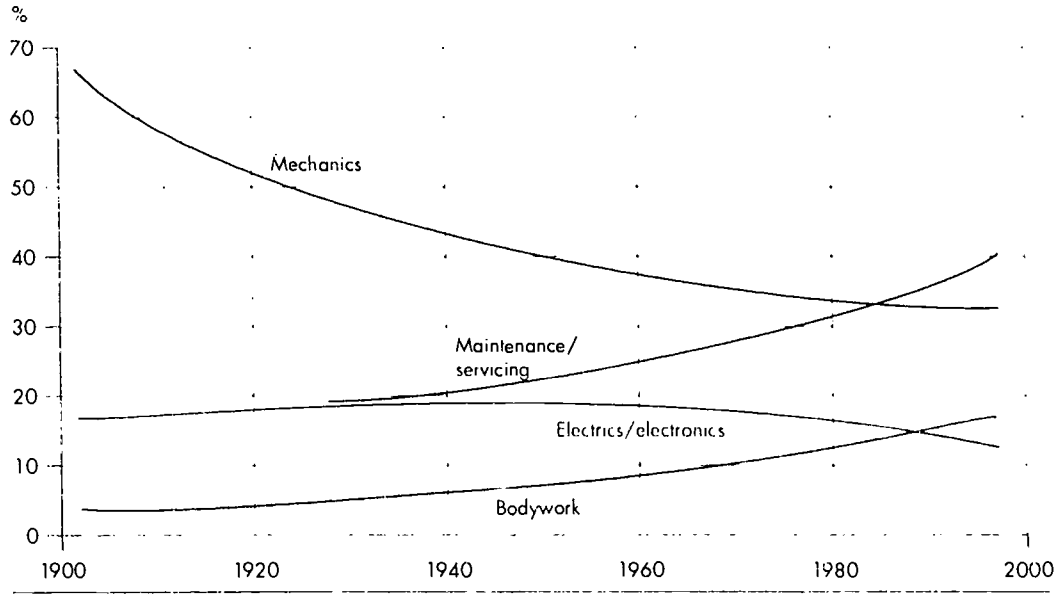
Table 5.1 – Distribution of jobs in the types of repair shop studied *in* %

Size of firm[1] / Jobs	Very small firm (4)	Small firm (7/8)		Small medium-sized firm (16)	Large medium-sized firm (40)	Large firm (55)
Maintenance Service	45	33	33	37	33	38 (28)
Brake repairs	15	12	15	12	8	18 (18)
Bumpers			1		1	2 (1)
Exhaust systems	5	6	8	10	5	6 (5)
Gear systems	5	1	1	3	4	6 (10)
Engine (transmissions)	5	2	2	3	9	4 (6)
Clutches		6	8	10	10	6 (10)
Electrics / Electronics / Systems technology	10	18	14	10	12	12 (14)
Bodywork	15	12 10	18	15	18	8 (8)

[1] Number of employees

Source: Rauner/Zeymer (1991, p. 63)

Figure 5.1 – Trends in distribution of work in the dealership



Source: Rauner/Zeymer (1991, p. 64)

there is a significant difference between them and small firms is also surprising. That does not, however, mean that over 30% of firms in category III (10–19 employees) do not include servicing and maintenance in their range of work. This tendency is clearly a result of less rigid division of labour in smaller repair shops.

The fact that the car cleaning department is proportionately larger in larger firms can also be explained by the used-car business which is also closely connected to sales of new cars. Used cars have to be "put back into circulation" which is why more attention is paid to cleaning used cars. The larger the firm the more extensive their sales of new vehicles and as a rule this is financed by a part-exchange deal on a used car. The preservation of the vehicle's value is reflected in larger firms by the increased emphasis on this work and the larger number of specialized employees.

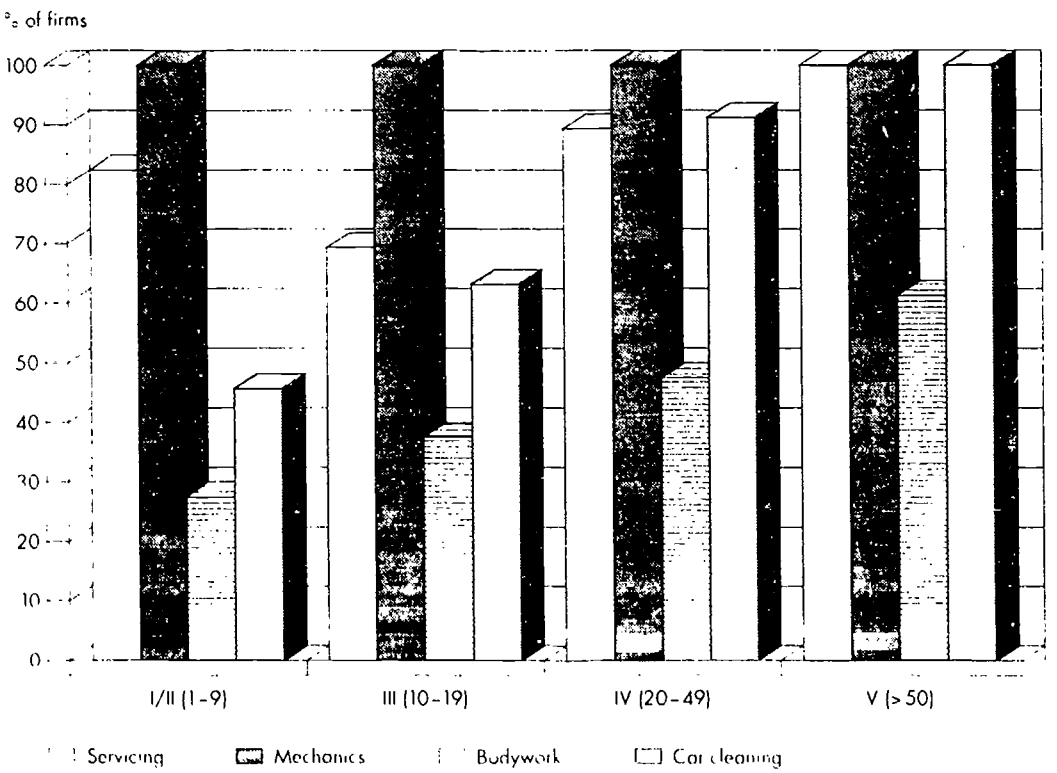
The staff structure in the firms studied corresponds to the generally observed trend. (Figure 5.3)

The relative proportion of staff in the repair shop decreases as the size of the firm increases, from over 80% in small firms to around 50% in large firms. The proportion of commercial and technical employees in the sales and administration departments increases at the same rate (cf. Table 4.5). "It must, however, be taken into account that particularly in firms with fewer than 10 employees there is often no one single person responsible for sales. Often the sales function is carried out either by the owner of the firm, by the foremen who also have administrative duties or by administrative staff." (Rühl et al., 1984, vol. 2, p. 61). "If a further distinction is made according to occupation groups, the results for all firms questioned for the dealership area showed that 79% of repair shop staff were trained as motor mechanics, 8% as auto-electricians, 6% as bodyworkers and 2% as body painters. In many firms the motor mechanics have, however, also participated in continuing training in other areas. They are still officially classed as motor mechanics but are often also skilled auto-electricians, bodyworkers and painters. Especially in small firms they are mainly employed in servicing and repair work and only use their other skills when the need arises. The other 5% are unskilled or miscellaneous employees." (Rühl et al., 1984, vol. 2, p. 70).

Conclusions

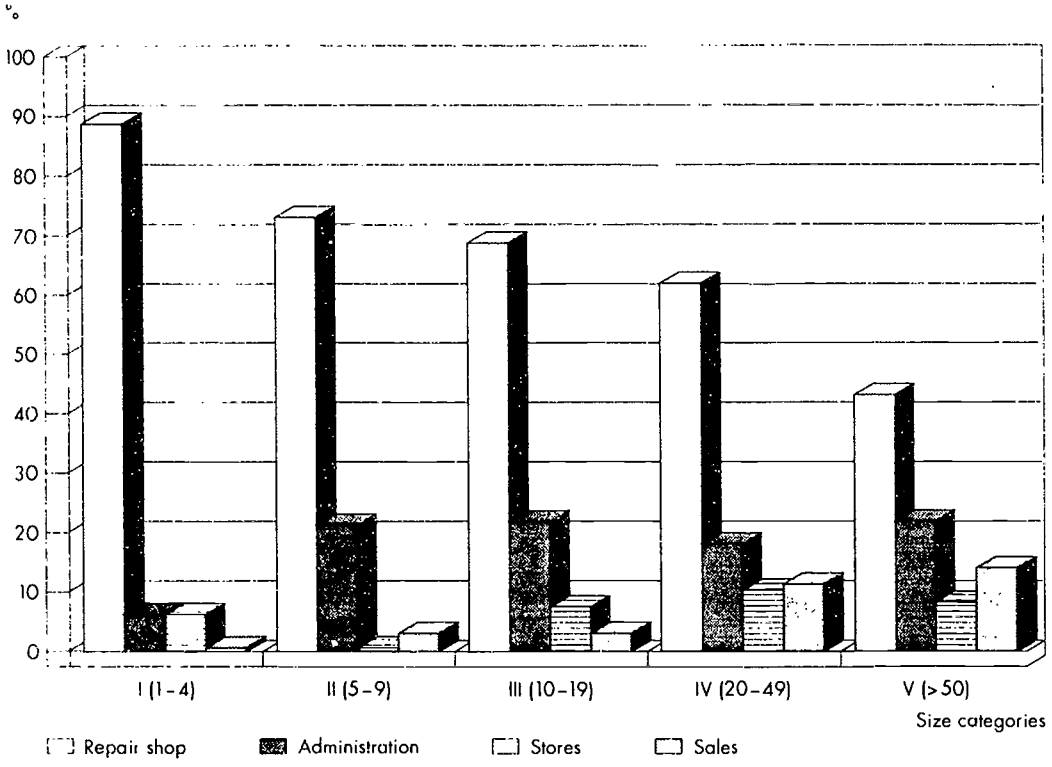
In order to gauge the extent of the change in the nature of work in the motor vehicle repair and sales sector three findings must be interpreted together:

Figure 5.2 – Jobs in firms in the motor vehicle repair and sales sector, studied by size category



Source Rauner/Zeymer (1991, p. 66)

Figure 5 3 – Jobs in firms in the motor vehicle repair and sales sector as a function of size category



Source: Rauner/Zeymer (1991, p 65)

1. The average volume of servicing and repairs per vehicle has decreased six-fold between 1950 and now.

2. This development was accompanied by a shift in areas of work, characterized by a relative increase in the "service and maintenance" and "bodywork" areas and a relative decrease in the motor mechanics and automotive electrics areas.

3. The increasing application of electronics in the motor vehicle industry advanced in inverse proportion to the amount of the work carried out in the field of automotive electrical systems and electronics.

These conclusions show that in the motor vehicle repair and sales sector there has been a far-reaching change in the nature of the work, both for the individual skilled worker and for the firm as a whole. The metalwork and fitting jobs, which dominated clearly in the early days of motor engineering, started to lose significance as soon as a motor repair sector began to crystallize in its own right. Although this area of work, which formerly dominated so clearly, has in the meantime fallen behind the areas of service and maintenance, the traditional image of the motor mechanic is still uppermost in the consciousness of the motor sector. That area on the other hand which at the outset did not even exist in its own right, the area of service and maintenance, has become the dominant area. Service and maintenance fulfil the function today of supporting the motor vehicle sales sector and are only part of the traditional motor firm to a lesser extent.

The change in the nature of work is clearly visible in the modern repair shop. It is now designed first and foremost for diagnosis and servicing and mechanical repair work is only a secondary function. Its significance for the turnover of a motor vehicle firm, particularly medium-sized or large firms, has dropped to a level often not more than 10 to 15%. However, as this study demonstrates, this does not in any way diminish its importance for the smooth functioning of the motor vehicle distribution business.

This in turn is reflected in the composition of employees in the motor vehicle repair and sales sector. In the medium-sized and large firms it is still the case that around 50% of employees are either employed in the repair and servicing department itself or directly responsible to it. A further interim result which should be emphasised is the glaring discrepancy between the electronification of the motor vehicle which is advancing relentlessly and the falling trend of this area of work in the repair shop.

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5.2 Changes in automotive technology and tools

The change in the work carried out in the motor vehicle repair and servicing sector is essentially determined by developments in automotive engineering, the way work is organized in the repair shops and the tools used in them (including testing and diagnosis equipment). The design of the tools used has a significant influence on the forms of work organization in the repair shops and thus on the changes in the work itself. The most dramatic technological change has taken place in the area of automotive electronics. This has of necessity led to the further development of the tools used in repair shops.

The electronic systems for vehicles can be divided into four categories:

- control electronics for the drivetrain
- in-car consumer electronics
- electronic systems for increased comfort and safety
- instruments and display panel

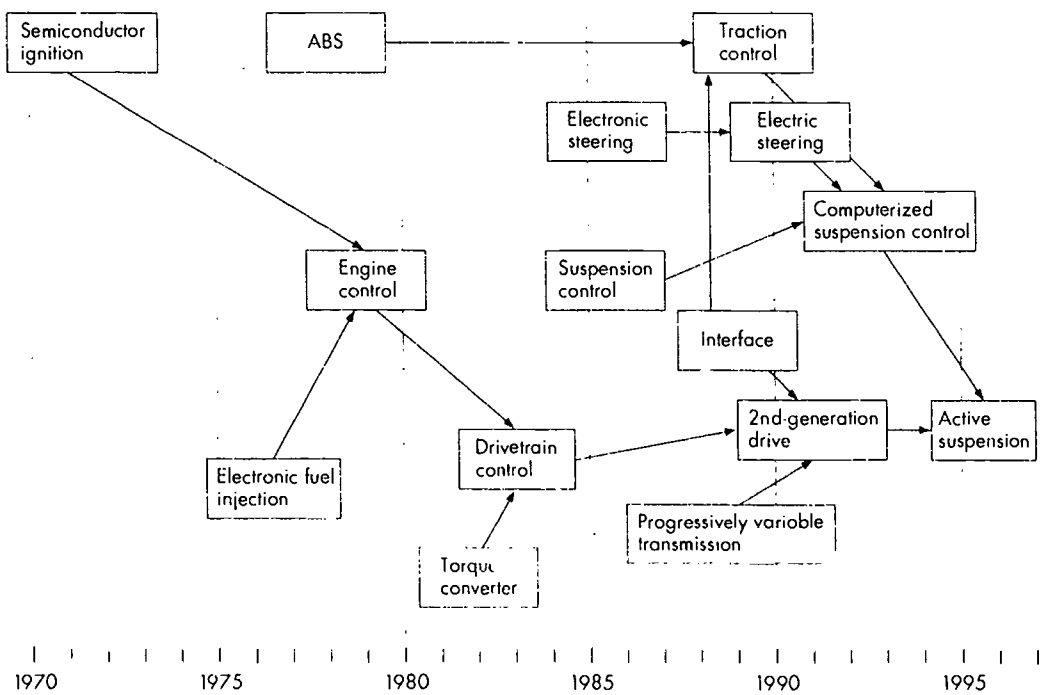
Figure 5.4 illustrates the structural relationship between certain applications and the current trends towards integrated electronics systems. The electronics for the drive train includes all functions which are connected with the control of the engine, such as engine management, electronic ignition and electronic gear control. Audio and other in-car electronics systems, which formerly were confined to the radio, now include cellular telephones, electronic management systems and high-tech sound systems. Variable servo aids for steering, active suspension systems ond anti-blocking systems are some of the components which are now used to increase comfort and safety. In the long term, developments are working towards integration of the individual systems. To perfect data exchange between the sub-systems Bosch has developed the CAN system (controller area network). Data are transferred in a bus using a specific protocol.

But it is not just electronic systems which are bringing about technical changes in the motor vehicle. New materials, complex mechanical, hydraulic and pneumatic systems are also being used and have effects on the qualifications now needed.

Table 5.2 shows the technical and management sectors which are particularly affected by the changes, the effects for the motor repair and servicing sector and the measures which will have to be taken as a result of these changes.

The development of new technology for motor vehicles is always accompanied by the development of new "tools". New mechanical tools need not be discussed here. The focus of attention should be on how the testing systems for:

Figure 5 4 – Trends towards integrated electronic systems



Source. Motorola

- the engine and transmission systems
- the comfort and safety systems
- the engine management systems

are changing. The use of computer-aided testing systems for the engine management systems or laser testing systems for running gear adjustment will soon be part of the normal working day in a repair shop.

The development of these systems for testing engine management systems has also been influenced by the EEC guidelines for exhaust emission testing. The introduction of the exhaust emission test II, which is based on EEC regulations, requires specially designed testing systems. The skilled workers will have to be trained to use these new systems and in particular learn:

- to use the testing systems
- to access the data provided by the manufacturers either on CD ROMs or via o network
- to interpret and analyze the values displayed by the testing systems.

This will lead to a considerable demand for training, which in Germany is required by law in order to acquire the license to carry out these new exhaust emission tests.

5.3 Changes in technology and tools used in the motor vehicle servicing and repair sector and mobility of the labour force

Standardization of automotive technology has been given tremendous impetus due to the influence of rationalization measures in the motor industry, the increase in integrated technology, standardized test procedures for exhaust emissions and brakes and international standards or standards imposed by particular manufacturers. On the other hand, however, the particular philosophies of the individual manufacturers have lead to both products themselves and tools, testing systems, diagnosis equipment, data and the employees having features very specific to the make of vehicle. The conclusion can be drawn that, although automotive technology, that is to say the technological systems and components, is

Table 5.2 – New technology in the motor vehicle servicing and repair sector

	Examples	
Electronic and microelectronic control systems	• Ignition system • Fuel-injection system • On-board computer • Check control • Service interval indicator • Engine management system • Navigation systems • Programmed seat adjustment • Heating control	• Transmission • Four-wheel drive • Running gear • Power steering • Anti-lock braking system ABS • Electronic traction control ETC/ASR • Seat-belt emergency tensioning system • Airbag • Closed-loop-controlled three-way catalyst
New materials	• Plastics Body parts Spoilers Bumpers Interior fittings • Galvanized metal body parts	• Higher-strength steel sheeting • Ceramics Spark-plug insulators Port liners Piston inserts (future) Catalysts Exhaust-gas turbochargers
Complex mechanical, hydraulic and pneumatic systems	• New drive technologies (hydrogen, hybrid) • Multi-valve engines • Superchargers (turbo, compressor) • Automatic transmissions • Infinitely variable transmissions	• Four-wheel drive • All-wheel steering • ABS and ETC/ASR • Shock absorbers (variable) • Conti tyre system • Procon-ten
Effects on technology management	• Market penetration of new technologies Advertising with new technologies among specific categories of buyers Widespread use of catalytic converters	• Disappearance of the second-hand car market with vehicles without new technologies

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	Effects on the motor-vehicle repair and sales sector	Action
Electronic and microelectronic control systems	• Specialist knowledge required in the fields of electronics and microelectronics • New measurement and test equipment required • New computer-controlled test equipment, different for each car model • Many circuits are designed as black boxes and therefore cannot be repaired, only replaced	• Standardization of the interface between electronic control units and computer-controlled test devices • Teaching of fundamentals in the fields of electronics and microelectronics • Instruction in the use of the necessary new test equipment • Provision of information about the state of the art in motor-vehicle electronics
New materials	• Difficulty in identifying the type of plastic • Special repair methods for plastics • Special painting methods for plastics	• Promotion of collaboration between manufacturers and dealerships so that new materials can be repaired correctly • Information and instruction: latest methods of identification and repair
Complex mechanical, hydraulic and pneumatic systems	• Growing range of knowledge • Specialized knowledge required • In some cases special tools required • Modern test and diagnostic technology required	• Initial and continuing training of employees to ensure that their knowledge matches the state of the art
Effects on technology management	• New areas of activity • Possibility of repair by independent repair shops greatly restricted	• Training of employees in the repair of new technologies • Monthly CD-ROM disk providing dealerships with the necessary non-manufacturer-specific data

becoming increasingly standardized, the cars themselves are more varied than ever.

Standardization must be seen, however, in the context of the individual manufacturer. There is no evidence at present of any standardization from one manufacturer to the next. Diagnosis interfaces are not standardized, nor are the diagnosis procedures which are not specific to a particular make of vehicle. For comparable jobs, such as engine testing, different test procedures are used and the surfaces of the test and diagnosis equipment vary from manufacturer to manufacturer.

The result of this development is that within a repair shop the level of skills in using the tools and diagnosis equipment required for different but comparable jobs varies enormously. The extent to which these operating skills can be applied to the apparatus of other manufacturers is limited. Whenever an employee changes job and works on a different make of vehicle his operating skills have to be re-developed in continuous training courses. This requires a high number of training staff, case studies 2 to 5 in particular demonstrate this, who are urgently needed to develop qualifications that can be applied to different work processes and levels of competence in general methods (such as how to carry out a diagnosis) as well as competence and skills in using instruments (such as diagnosis equipment) which can be transferred with ease to other kinds of equipment.

In order to counteract the mobility problems caused by skills which are confined to one particular make of vehicle, we would recommend that diagnosis systems harmonized, which in turn would require standardization of interfaces. On the other hand initial and continuing training courses should focus on teaching skills which relate to general procedures.

Impediments to mobility on the single European market resulting from differences in environmental legislation, licensing requirements for motor businesses owners and language or other barriers cannot be discussed here.

5.4 Organization of work

A further factor influencing the demands placed on skilled workers in the repair shop is the way work is organized.

Rauner/Zeymer (1992) came to the conclusion that the dominant model for organization of work is characterized by a horizontal division of tasks and work, albeit to a degree which varies from case to case. The allocation of jobs to each employee or group of employees is based on the main aggregates of the motor vehicle.

- Bodywork and body painting and
- Automotive electronics

are very stable, well-defined areas of work.

Whilst in the area of aggregates and sub-assemblies used in motor mechanics there is a certain amount of permeability, these two areas of work involve clearly defined, specific jobs. In this automotive electronics, an indispensable part of the increasing integration of systems, requires particularly intensive further training. Often a qualification as mastercraftsman or technician is associated with these jobs. The division of labour within a firm corresponds to the way teaching is organized at the customer service training centres. Regarding which employees take up further training places at the customer service training centres, it is generally true to say that specialists in particular areas attend the corresponding special training classes offered.

In addition to this, at least two other models can be found in repair shops. One is the so-called "all-round model", in which all employees are qualified as all-round mechanics and each mechanic can do each job, the other is the concept which V.A.G. introduced, called the "team concept".

The increased volume of repairs in the urban conglomerations has caused V.A.G. to increase the size of their dealerships carrying out servicing. As a result of this, the system of job-scheduling by the foremen in the repair shops reached its natural limits. A central job-scheduling department was considered the only appropriate response to this development. The separation of reception from the work of the repair shop proved, however, to be a serious disadvantage. This affected the dealerships and the manufacturers at a very sensitive point, namely the lack of contact between customers and repair shop staff which accompanied this development. The so-called team concept was introduced as a response to the problems this posed to successful marketing.

This concept aims to re-organize the dealerships. V.A.G. had realised themselves that there was room for criticism, calling them "repair factories" which had become difficult for the customers to understand. They were thus divided into a number of smaller units (teams). The teams are groups working independently, each responsible for a pool of repair jobs, looking after them from reception to the return of the vehicle to the customer. V.A.G. believes that these teams should be introduced in all larger firms – the authors believe that this should happen in category III firms (20 employees or more). Each team consists of:

- a master mechanic in charge of customer service
- a head mechanic
- three to four mechanics
- two to three apprentices.

The foreman is the head of the team, in charge both of disciplinary action and technical decision-making. He is responsible for job reception, job scheduling, technical advice and team leadership as well as final checking of the vehicle and returning it to the customer. The head mechanic is his deputy. 15 to 17 jobs are dealt with by the team each day.

The changes in organization of work or the introduction of an entirely new organizational concept is, as organization trends in other areas have indicated for a long time, a task which can only be solved if it is accompanied by relevant further training for employees and if those involved are brought into the process very early on and in an intensive way. It must also be said that it did not meet with unqualified acceptance in all firms. An example of this can be seen in the V.A.G. case study – case study no. 5. It will only be possible to stabilize this forward-looking development if firms are given a high degree of support in these organizational processes from:

- manufacturers and their customer service training centres
- programmes for relevant experiment and introductory trials on a national and EEC level
- economic programmes and programmes of action and also employment and technical programmes initiated by the federal states.

Of course, an innovation of this kind which affects both competition and the labour market depends on a high standard of initial and vocational continuing training.

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6. INITIAL AND CONTINUING VOCATIONAL TRAINING IN THE MOTOR VEHICLE REPAIR AND SALES SECTOR

6.1 The organizational basis required for school and vocational qualifications in Germany[3]

To facilitate understanding of continuing training strategies in this sector we shall first of all describe the essential features of the German school system and vocational training system (cf. Figure 6.1).

The German system is essentially a three-tiered system, i.e. put simply, there are three types of school: the Hauptschule (9 or 10 years compulsory attendance depending on the particular federal state), the Realschule (10 years) and the Gymnasium or Gymnasium stream of the comprehensive school (13 years).

The Realschule leaving certificate and a certain type of Hauptschule leaving certificate open the way to a range of vocational schools, further education colleges of a general nature and specialist institutes of higher education. The Abitur (leaving certificate from a Gymnasium) is the university entry requirement.

In recent years vocational training has increasingly become a minimum requirement for entry into working life. Nearly all young people attempt to undergo some form of vocational training in schools, colleges or their workplace; the proportion of those who attain no vocational qualification has dropped to less than 10%. Around two-thirds of young people in a given school year receive vocational training at the workplace.

Access to careers with in-house training is in principle organized in such a way that it is open to all pupils leaving a Hauptschule. In practice, however, the situation is increasingly such that careers with vocational training, particularly the more popular ones, are being taken by pupils from Realschulen or those who have passed their Abitur. The main reason for this is that the general level of education of all school-leavers has risen enormously over the last 20 years. A "downward trend" began which severely reduced opportunities for pupils from Hauptschulen. Whilst in former times it was virtually only school-leavers from Hauptschulen who went into vocational education, now only 40% of trainees in the dual system belong to this category. Pupils leaving Realschulen and young people with Abitur qualifications now occupy the majority of training places in firms. A large number of school-leavers with Abitur decide to combine vocational training with university studies which gives them good prospects of promotion to management positions. Many companies have developed their own training schemes for this group of school-leavers.

6.2 Legislation governing vocational education

Since 1969 vocational training has been regulated by the Berufsbildungsgesetz – BBiG (Vocational Education Act). This act stipulates basic requirements for vocational training, further training and re-training. Vocational training must provide broad, basic vocational education and specialist training and facilitate the attainment of work experience. It must also teach the specialist skills and knowledge needed to carry out a skilled job.

The purpose of further vocational training should be to preserve or expand the knowledge and skills acquired or to adapt them to new technological developments. It should also facilitate promotion possibilities. It therefore includes further training with adaptation goals and promotion goals.

The main feature of vocational training in Germany is that it takes the form of in-house training (on the job, in teaching workshops or offices or in training centres outside the company) accompanied by attendance at a Berufsschule (part-time vocational school). This is known as the "dual system". The educational regulations which govern the in-house part of the training apply on a nationwide basis whereas the curricula for the vocational schools are drawn up by each German state (cf. figure 6.2).

Since 1969 the Vocational Education Act has created a statutory education ordinance for all occupations. It stipulates for each individual occupation what subject matter must be taught in the firms within what time frame and is constantly updated in line with changing demands. The education ordinances contain a framework curriculum, which is co-ordinated at federal level by the Kultusministerkonferenz – KMK (Conference of Ministers of Education and the Arts) in order to ensure a minimum of uniformity for all educational requirements. The individual German states base their curricula on this outline curriculum and often simply adopt it without change. These education ordinances draw up minimum requirements applicable to in-house training. They are open to new technological and organization developments. The firms themselves can also provide training for additional qualifications. The private training contract can formally – within the limits of the legal regulations – be designed at will, but in practice model contracts drawn up by the competent authorities are normally used which closely follow the stipulations of the Vocational Education Act (cf. Figure 6.3).

[3] This section has been taken from the Force Sector Report by G. Kühnlein. "The retail sector in the Federal Republic of Germany" (sfs).

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Figure 6.1 – The German School System

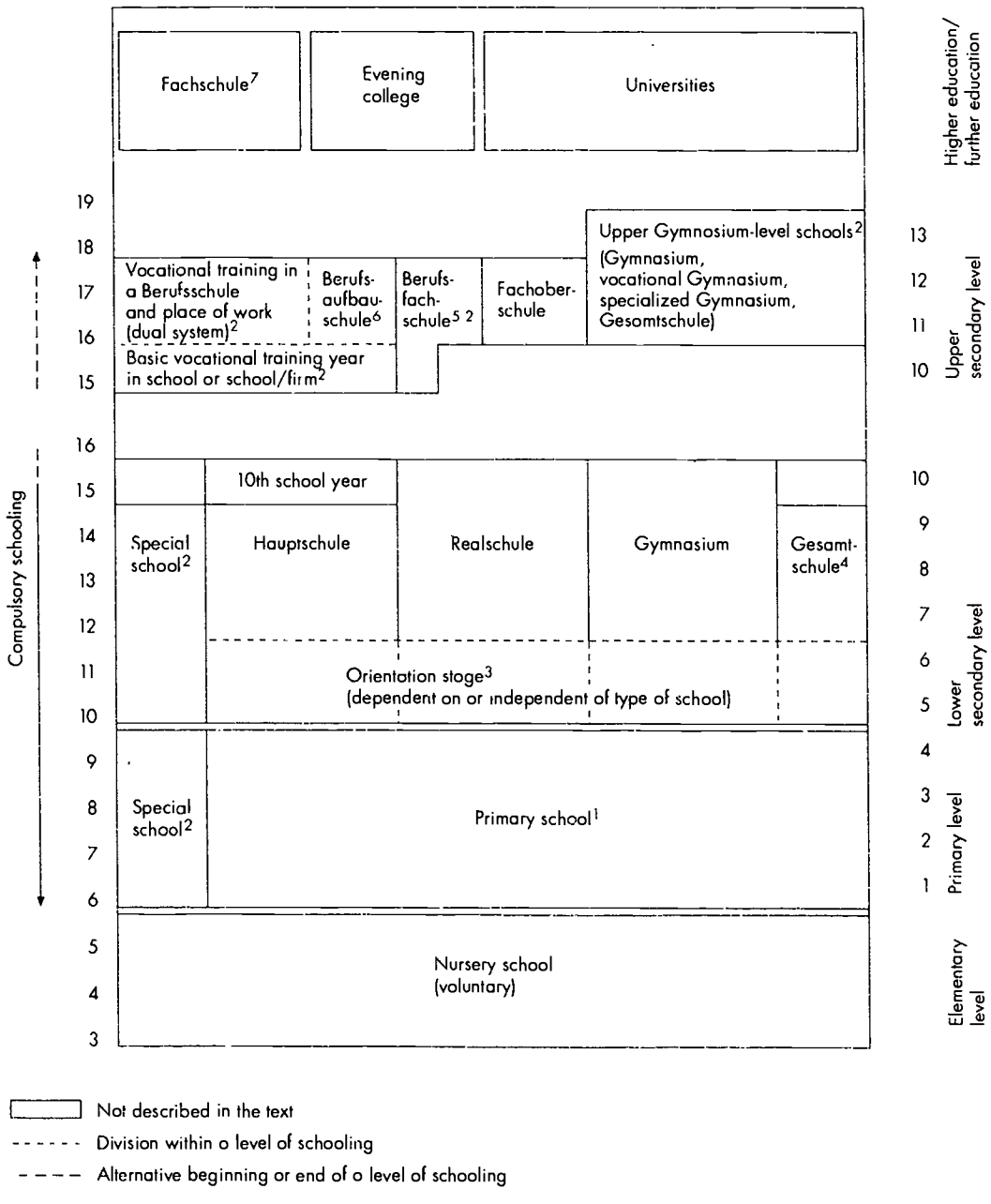


Diagram of the system as of September 1990. Within the limits of this basic structure there are some deviations in individual German states. Since the reform process has not yet been completed the educational system in the five states of former East Germany which became part of the Federal Republic of Germany on 3rd October 1990 have not been included in the diagram.

[1] There are different types of arrangement for the transition from nursery school to primary school in the individual states (pre-school classes, nursery classes). In Berlin primary school education lasts for six years and there is thus no orientation stage.

[2] Education for disabled children in special kinds of general and vocational schools according to the kind of disability.

[3] In all individual states with the exception of Bavaria where the orientation stage is being tried out (5th and 6th year primary school).

[4] In some states a standard form of schooling which co-exists with the Hauptschule, Realschule and Gymnasium; in other states it is an optional kind of school, pilot school or combination of schools.

[5] Full-time vocational schools with different admission requirements, duration of training and final examination.

[6] Part-time in parallel to or full-time on completion of the Berufsschule

[7] Duration of 1–3 years.

Source: Eurydice/CEDEFOP 1991, p. 40

1.

The education ordinances for the individual occupations are issued by the federal Minister responsible for that particular field of work. The education ordinances are prepared by expert representatives of labour and management with the participation of the Bundesinstitut für Berufsbildung – BIBB (German Institute for Educational Training).

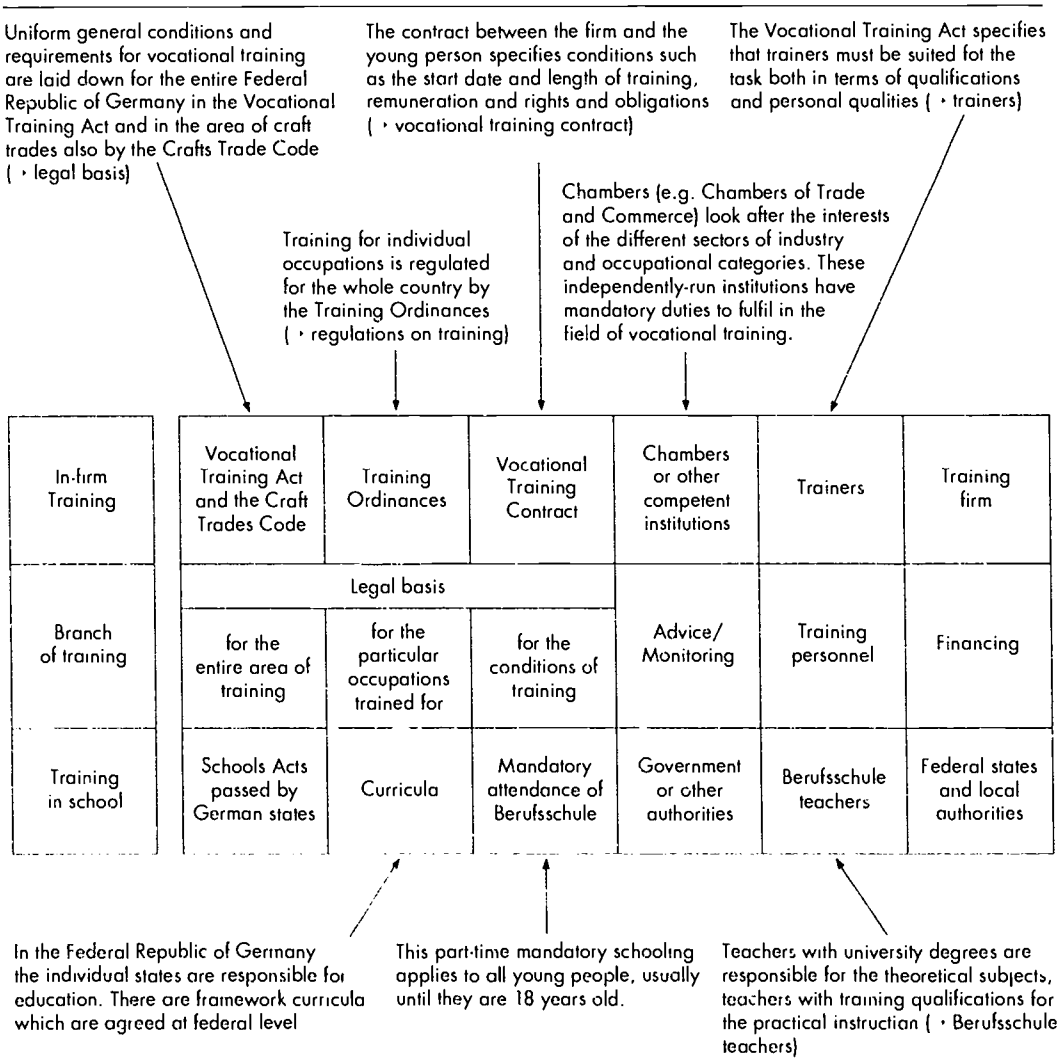
The BIBB consists of an equal number of representatives of employers and employees (trade unions) and of representatives appointed by the German states and the German government. At regular intervals it reviews whether the education ordinances continue to reflect the reality of education and modern vocational requirements. Most occupations have been re-organized in recent years.

The control of in-house education is transferred to the responsible authorities, i.e. the self-administration organs of industry (such as the Chambers of Industry and Commerce or the Chambers of Trades). Article 45 of the Vocational Education Act stipulates that they have the particular responsibility of monitoring the implementation of vocational training and promote this by counselling apprentices. The implementation of the vocational training takes place in the firms themselves.

Unlike the initial vocational training, only particular areas of continuing training are regulated in Germany. Only those parts of continuing training and re-training schemes which terminate with an examination are covered by the Vocational Education Act (Articles 46 and 47).

The most important part of continuing vocational training, in-house continuing training (which accounts for over half of all continuing training activities), is, on the other hand, subject to very few regulatory measures. There are no comprehensive curricula developments. Here too, the regulations on further training apply only to that

Figure 6.2 – Structure of the dual training system



part of continuing training in the firm which leads to a new vocational qualification with a recognized certificate (e.g. mastercraftsman, technician).

Apart from that, the firms make their own decisions about courses, the criteria for selecting employees to participate in in-house continuing training and how the courses taken affect the further career of an employee within the firm (cf. Kühnlein G./Paul-Kohlhoff, A., 1991).

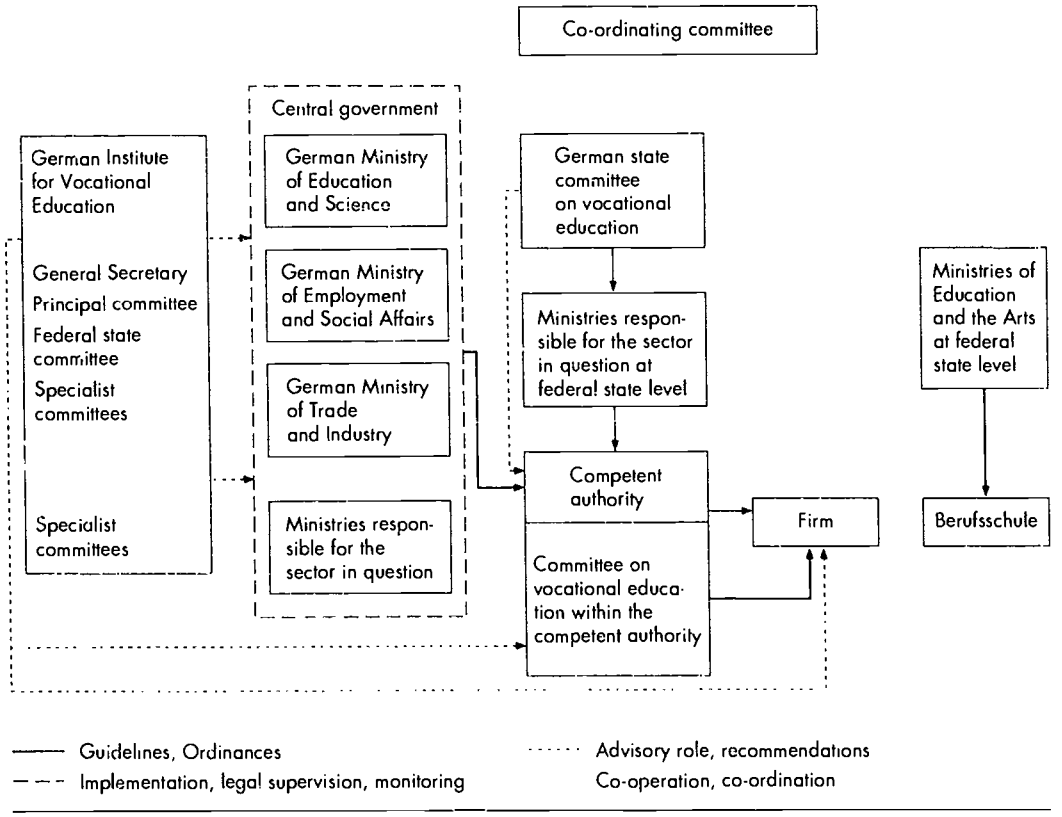
Whenever firms consider continuing training courses to be necesscry for an employee to enable him/her to fulfil the requirements of their job, the company usually finances either a large part or all of the continuing training. The time is also counted as part of the working hours.

The money spent by firms on continuing training is very difficult to estimate because there is no generally applicable basis for calculation. The Institut der Deutschen Wirtschaft (German Economics Institute) has calculated that in 1987 alone industry spent over DM 26 thousand million on continuing training. Other experts consider this figure to be a wild exaggeration[4]. It does, however, clearly demonstrate the great significance which companies have been attaching in recent years to the qualification of their employees. Virtually all companies, 92%, stated in the IDW study that they carry out or make available further training schemes (R. Weiss, 1990). In terms of the participation of certain groups of employees in vocational continuing training, the following trends must be mentioned:

- Generally speaking, the significance of continuing vocational education has increased dramatically in recent years: 18% of Germans were involved in some form of further vocational training in 1988, which is double the figure for 1979, i.e. ten years previous.

- A disproportic nately high number of management and academic staff are involved in continuing vocational training. Qualified white-collar workers take part more frequently in continuing training courses than skilled workers. Involvement is lowest amongst semi-skilled and unskilled workers (in 1988 only 6% of "simple workers" took part in continuing education). The gulf between the individual groups of employees has tended to become wider rather than narrower in recent years.

Figure 6.3 – The legal and organizational structure of the vocational training system



4 For more details see Kühnlein G./Paul-Kohlhoff, A., 1991, p. 11ff.

- The involvement of women in continuing vocational training is lower than that of men. This particularly applies to those courses needed to gain access to promotion, that is courses and schemes lasting several days or several weeks.

6.3 The system of continuing vocational training and its implications

As has already been mentioned above, vocational training in Germany is regulated by the Vocational Education Act (BBiG). Article 1 of this act defines the scope of the act. As stated in this article it covers:

- university degree courses
- school courses which come under the jurisdiction of the federal state school legislation and
- vocational education, in so far as it is carried out in an employment situation governed by public law.

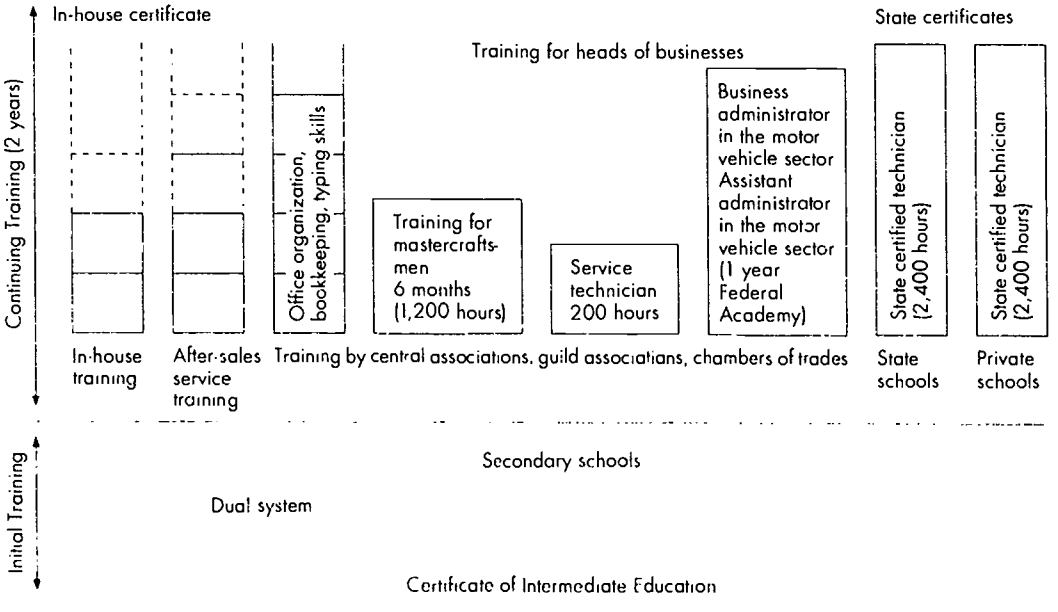
Vocational education as defined by this act includes initial and continuing vocational training (Article 3). Article 1, however, excludes an important component of vocational education in the dual system from the regulations of the BBIG, namely the Berufsschule. The Berufsschule is subject to the schools legislation of the individual German states. This act also regulates continuing vocational training (Article 46). Article 46 is the basis for numerous activities in the field of continuing education today, which were initiated by labour and management but are not connected to the state school system, and are therefore quite separate from the vocational education in state schools.

The whole range of continuing vocational education is shown in Figure 6.4 with a small degree of differentiation. Even this shows that a wide variety of continuing education activities exist besides that which is offered by the state schools. Essentially there are six pillars which continuing training in the motor vehicle repair and sales sector rests upon:

1. Customer service training centres and in-house training
2. Meisterschulen (mastercraftsmen schools) and Technikerschulen (technical schools) for the trade (Guild Associations and Chambers of Trades)
3. Academies and Bundesfachschulen (Federal Vocational Schools) run by the regional Associations of Guilds, the ZDK, and the Chambers of Trades (training courses in business management and organization systems)
4. State Technikerschulen (technical schools)
5. Private and semi-private facilities aiming to train technical or managerial staff, business administrators etc.
6. Courses offered by the Chambers of Trades (office organization, bookkeeping, word processing).

The individual institutions differ considerably in their general objectives, recognition of certificates, training activities, extent of training offered, and importance, measured in terms of how

Figure 6.4 – Overview of main areas of continuing education in the motor vehicle repair and sales sector (ITB)



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many people they train. This is discussed below in greater detail.

Nevertheless, all institutions have in common that they are based on a remit to provide vocational training within the dual system, regardless of whether that be continuing training in the technical, commercial or management field. There are virtually no exceptions in the technical field. At management level, however, more and more employees in larger firms have not completed their vocational training in the dual system but at a college or university.

The entrance requirements, however, also differ from one institution to another and from one training programme to another – work experience, courses already attended, approval of the firms etc. The admission requirements to individual programmes vary from one year to six years work experience.

6.3.1 Participation in continuing vocational education

The BiBB carried out a survey on participation in continuing training courses in the motor vehicle repair and sales sector. Its results indicate that works managers and other employees in motor vehicle firms have participated in a large number of continuing training courses. The motor vehicle repair and sales sector is the leader in this amongst all the trades classed in Germany as craft trades.

In terms of the extent of the continuing training and the areas focused on, the figures in Table 6.1 show clearly that the majority of courses lasted several days and there were also a large number of 1–2 week courses. The main place where the courses took place (65%) were the manufacturers' customer service training centres (cf. 6.5). The remaining 35% of courses were distributed amongst the group training centres (11%), specialist vocational schools (Fachschulen) or schools for mastercraftsmen (Meisterschulen) and others. These training facilities are described in the sections below.

Table 6.1 – Length of attendance in continuing training courses

	Days spent in continuing training Heads of businesses (%)	Days spent in continuing training Employees (%)
Less than 1 day	14	6
1 – 6 days	49	28
1 – 2 weeks	28	25
2 weeks to 1 month	7	29
Over 1 month	(1)	12
Firms questioned	489	567

The owners and staff of the 799 firms surveyed attended the courses listed in Table 6.2:

Table 6.2 – Subject matter of the courses attended

	Owners	Employees
New technology	9	20
Courses for technicians and master mechanics	3	7
Other specialist courses	27	48
Data processing courses	14	22
Bookkeeping courses	5	13
Purchase	2	5
Distribution/sales/marketing	25	19
Management	21	7

6.3.2 Continuing training for staff employed in independent dealerships

The problem of continuing training is particularly acute for the employees of independent dealerships. If these dealerships want to survive they need people to service and repair the vehicles in use today. They cannot make use of the continuing training courses offered by manufacturers because they are not eligible for them.

Employees of independent dealerships can make use only of courses offered by component manufacturers such as Bosch, ATE, SKF etc. (cf. also Case Study No. 1 – Independent Dealership). They can also participate in courses offered by state-run continuing training centres or the Chambers of Trades, guilds and crafts academies. Fees for these courses are, however, normally quite high whereas manufacturers have not so far required their dealers to pay anything for the courses at their customer service training centres. These courses normally provide a basic level of qualification but are less directly tailored to the immediate needs of the dealerships than is the case with the customer service training centres run by manufacturers.

6.4 State and state-approved Technikerschulen (technical schools)

There are at present only six state and state-approved Technikerschulen (technical schools) operating in the Federal Republic of Germany. Two of those opened in the last two years. An average of 350 technicians are currently being trained. The number of students applying is not very high. Table 6.3 gives an overview of the technical schools and student numbers. This shows clearly: the state and state-approved technical schools in the motor vehicle repair and sales sector do not play a very important role, neither in terms of quality nor quantity.

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Evidently firms in the motor vehicle sector have not been quick to recognize students from technical schools. There are many different reasons for this. Small firms are organized in such a way that they predominantly need people with a good deal of "practical training". An education at a technical school does not necessarily provide this.

The curricula of the technical schools are structured on the basis of subjects and a high proportion of their teaching focuses on basic knowledge and metallurgy. The specific relevance to the motor vehicle sector is thus quite low. This is reflected in the timetables (cf. Table 6.4). There are no essential differences here between the state and the state-approved schools.

The entrance requirement for the technical school is the Hauptschule leaving certificate, vocational training in the motor vehicle repair and sales sector, and two years work experience.

6.5 Continuing training outside the state schools

Outside the state or state-approved schools numerous continuing training courses are offered in specific subjects such as technical skills, company administration, after-sales management, behaviour when dealing with customers, service and sales. They are mostly organized by the Chambers of Trades and guilds of the motor vehicle sector or the numerous privately run academies.

The manufacturers' customer service training centres, Meisterschulen and the training scheme for service technicians also fall into this category.

6.5.1 Mastercraftsman training

The mastercraftsman training in Germany has a long tradition. It evolved out of the medieval guild system. Today it is regulated by the Ordinance on Mastercraftsmen in the Motor Vehicle Sector under the responsibility of the Federal Ministry of Trade and Industry (last ordinance issued on 18 August 1988). A distinction is made in the training between a mastercraftsman in the field of motor mechanics and electronics. The mastercraftsman diploma entitles the holder to run a recognized motor vehicle repair and distribution business.

Table 6.3 – Overview of state and state-recognized Technikerschulen in the motor vehicle sector

Name		Admissions per		Drop-out rate	Comment	Run by	Certificate
		1/2 year	Year				
Rheinische Technikerakademie Köln e.V.	FT[1]	FT 40		approx. 10%	Figure constant for 5 years	Non-profit making organization (state recognized)	State approved
Fachschule für Technik Köln	PT		PT: Formerly 64 From 1993: 96	approx. 10%	Figure rising	State	State approved
Fachschule für Technik Essen	FT PT		FT: 70 PT: 55	approx. 20% approx. 30%	Figure constant	State	State approved
Westfalen-Technikum Dortmund	FT		FT: 60		Figure constant	Limited company (state recognized)	Private but state approved
Staatliche Fachschule Technik Saarbrücken							
Ferdinand-Braun-Schule Fulda	FT		FT: 20 since Sept 92	approx. 20%	Bodywork and vehicle technology (newly set up in 1991)	State	State approved
Berufsbildende Schule Germersheim	FT		FT: 30 (PT: 28)	approx. 15%	Newly set up in 1990; no more part-time applicants.	State	State approved
Total	379						

[1] FT: Full-time; PT: Part-time

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Table 6.4 – Timetable for technician's training in automotive engineering *(Full time course)*

Subject	1st year basic level	2nd year advanced level	Total no. of hours
	No. of hours based on 40 teaching weeks a year	No. of hours based on 40 teaching weeks a year	
Scientifically-based working methods	40	–	40
Mathematics	280	–	280
Basics of data processing	80	–	80
Experimental physics	120	–	120
Statics and dynamics	120	–	120
Strength of materials	80	–	80
Chemistry	80	–	80
Materials science	160	–	160
Technical drawing/descriptive geometry	120	–	120
Electrical engineering	120	–	120
Measuring technology and control engineering[1]	–	120	120
Basics of mechanical engineering	–	120	120
Design and calculation	–	200	200
Machine tools and processes, bodywork[1]	–	200	200
Combustion engines[1]	–	120	120
Vehicle technology[1]	–	120	120
Automotive electrics[1]	–	120	120
Work scheduling	–	120	120
Occupational sociology/labour law	–	80	80
	1,200	1,200	2,400

[1] Written examination required

The main subject of the ordinance is the job outline and examination requirements. The main areas covered in the job outline are listed below (Figure 6.5) in the form of key areas. These key areas and the number of hours also describe the courses which prepare for the mastercraftsman examination at the Meisterschulen.
Further details on the mastercraftsman examination are set out in the Craft Trades Code (Articles 45–51). The entrance requirements are important:

People who:
- have passed a journeyman's examination and
- can prove that they have worked at least three years in the trade in which they wish to take the mastercraftsman examination

will be admitted to the examination.

Figure 6.5 – Main subjects studied in the master mechanic training

	Number of hours	
	Mechanic	Electrician
Running gear technology incl. car brakes	80	80
Commercial vehicle brakes	80	80
Aggregate technology (power transmission)	60	60
Combustion engines	100	100
Diesel engines	80	80
Bodywork	80	40
Paintwork	40	–
General electrical engineering, automotive electrics/electronics	80	160
Electronic systems in vehicles	40	120
General hydraulics and pneumatics	60	60
Materials science	80	80
Welding, soldering, adhesion techniques	80	–
Business organization, guidelines for places of work	80	80
Business studies	120	120
Road traffic licensing regulation	60	60
Environmental protection	80	80
	1,200	1,200

rce: Gemeinschaftsinitiative 1992

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The title of mastercraftsman enjoys high recognition in the motor vehicle sector. Virtually all positions in middle management are carried out by master mechanics and they have a broad range of responsibilities in the firm. If the master mechanic is not also the owner of the firm he can carry out the function of head of the repair shop, after-sales manager, sales manager or general organizer. He is responsible for job processing, organization of workloads, after-sales, staff management, general management, sales etc.

The profile of the mastercraftsman in the motor vehicle sector and the programmes designed to train people for the job is based on this broad range of requirements. On a full-time course the trainee master mechanic will participate in 1,200 hours of training in just under six months whereas the technician mentioned above has 2,200 hours spread over two years. An exclusively technical training would be inadequate. He is also required to carry out management functions and thus needs managerial skills. The job outline is based on this broad-based qualification. If an attempt were made to put a figure on it based on the number of hours in the curriculum, about 28% of the training is concerned with managerial and other general aspects, whereby special training in staff management, after-sales and sales play only a small part.

The mastercraftsman training courses which take the form of continuing training have two main features:

a. The subject matter taught has a clear vocational orientation (see the overview in Figure 6.5) and is not linked to any particular make of vehicle
b. The practical part of the training is 50%

The number of trained master mechanics has been steadily rising in recent years (cf. Table 6.5). In the meantime there is a surplus of trained master mechanics. Many of them set up their own small businesses, others work as foremen in repair shops (experts estimate that this applies to about 15 to 20%) and are responsible for more high-level servicing and repair work. When vacancies arise they often either become manager of the after-sales department or the repair shop or they become assessors.

People interviewed for the case studies said that master mechanics in firms make an important contribution to maintaining the high level of qualifications and improving the communication between the repair shop and the customer.

6.5.2 The non-state training for technicians in the motor vehicle repair and sales sector

There are a number of forms of training for technicians in the motor vehicle repair and sales sector, apart from the state school training already mentioned:

a. Training as a service technician, initiated by the ZDK, VDA, and VDIK in September 1992,
b. Training as a diagnosis technician – and comparable levels – in the manufacturers' customer service training centres,
c. Initiatives on the part of the ZDK and trade union (IGM) to modify the service technician training (point a) and acquire state approval for it.

Models a. and b. are described below. Model c. is still in the stage of preliminary discussion which is why no further reference to it is made.

Motor vehicle service technician

The service technician training is a form of continuing training which was launched by the Verband der Automobilindustrie – VDA, (Association of the Automobile Industry), the Verband der Importeure von Kraftfahrzeugen – VDIK (Association of Motor Vehicle Importers) and the Zentralverband Deutsches Kraftfahrzeuggewerbe – ZDK (Central Association of the German Motor Trade). The aim of this continuing training is to create a qualification level between the mastercraftsman diploma and the skilled worker/journeyman certificate. In terms of the extent of the technical training there is little difference between the

Table 6.5 – Master mechanics/auto-electricians trained between 1984 and 1990

Year	Motor mechanic		Auto-electrician	
	Passed	Failure rate	Passed	Failure rate
1984	3,673	30.4%	244	18.1%
1985	4,177	27.3%	290	27.5%
1986	4,207	29.4%	294	20.1%
1987	4,303	30.0%	342	30.8%
1988	4,544	29.7%	374	23.2%
1989	5,092	27.0%	385	20.0%
1990	4,890	27.0%	401	20.0%

Source: DHKT

As of 30.12.1990

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service technician and the mastercraftsman training.

The associations list the following motives for initiating the service technician training schemes:

1. The development of the new Training Ordinances for motor mechanics and mastercraftsmen in the motor vehicle sector demonstrates the dichotomy in the repair shop. Next to a mechanic with a basic training in automotive engineering is a master mechanic who is mainly involved in middle-management tasks.

   The basic training is not sufficient to enable the mechanic to reliably service and repair newer "vehicle systems" and the master mechanic does not have enough time to solve the detailed technical problems.

2. There is not enough new blood in the sector. The younger generation are not motivated because of a lack of career prospects, promotion opportunities and pay incentives.

3. The job of motor mechanic is not attractive enough to graduates of higher schools such as the Realschule or pupils from equivalent types of educational background.

As a consequence of this the idea of setting up a training system for service technicians had three main aims:

1. To create a pool of newcomers to the sector who are technically better qualified than those produced by the current vocational training system.

2. To create a pool of technical experts who have as extensive a technical training as the master mechanic but work in the repair shop only.

3. To open up career opportunities for motivated young people who have just finished their initial training, in order to reduce the loss of particularly capable skilled workers to other sectors.

This continuing training is carried out in the vocational training centres of the craft and at the manufacturers' after-sales centres.

The requirement for the service technician training is vocational training in the vehicle repair sector. This includes motor mechanics, auto-electricians, motorcycle mechanics, car mechanics and body-workers. No additional work experience is required.

The firm may assume the costs of this training if it has a vested interest in the continuing training schemes. If it is purely in the interest of the individual wishing to improve his career prospects he will have to finance himself.

The key areas of subjects in this continuing training scheme are:

- Service – communication
- Basics of motor vehicle engineering
- Basics of automotive electrical systems and electronics
- Fuel induction/ignition
- Comfort and safety electronics
- Diagnosis

These subjects are taught for a particular make over a total of about 200 hours. Table 6.6 shows the structure of the subjects using the example of two makes of car. This training has a clearly technical orientation and is not very extensive at 200 training hours. The link to a particular make of vehicle reduces the extent of training required in that it is only necessary to deal with the special features of that particular make. However, the planners belief that there would be no problems in transferring the material learnt to other makes has remained an unconfirmed hypothesis. The material taught during the continuing training has been organized into uniform modules which are then "tuned" to fit each specific firm.

The training can be undertaken over a period of up to three years. It ends with a final examination. If the candidate passes he gains a certificate jointly awarded by the ZDK, VDA and VDiK. The final examination includes a written and a practical test. During the practical test, diagnosis and measurements on at least three different systems of automotive electrics (e.g. ABS, Motronic, level regulation) should be carried out. The practical diagnosis in the final test is considered to be more important than the theory. (Table 6.6)

The salary of the service technician corresponds to the level of continuing training and the formal grading of the job between journeyman and mastercraftsman (cf. Figure 6.6). Collective agreements have still to be concluded. Labour and management representatives are expected to reach an agreement in the next round of collective bargaining at the beginning of 1993.

Not only the formal qualification gained but also the way the service technician is employed influences the grading of the job. The intention is that the service technician should work in all areas which to date required highly or very highly qualified motor mechanics. These are jobs which demand extensive special knowledge in the field of:

- electrics/electronics
- hydraulics/pneumatics
- ABS/ETC
- automatic transmissions
- running-gear electronics etc.

Table 6.6 – Overview of continuing training schemes linked to a particular make of vehicle

Training plan for motor-vehicle service technicians VW/Audi passenger cars

1. Basic vehicle technology[1]

44 K-Jetronic
56 Digijet in Transporter with water-cooled opposed-cylinder engine
87 Digifant in passenger cars
93 Five-cylinder 20-v engine
94 Mono-Jetronic
95 KE-III-Jetronic
102 KE-Motronic in 16-v 2.0-l engine
103 1 8-l engine with G-blower
105 VC8 engine
111 Motronic in 5-cyl. turbo engine
121 MPI in 20-v naturally aspirated engine
127 VR6 engine
130 MPI in Audi V6 engine
134 Mono-Motronic
143 Motronic '92, 20-v engine, V8 engine
150 MPFI in 2 6-l V6 engine — SSP approx. 32 h

2. Fundamentals of vehicle electrical[1] [2] systems/electronics

- Vehicle electrical systems 1
  Basic circuit, circuit diagrams, cable colours, conductor cross section, relay, circuit with relay, ignition-starter switch, light switch, generator and turn-signal control, brake-light system — Course 18 h
- Vehicle electrical systems 2
  Voltage measurement, voltage-drop measurement, testing alternator and voltage regulator, measurement of hidden loads, trouble-shooting on practice model — Course 18 h
- Vehicle electrical systems 3
  Basic electronic components, sensors, analog/digital variables, basic logic operations, systematic trouble-shooting — Course 24 h

3. Fuel induction/ignition[1]

- Mixture formation, fuel-injection engines — Course 24 h
- Trouble-shooting in fuel-injection systems — Course 24 h

4. Convenience and safety electronics

104 018 4-speed automatic in Audi V8
112 4-speed automatic transmission, electro-hydraulically controlled
131 Audi 100 air conditioning system › '91
132 Central locking with remote infrared control
135 Climatronic
144 Theft-warning system for Passat and Corrado
149 HP 18 4-speed automatic transmission
81 Anti-lock braking system (Teves) in Golf
86 Anti-lock braking system (Bosch)
114 Airbag in Audi
115 Electronic traction control (ETC/ASR)
117 Anti-lock braking system (Teves) with electronic differential lock — SSP approx. 24 h

Final test — 8 h
Certificate

Total hours. — approx 184 h

Training plan for motor-vehicle service technicians Mitsubishi

1. Basic vehicle technology[3]

- Petrol and diesel engines
  Design and operation
  Setting and test work
- Automatic transmissions — Course 10 h

2. Fundamentals of vehicle electrical systems/electronics[2] [3]

- Ohm's law
- Connections, terminal designations, cable colours, graphical symbols, cable installations
- Electrical and electronic components
- Trouble-shooting on a prepared vehicle
- Handling measuring and test equipment
- Basic electrical and electronic circuits — Course 30 h

3. Fuel induction/ignition[2,3]

- FBC carburettor (D)
  SOHC
  DOHC
- Pollutant check diagnosis (D) — Course 64 h

4. Convenience and safety electronics

- Electronically controlled automatic transmission (D)
- ABS (D)
- Electronically controlled suspension – ECS (D)
- Traction control – TCL (D)
- ETACS system (D)
- Multiplex wiring (D)
- Automatic air-conditioning (D)
- Cruise control (D)
- Airbag (D) — Course 75 h

Final test — 8 h
Certificate

Total hours: — 203 h

[1] Service communication 12 h
[2] Diagnostics
[3] Service communication 16 h

Quelle: Gemeinschaftsinitiative 1992

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As mentioned above, Article 46 (2) of the Vocational Education Act permits continuing training schemes to be formally regulated at federal level. It is expected that the labour and management representatives of the motor vehicle sector will obtain state recognition for this continuing training scheme from the competent German minister. First steps in this direction have already been initiated. Labour and management, under the leadership of the ZDK and IGM, are working on a uniform continuing training concept which would apply to the whole country and be independent of any particular make. If a uniform agreement is reached, state recognition of the occupation of service technician from the German Minister for Trade and Industry will in all probability ensue. The qualification for the occupation will be organized by the motor vehicle sector and the unions outside the state school system.

This situation will probably make it very difficult for the state-run vocational schools to put forward a competitive offer for a successful service technician training scheme.

6.5.3 Customer service training centres

As has been mentioned several times, automotive technology is becoming increasingly complex. The customer service training centres have initiated a number of different schemes designed to train people to deal with the work which that produces.

Further and continuing training by the manufacturer

Since the 1930s, car manufacturers have been steadily expanding their training courses in after-sales service, initially they were all centralized but later they became decentralized. The car manufacturers have constantly increased the scope of topics covered by the further training and continuing training, the number of tutors and the amount of training each employee receives (MTD – man training days). In addition to this, component manufacturers and other suppliers also offer training for repair shop staff, tailored to their particular products.

The technical training offered by German car manufacturers comprises over 100 days. In the case of Daimler-Benz it is at present 167 days. The Opel customer service training centres offers a training course which lasts for a total of 191 days. Of that, 113 days are reserved for technical instruction. The centralized further training provided by German manufacturers has reached approximately 2.5 training days per technical employee. This figure seems to be the ceiling level which – at least in terms of further training in the manufacturers' central training facilities – cannot be exceeded for reasons of capacity. The scope of material covered has visibly levelled off. There are clear indications that the manufacturers will not extend the material taught beyond the high standard already reached. If the extent of the further training is projected onto a single employee in the motor vehicle repair and sales sector it can be concluded that each technical employee in the motor vehicle business has to re-learn his trade every six years. Given a working life of 40–45 years that means a total of seven cycles (cf. Rauner/Zeymer 1991).

The freezing of central after-sales training at 2.5 training days has meant that there has been a shift in emphasis in response to the increased need for further training for repair shop staff with the result that further training is now increasingly being carried out in the repair shops. Our survey showed that in the case of a German manufacturer the training volume has in the meantime reached the level of four days of de-centralized training. Manufacturers concede only unwillingly that there is a great demand for de-centralized further training. The conflict of interests between manufacturers and repair shops is gradually coming to a head.

The resistance to a further shift of further training into the repair shops is growing. Further training carried out alongside the normal servicing and repair work of the firms is seen as a disturbance and, although attempts are being made to force employees to use self-study learning aids in their free time, this approach offers limited scope for solving the further training problem.

The actual volume of further training is well over a week, as the amount of training time spent in the repair shops and in the employee's free time (working through training material) is somewhere in the region of 3–4 days a year. This applies primarily to manufacturers, who have taken up a pioneering role in the implementation of MC technology and are selling a particularly broad range of vehicles. The move to decentralization and the shift of additional further training to the repair shop is being underpinned by provision of programmed learning materials and multi-media systems (learning programmes, learning kits for electronics, programmed audio-visual media, computer-aided learning). These media concepts were developed in the 60s and 70s. The expectations which were attached to this method of training have long since been replaced by a more sober estimation that the value of programmed instruction for solving skilling problems is very limited. In the motor vehicle industry only a few individual companies have embarked on this method.

The essential criteria here are an understanding of problems in their broader context and the ability to master the entire range of measuring, testing and diagnosis technology. There is no simple answer to the question of at which formal level this

specialist training should be placed. The answer will differ depending on the internal organization of work within a company and the structure of courses/policy for awarding certificates practised by the customer service training centres. What in one case, almost naturally, remains part of the job of the motor mechanic is in another case carried out only by:

- the specialist auto-electrician
- the master mechanic, or
- the "service technician" or "diagnosis technician" who has a certificate from the customer service training centres

The particular status of specialists for automotive electrical systems and electronics in the 80s has been replaced in the 90s by greater emphasis on repair shop staff specializing in specific aggregates. For example, Opel has adopted the following categorization of specialists in its concept for staff development.

Specialists for:

- Comfort and safety electronics
- Fuel induction, electronic engine management and diagnosis
- Opel servicing systems
- Body painting and corrosion work
- Light commercial vehicles and all-terrain vehicles

This new orientation is consistent since electronics have become an "across the board" area of technology within automotive technology and basing further and continuing training specialization on particular subject areas, such as electronics, hydraulics, motor mechanics etc., would reduce the opportunities for the skills to be used in practice.

Generally speaking, it can be said that car manufacturers who have concentrated their range of models in the middle or luxury class area and were quicker to follow the trends towards increasing use of electronics have already introduced the informal job title of technician and a corresponding training programme.

As far as we know at present, these manufacturers will maintain their qualification principle in the future. It is generally accorded higher status than the service technician who is the product of a "joint initiative".

The following section describes three of these further training models.

Systems technician (Bosch)

The Bosch systems technician is a "specialist" in the Bosch after-sales service for systems technology and components such as Jetronic, Motronic, anti-blocking systems etc. The main focus of his work is fault diagnosis. The entrance requirements for the course are previous training as an auto-electrician, several years work experience and well-grounded knowledge of systems technology gained as a skilled worker. The systems technician training is spread over a two-year period and involves 10 weeks in the Bosch customer service training centre.

The training covers all well-known electrical and electronic systems as well as electronically-aided systems developed by Bosch automotive technology. In addition to this, the trainees are taught how to deal with customers and given opportunity to practice. The first part of the training is a four week training in electronics.

Each of the one-week courses begins with a test and ends with an interim exam. At the end of the basic electronics training there is a comprehensive final examination to conclude the first stage of the systems technician training. Only those participants who pass this final examination can continue the systems technician training.

In the second stage of their training – which consists of 6 courses – the systems technicians acquire the specialist knowledge they require for the main components of the automotive systems technology:

- Jetronic
- Digital engine electronics
- Anti-blocking systems
- Electronic ignition systems.

Short tests are also held throughout this phase of the training to check the system technician's progress.

In stage 3 – which consists of a one-week course – the trainee systems technician attends an intensive two-day behaviour-oriented seminar, during which he learns how to deal with customers. During the rest of this week the systems technician prepares for the extensive final examination which lasts for two days.

Service technician (BMW)

The stated aim of the training course for service technicians is: to teach an understanding of the technical and economic aspects of the business, an overall knowledge of the technology involved, and to enable the service technician to pass on new knowledge in his area of work.

The BMW service technician has all the technical know-how at his fingertips and can "provide information" on all aspects of the business. He can act as customer advisor and is deployed as a "mediator" between the business and the customer.

The entrance requirements for this customer advisor training are previous training as a motor mechanic or auto-electrician, several years work experience in one of these two jobs and continuing training up to technician level. The training takes place in three stages:

• the training for customer advisors comprises topics such as how to receive customers, diagnosis, advisor/customer role-play, writing orders, cost estimates, warranty/guarantees, customer, time and deadline management, return of vehicles, contact between customers and the repair shop.

• the training for customer service managers comprises, as well as the topics mentioned above, additional seminars in the area of "dealership management" and "financial report". There are also seminars for customer advisors such as "Basics of active selling in the after-sales department", "techniques for refunds" and "dealing with complaints." The seminars for after-sales managers focus on topics such as "Managerial techniques for after-sales managers" or "Staff management".

• In part I of the service technician training, instruction is given in: the position of the service technician in the business, his responsibilities, duties, field of competence and exchange of information with the employees in the repair shop on new automotive technology and new working and measuring processes.

In part II of the service technician training, instruction is given in: new BMW models, new engines, special fitting of central locking systems, EH transmissions, on-board computers, anti-blocking systems, servotronic, heating and air conditioning systems and all the diagnosis, adjustment and testing work connected with these systems.

Diagnosis technician (BMW)

To complement the work of the service technician, BMW has introduced the job of diagnosis technician for the following reasons. The aggregates of a motor vehicle, such as the engine, running gear, transmission, steering and electrical signalling and lighting technology are to an ever-increasing degree controlled by computers and electronics. In addition to this there is a trend towards increasing comfort such as electronically controlled locking for the doors of the car, electronic windows, electronic sliding roof. On-board diagnosis has also been widely introduced. Seen as a whole, electronically controlled systems in vehicles require knowledge that goes beyond understanding the engine, transmission, running gear, brakes etc. A mechanic must have knowledge and skills in the field of systems technology, in order to be able to test and detect faults using specially programmed testing ices and manuals.

The main jobs of the diagnosis technician consist of carrying out servicing and repairs of all electronic systems in the vehicle using the BMW service testing system, the testing instructions and all the integrated diagnosis techniques and tests using repair shop testing systems, on-board diagnosis and central computers.

The training focuses on:

- Automotive electrical systems with a practical component
- Automotive electronics with a practical component
- Measuring and diagnosis work on BMW vehicles using service tests, test instructions and Modic.

Mobile training is carried out in 32 centres (BMW dealers). The length of training is 3 times 40 hours for 3 stages of training over a period of approximately five months. The training is organized in two sessions of 3 hours per week (from 4.00 p.m. to 7.00 p.m.). The central training aid is a BMW teaching and diagnosis set.

Conclusions

• The comprehensive range of courses offered by the customer service training centres and the strain placed on firms having to carry out further training themselves reflect the fact that the initial training is not based on realistic ideas of what is involved in the sector today and also the low level of general education of the applicants (leaving certificate from Hauptschulen). Job outlines must be brought into line with future demands and implemented in all trainin centres.

• Unlike the specifications in the training ordinances and the curricula they prescribe, the curricula in the customer service training centres are designed with the complexity of computer-aided systemic automotive technology and the reality of the modern repair shop in mind. At the same time they are organized in modules so that initial and further training can be integrated. They are, however, very much based on particular makes of vehicle or even particular models. In some areas of the customer service training centres, which sometimes use very school-like teaching methods, teaching basic electronics, for instance, by abstract experiments which are thus far-removed from daily reality, the effectiveness of the customer service training centres is correspondingly low. The subject matter of the customer service training centres is based entirely on the latest technology and the needs of the motor vehicle repair shop and the training is based on particular makes. This restriction is not permissible under the training ordinances related to the BBiG and its curricula.

• In terms of teaching and learning methods, the customer service training centre is more innovative than the Berufsschule and the initial training in firms. Further training will acquire a new quality in the area of implicit learning by the introduction of new computer-aided work systems. It is to be expected that, in the second half of the 90s, motor vehicle repair shops will become one of the major centres for vocational education – within the work process.

• The question of the training ordinances and the horizontal and vertical division of labour is of particular importance for initial and further training. Our study has shown that the most differing organizational concepts compete with each other, a situation with great similarities to the developments in the general range of products on offer. Ranging from the team concept (VW) to the all-round mechanic concept in individual repair shops to the strict division of labour and thus shift in workload organization in a job-processing centre at a distance from the repair shop (with a master computer), a wide variety of concepts for work organization compete with each other. In order to promote a more customer-based approach to ensure customer satisfaction, a very real necessity today, those models for work organization which support this must take priority. Models based on a rigid division of labour are increasingly being abandoned.

A summary of the essence of this comparison leaves no doubt about the fact that the customer service training centre has clearly overtaken the Berufsschule in its significance for training employees in the motor vehicle repair and sales sector. It has in effect become the "vocational school" for this sector. Apart from detailed knowledge about the systems technology of motor vehicles, the customer service training centres also provide an understanding of the overall context of these specific areas of knowledge and how they connect to each other.

Other approaches which car manufacturers are taking to solving the training problems include:

- reduction in the complexity of diagnosis and repair work
- introduction of computer-aided work and information systems with a strong tutorial quality.

Due to lack of space it is not possible to describe these systems in more depth. Details can be found in Rauner/Zeymer (November 1991, p. 7ff).

6.6 General continuing training for managerial staff

The Chambers of Trades, Associations of Guilds, private interest groups and the ZDK run numerous centres for continuing training which do not have a technical orientation and have a number of different aims.

The Chambers of Trades offer courses designed for administrative staff which aim to facilitate the administration of businesses. The courses range from the "business letter" to PC word processing and data management.

For owners of businesses, courses in general management, public relations, financing and staff management are offered.

Most Chambers of Trades offer courses to train people to become "business administrators for the motor vehicle sector." This is the commercial counterpart of the service technician.

Apart from the Chambers of Trades and guilds, there are numerous academies which offer continuing training seminars for owners of businesses. The subject matter of the seminars depends on demand but the central topics are management questions, public relations and general principles of management.

Continuing training as an aid to promotion is offered by the Bundesfachschule für Betriebswirtschaft for business management in the motor vehicle repair and sales sector. This institution, financed by the ZDK and associations of guilds, offers a 1-year training course leading to the qualification of business administrator or administrative assistant in the motor vehicle repair and sales sector. Admission to the business administrator course is for people with a commercial training in the motor vehicle repair and sales sector and to the course for assistants a journeyman's examination. In both cases one year's work experience is required.

The ZDK runs a "Car Academy" and from 1991 the "Technical Academy of the motor vehicle repair and sales sector" (TAK). The former offers a similar range of courses to the Chambers of Trades, whereas TAK offers courses mainly in environmental protection.

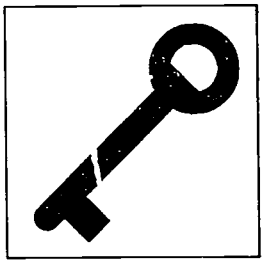
Summary

The continuing training schemes on offer within the motor vehicle repair and sales sector are very varied and wide ranging. They cover the entire area of technical, commercial and managerial areas; they are very much oriented towards demand and promoting the motor vehicle repair and sales sector. The major training providers, the customer service training centres, are, however, very much linked to particular makes or sometimes even particular models. The courses offered by the different institutions have acquired a high degree of recognition by motor vehicle businesses.

The state training institutions have to date not been able to compete with the wide range of activities and courses offered nor have they achieved the same level of recognition by the sector.

CASE STUDIES

PART 2:



1. Independent dealership N.
2. Mazda
3. Mercedes-Benz Autohaus K.
4. BMW agency
5. VW-Audi agency
6. Conclusions from the case studies

1. INDEPENDENT DEALERSHIP N.

Size of the Firm: I

Car Manufacturer: All

Type of Vehicle: A, B

Type of Firm: D

1. General description of the case

This is a small motor vehicle repair shop to the north of a city in the Ruhr region of Germany; it is not attached to any particular car manufacturer. The firm has been in existence since 1985, currently employs four people, and has concentrated on servicing, general repairs and body painting. It specializes in restoring vintage cars. It recently abandoned its second-hand car business.

In its continuing training activities it has to rely on courses offered by the Bosch customer service training centre, the Chambers, component suppliers and paint manufacturers. The employees do not have access to the training provided by car manufacturers, but after a time lag of approximately one year's the firm has sufficiently detailed knowledge to feel confident in carrying out normal servicing work, even on newer cars, particularly Opels. This knowledge is mostly acquired through informal contacts (such as during purchase of spare parts or through personal acquaintances) and to some extent from what can be gathered or interpreted from copies of documents from companies. A second important source of information about new technological developments are trade journals. Sometimes it can help a great deal to use simple common sense and have sufficient time to try things out on the basis of previous models.

Given what is normal and possible in terms of continuing training for businesses of this type in Germany, this firm considers its own policy to be exemplary. In its opinion, other comparable firms have relied for too long on knowledge acquired some time in the past.

2. General description of the firm

The firm is a limited company with four employees and thus belongs to type 1 in the classification system chosen for this project. It is not attached to any particular manufacturer, does not aim to be and would probably not be given the opportunity; it does, however, say that it specializes in Opel engines. That is connected with the fact that one of the employees worked for a long time in an Opel repair business and still has good contacts there which enable him to keep abreast of new developments and pass his knowledge on to his colleagues. Sometimes it is possible to use this informal channel to look at documents which the manufacturer has circulated for internal use only.

All common makes and models of vehicles are serviced and repaired. Only difficult cases
cularly in the area of diagnosis of electronic systems – are occasionally refused or passed on to a specialist firm if insurmountable difficulties arise after a job has been accepted. All repair and maintenance work which comes under a manufacturer's warranty agreement ("guarantee") are refused as a matter of course – unless the work involves rectifying accident damage to a chassis.

This is a second speciality of the firm – repairing accident damage – since they have both a straightening jig for chassis repairs and a modern spray-painting booth. They use the straightening jig and even more the spray shop for sub-contracts from other businesses, in the motor vehicle sector; firm N. regularly receives sub-contracts from four businesses including a nearby authorized Ford dealership. Firm N. does not itself sub-contract work on a regular basis. The owner says that the third speciality of his firm is restoring vintage cars, but points out that from the point of view of economics this has to be seen more as a hobby. Until recently the firm also dealt in second-hand cars but abandoned this since this area of the business is not financially feasible due to its location (see below).

Firm N. is situated on a side road on the edge of a small industrial estate in a suburb of a city in the Ruhr region. Its premises are compact; the boundaries are marked by the front of the repair shop and a wall with an entrance gate to the street, by other firms on either side and to the rear by a railway line. On the site, which is divided in two, there is an outdoor car park with space for 15 vehicles and a shed building covering the whole length of the site which houses an office, store, repair shop and paint shop. 10 more vehicles can be parked here.

The location is quite unfavourable for a motor repair business which by its very nature has a large number of individual customers: there are several firms nearby which recycle scrap or other waste materials and create quite a run-down atmosphere. It is at least a 500-metre walk through this inhospitable area to the main road and tram stop which is important for the customers bringing their cars to be repaired and collecting them again.

Advertising on the premises is relatively ineffective given that the majority of traffic on the road which runs past this firm has a specific destination, in other words has little potential for providing random customers. Advertising is thus confined to an illuminated sign with the firm's logo directly on the side of the building facing the street. The proprietor has also rented advertising space at a sports ground.

Signposts on the main road would not significantly improve the situation since there are at least ten motor vehicle businesses on this road near the junction with the side road. They include author-

ized dealerships for Japanese makes, motor vehicle repair firms, a large filling station, a tyre specialist and other businesses involved exclusively in the second-hand car sector. But the proprietor nevertheless does not see these firms as competition, on the contrary: some of them pass jobs on to him which they are unable to deal with themselves due to lack of the right equipment and with others there is an exchange of professional experience.

There is an unusual accumulation of motor vehicle businesses in this city on the edge of a former coal mine, a location which until recently was considered to be highly unappealing and attracted a number of second-hand car dealers of a suspect nature. It remains to be seen whether the redevelopment of the pit site which is in the planning stage at present, will change this structure.

The firm was started by the present owner in 1980 as o one-man business. He began working alone, in the first instance at a different site in the same borough of the city. At the time the firm did not have any employees with a master mechanic qualification and thus was not entitled to train apprentices nor be registered on the Craft Trades Register. It was therefore counted as a commercial business and became a member of the Chamber of Trade and Industry (IHK). It has not to date changed its registration although it is now entitled to train apprentices.

In the following years the firm was able to consolidate its position to an extent which enabled it to expand. In 1985 it became a limited company, took on two employees, bought the site of the present premises and built the shed on it. When the paint-spraying booth, the straightening jig and the Bosch compact tester went into operation it became possible to deal with the entire range of repairs and these are in fact carried out today. A second-hand car business was also incorporated but due to a lack of possibilities for presentation, the unfavourable location for random customers and fierce competition in the immediate surroundings this proved to be uneconomic. The only trading in second-hand cars which occurs now is when occasionally a vehicle is found for regular customers.

90 percent of the customers have been regular customers for many years. When they buy a new car they take it for servicing to the authorized dealerships during the guarantee period but then return to N. The vast majority of these customers (some 80%) are from the same city, most of them from the same borough. There are, however, a number of regular customers who live in neighbouring cities and who travel 20 kilometres or more. In view of the "advertising situation" described above it is not surprising that custom is attracted almost without exception through word of mouth. To date this form of attracting custom was sufficient, in fact often to the extent that the firm was working at full capacity which is approximately 10 vehicles per day.

As already mentioned above, the firm is a member of the Chamber of Trade and Industry. Its proprietor does not belong to any other organization (employers' or professional association). The employees are not members of a trade union. Due to the size of the firm (less than 5 employees) it would not be entitled to form a staff committee, quite irrespective of whether any of the employees considered it necessary to have either a staff committee or a representative.

At present four people, including the owner, work in the firm. A fifth person, a master mechanic, is due to be taken on shortly. All the employees are German and have a relevant vocational qualification: a paint-sprayer, car mechanic and master mechanic, an automotive electrician, who has undergone further training in electronics, and a bodyworker. Two of the employees are under forty, two are over forty years old. One of them has been with the firm for over 10 years, two others for more than five years, and one began work with the firm this year.

The owner reports that the age of his employees is ot present not a problem. On the contrary: he estimates that the staff have increased their efficiency by a remarkable 25 percent. He says, however, that he will have to start to think about taking on younger people again. His son has now started his apprenticeship and is due to take over the business in a few years time. He is confident that he will then bring young people into the business.

Wages and length of annual holiday are based on the conditions in other firms. All the employees are full-time, working eight hours a day, in other words a forty-hour week. Overtime is an exception (on average 20 hours per employee per year).

There are virtually no differences in functions in the firm, and a carefully worked out organizational structure is unnecessary. The commercial side of the business (purchasing, invoicing) is mainly the responsibility of the owner but other employees carry out this work as well. Any division of labour is on the basis of particular skills but even this is not strictly adhered to because jobs often involve people with different skills working side by side. Each person masters their own special area of work and is responsible for care and maintenance of the equipment, but the different amount of use of different apparatus and the necessity to help with certain activities alone necessitates co-operation between the employees with different skills.

Apart from professional ability and proficiency, social and communicative skills are also needed because each of the employees has direct contact with customers. Spontaneously the owner even describes his priorities when employing a new person as follows: "First of all he has to fit in with us. We are a family business. He must not be petty, must be flexible and must, of course, know what he is doing. He has to be friendly to the customers. We are an unusual case: the paint-sprayer and I served our apprenticeships together and the fitter is a relative of the paint-sprayer." This recruitment policy, choosing staff with care to make sure that they get on together, explains why there is little difference in the social background and functions of the staff.

There is ample opportunity for this kind of recruitment policy in the Ruhr region due to the situation of the labour market there: the unemployment rate here has been over 10 percent for more than ten years and has on occasions risen well above the 15 percent mark. In addition to that, the number of people trained, particularly in the motor vehicle sector, far exceeds the number subsequently employed by the firms who trained them. This explains why even firms with such specific wishes have never encountered difficulties in the past in finding qualified staff.

3. Provision of continuing vocational training

To cover its continuing training needs, firm N. uses the Bosch customer service training centre, special courses run by the manufacturers of spare parts or suppliers and the local training events organized by the Chambers. In addition to this, the employees read relevant trade journals to keep themselves informed about the latest developments in their field of work. (Cf. Appendix, programme for '93).

4. Training practice at the firm

The firm does not train apprentices itself. Requirements for employing a new person include relevant vocational training and the willingness to fit in with the customs of the firm. Given the way staff are selected, experience has shown this to be sufficient for this firm.

Continuing training within the firm is based on what is available and what interests the employees. When it is a question of cost, the owner, of course, decides which training courses can be attended, but mostly people come forward themselves with suggestions for courses which they consider to be important and necessary for their own work.

There is no specific planning of continuing training in the firm. It is not really possible, since they have to rely on what is offered by the suppliers or whether there are free places at the Bosch customer service training centre. On the other hand, it is not really necessary since the employees themselves look for possibilities when they are confronted with new demands and find free places for themselves. Their motivation to take part in continuing training is sufficiently high. ("The mechanic is absolutely mad about continuing training," says the proprietor).

Continuing training began in 1985. When the limited company was formed, new paint-spraying booths were put into operation and entirely new procedures and techniques had to be learnt. The introduction of new paints, especially more ecologically acceptable kinds, has once more necessitated new specifications for using them correctly and economically. In addition to this, the rapid developments in automotive electronics makes continuing training necessary on a virtually permanent basis. "Particularly in the field of electronics: every one to one-and-a-half years each of us has to go on a course. Developments are not quite so rapid for mechanics."

The owner estimates that the independent motor vehicle repair firms do have their basic training needs fulfilled – albeit with a time lag or not until after a new product or procedure has been introduced. This is not so significant in the case studied because vehicles do not have to be serviced and repaired while they are still under guarantee. It is, however, a fact that they have no influence on what kind of training is offered. "You have to take what is on offer." At best a sales representative might occasionally enquire about specific needs for continuing training; it is doubtful, however, whether he can then influence at short notice what his firm offers.

The basic courses on offer are often not adequate for special problems since "we have to figure things out for ourselves, we have to search for a long time and learn from our mistakes." Often they do not have the documentation, describing possible reasons for faults and how to rectify them, which car manufacturers provide for their vehicles and firm N. usually receives much later, if at all.

Presentations by firms or visits to trade fairs are also seen as opportunities for continuing training: for example, certain suppliers often run three to four-hour information sessions locally (Sachs, for instance, a brake and clutch company). The customer service training centres also provide information about new technical developments, particularly in the field of automotive electronics, usually with a delay of a year. "We do not have access to the latest developments, it usually takes a year." The owner, accompanied by the electrician, often visits trade fairs which can prepare them for new problems which might arise in practice. They decide on the basis of the impression gained at the trade fair whether a new generation of equipment or apparatus for the

repair shops is necessary or whether it is possible to manage for another year with what they have.

The introduction of a new generation of equipment is accompanied by a leap forward in continuing training: "Next year we will probably get another new diagnosis system. Sum to be invested: DM 70,000, the old appliance will be taken as part-payment. Software and training on the appliance are included in the price but any extra training course costs more. Advice on problems or difficulties, either by telephone (usually sufficient) or by a visit from a technician, is free. There are, however, additional costs for the different modules needed for different models (approximately DM 700 each)."

Apart from technological innovations which necessitate increased continuing training but to some extent are only ever presented to the independent firms in the finished car, new legislation also necessitates continuing training. An example of this is the new exhaust emission regulation due to come into force in 1993 which also applies to diesel engines. Up to the time of the interview the details of this regulation were still not known and therefore the design of the test was similarly not known.

Apart from spontaneous events organized by the Chambers, which deal with commercial or tax questions, the continuing training courses in this firm concentrate on technical training. Something in the order of one percent of working time and labour costs are spent on continuing training.

5. Evaluation of the training concepts

Below is an example showing which courses were taken in 1991/92:

Continuing training courses in 1991/92

Course 1

• Topic:	Colour mixing and spraying techniques for new paints
• Participants	Spray-painters
• Length in units of time/over what period of time?	3 days compact: Fri., Sat., Sun.
• During or outside working hours; paid?	Partly during, partly outside, working hours; paid for by the firm, wages paid
• Type of course/ methods; Certificate?	External course run by the paint suppliers; seminar with practical exercises; certificate of attendance
• Participation: Obligatory or voluntary? How is information provided, how is participation organized?	Participation is voluntary; The spray-painter was informed by the paint sales representative.
• Goals of the firm?	Economic and functional use of new (low-solvent) paints
• Expectations of participants?	Correct use of the new paints, learning tips about its use.

Course 2

• Topic:	Airbrush design: a technique for applying posters or similar designs directly onto a surface
• Participants	Spray-painters
• Length in units of time/over what period of time?	One week
• During or outside working hours; paid?	During working hours; paid for by the firm, normal wages paid
• Type of course/ methods; Certificate?	Practical instruction in the firm by a mastercraftsman employed by the manufacturer; certificate of attendance
• Internal or external course?	Internal with external teaching staff
• Participation: Obligatory or voluntary? How is information provided, how is participation organized?	Since the firm had provided the venue for the training participation was a matter of course; it was offered by the paint manufacturer; it was provided free of charge by the supplier.
• Goals of the firm?	Introduction to the technique in order to be able to sell it in the future (e.g. for advertising slogans)
• Expectations of participants?	Simplification of signwriting on vehicles

Course 3	
• Topic:	New applications for the compact tester.
• Participants	Automotive electricians
• Length in units of time/over what period of time?	Four Saturdays
• During or outside working hours; paid?	Outside working hours; paid for by the firm
• Type of course/ methods; Certificate?	Practical instruction at the Bosch branch establishment; certificate of attendance
• Internal or external course?	External on the premises of the supplier
• Participation: Obligatory or voluntary? How is information provided, how is participation organized?	Participation is voluntary, but the participant wished to take part; these courses are offered at regular intervals by the supplier, with an increased number when changes to the testers are introduced; normally the sales representative draws attention to these courses.
• Goals of the firm?	Introduction to new applications in order to be able to satisfy customers with newer models.
• Expectations of participants?	Correct working methods for new models, certainty of diagnosis.

This number of courses is not, however, typical for the continuing training policy of firm N.; there was above-average attendance of courses in this period. Mostly only one employee per year attends a course; for updating on applications of the compact tester it is actually adequate to attend a course every two to three years. Apart from that, this particular year does reflect the most important elements in the continuing training policy of the firm: the courses offered by the paint manufacturer and mastering the diagnosis system. These are the areas where the highest number of changes take place, requiring regular continuing training; changes in the area of mechanics and bodywork repair are very much slower.

6. Applicability to other firms

The proprietor believes the continuing training activities in his firm to be applicable to other firms. He also believes, however, that it is true to say that "many firms of a similar size to mine shy away from the costs involved; they think they can manage to keep up with the knowledge they have. Many are living from hand to mouth. If they don't understand something any more they just bluff their way through or try to find out from colleagues."

He is convinced that particularly the small firms will only be able to survive if they prepare for new developments as they arise. That does cost quite a lot of money, but equally saves time in fault detection and thus saves money in the long run. He says that is particularly true because the independent repair shops in any case have to live with delays inherent in the system before they can catch up with new technical developments. Any firm which does not want to establish a reputation for dealing only with technically obsolete vehicles cannot survive without this constant continuing training. But in a couple of years it will not even be possible to repair the vehicles which are by then technically obsolete without extensive knowledge of electronics.

Example of the continuing training programme of a Bosch branch establishment in cooperation with the local Chamber of Craft Trades

Course	Seminar	Target group	Dates	Dates	Duration of course	Course fees	Syllabus of courses
A	Engine testers with oscilloscope and exhaust emission analysis (User training)	Motor mechanic Automotive electrician	1st half-year of 1993 1.4. – 29.4.93 every Thursday	2nd half-year of 1993 26.8. – 23.9.93 every Thursday	5 evenings from 5.30 – 8.45 p.m.	DM 275	• Demonstration and use of current equipment • Measuring technology used to locate defects in batteries, starter motors and dynamos • Explanation of the basic oscillograms • Oscillographic interpretation used for components of the ignition system, mixture formation and engine mechanics • Measuring techniques and correction of defects in exhaust emissions, AU II: latest specifications
B	Electronic ignition systems with fault detection and use of testers	Motor mechanic with basic knowledge of measuring technology	1st half-year of 1993 20.1. – 10.2.93 every Wednesday	2nd half-year of 1993 30.9. – 21.10.93 every Thursday	4 evenings from 5.30 – 8.45 p.m.	DM 210	• Overview of ignition systems • Basic functions of the TZ-1, TZ-H, EZ-K, VZ, VZ-K systems and of ignition systems with RUV • Demonstration and use of current equipment • Testing components by measuring voltage, current and resistance • Locating defects in the timing angle control system, checking the timing and adjusting the angle • Oscilloscopic evaluation of dynamo signals and components in the ignition system • Diagnosis on vehicles with memory for storing defects
C	Electronic fuel-injection systems LE Jetronic, Motronic, Lambda control with use of testers	Motor mechanic Automotive electrician with specialist knowledge and practical experience in the field of mixture formation	1st half-year of 1993 6.4 – 11 5.93 every Tuesday	2nd half-year of 1993 12.10. – 16.11.93 every Thursday	6 evenings from 5.30 – 8.45 p.m.	DM 290	• Demonstration and use of current equipment • Peripheral checking of systems using a universal test adapter and measurements of feed, pressure and possible leaks in the fuel system • Use of appliances to evaluate stored defects in systems with self-diagnosis • Adjustment and testing of exhaust emissions, exhaust behaviour, effectiveness of catalytic converter, idling speed, pulse ratio and lambda control • AU II: latest specifications

Course	Seminar	Target group	Dates	Dates	Duration of course	Course fees	Syllabus of courses
D	Electronic fuel-injection systems. Mono-Jetronic, Ecotronic, Lambda control with use of testers	Motor mechanic Automotive electrician with specialist knowledge and practical experience in the field of mixture formation	1st half-year of 1993 17.2. – 10.3.93 every Wednesday	2nd half-year of 1993 28.10. – 25.11.93 every Thursday	5 evenings from 5.30 – 8.45 p.m.	DM 275	• Demonstration and use of current equipment • Peripheral checking of systems using a universal test adapter and measurements of feed, pressure and possible leaks in the fuel system • Use of appliances to evaluate stored defects in systems with self-diagnosis • Adjustment and testing of exhaust emissions, exhaust behaviour, effectiveness of catalytic converter, idling speed, pulse ratio and lambda control • AU II: latest specifications
E	Electronic fuel-injection systems: K, KE Jetronic, Motronic, Lambda control with use of testers	Motor mechanic Automotive electrician with specialist knowledge and practical experience in the field of mixture formation	1st half-year of 1993 19.1. – 02.3.93 every Tuesday	2nd half-year of 1993 31.8. – 05.10.93 every Tuesday	6 evenings from 5.30 – 8.45 p.m.	DM 290	• Demonstration and use of current equipment • Peripheral checking of systems using a universal test adapter and measurements of feed, pressure and possible leaks in the fuel system • Use of appliances to evaluate stored defects in systems with self-diagnosis • Adjustment and testing of exhaust emissions, exhaust behaviour, effectiveness of cotalytic converter, idling speed, pulse ratio and lambda control • AU II: latest specifications
I	Electronic systems ABS for cars with use of testers	Motor mechanic Automotive electrician with specialist knowledge	1st half-year of 1993 06.5. – 13.5.93 every Thursday	2nd half-year of 1993 23.11. – 30.11.93 every Tuesday	2 evenings from 5.30 – 8.45 p.m.	DM 110	• Demonstration and use of current equipment • Peripheral checking of the system using an LED test adapter in conjunction with a brake test stand • Oscilloscopic evaluation of dynamo signals
G	Modern measuring and testing techniques for diesel engines Electronic analysis of running gear	Motor mechanic Automotive electrician and bodymakers with basic knowledge	1st half-year of 1993 07.4. – 05.5.93 every Wednesday	2nd half-year of 1993 02.12. – 21.12.93 every Tuesday and Thursday	5 evenings from 5.30 – 8.45 p.m.	DM 265	• Demonstration and use of current equipment • Testing and adjusting procedures for motor mechanics, engine control systems and start of feed; adjusting equipment • Exhaust analysis as specified in the legal provisions governing testing of exhaust emissions (AU II) • Digital diesel electronics (DE) • Evaluation of stored defects
H				2nd half-year of 1993 on request	2 evenings from 5.30 – 8.45 p.m.	DM 110	• Demonstration and use of current equipment • Explanation of the terms steering geometry, king pin angle, steering angle, inclination of steering knuckle pivot, trailing effect • Requirements and preparation for wheel alignment on all-wheel drive vehicles • Analysis of measurements

2. MAZDA

2.

Size of the Firm: II

Car Manufacturer: Mazda

Type of Vehicle: A, B

Type of Firm: B

1. General description of the case

The Mazda dealer Autohaus M. GmbH, in a small town in North Hesse, employs seven staff. They sell and repair the entire range of vehicles marketed by Mazda in Germany. The dealership also trains its own employees.

The Japanese car manufacturer Mazda has a European training centre in Brussels, where the full-time employees of the customer service training centres in the various European countries are trained.

The German customer service training centre for Mazda is located in Leverkusen. This is where the staff of the more than 100 Mazda dealers and repair shops in Germany are trained in motor-vehicle technology, customer service and data processing by seven full-time trainers. In the event of model changes, special one-to-two-day courses are held for all vehicle dealers in Germany (attendance is obligatory); these run for about six months.

In addition (on account of the limited capacity at the customer service training centre), video units, each running to about 20 minutes, are made available to the dealerships for the purpose of self-study in model technology (especially in view of the growing importance of chip-controlled vehicle technology).

Apart from evening courses for the master mechanics' qualifying examination at the responsible Chamber of Trades, the firm rarely makes use of other training opportunities because of the time and cost involved.

2. General description of the firm

Autohaus M. GmbH is an authorized dealership and repair shop for the Japanese car manufacturer Mazda in a small town in North Hesse. All cars and small vans marketed by Mazda in Germany (including the sports-car range) are sold, serviced and repaired by the total of seven employees. The firm has specialized particularly in the repair of electronic components, engines, ignition and fuel-injection systems, and in body repair and painting work.

The firm was founded in 1981 as a filling station on an arterial road in the town. The workforce initially comprised the only master motor-vehicle mechanic M., the proprietor then and now. In 1985 the firm underwent expansion with the construction of a repair shop designed for three staff, a store, an office, and a vehicle reception area on an adjacent plot of land. At that time the staff consisted of three motor-vehicle mechanics and the head of the business. A showroom was added in 1988. A repair shop for body repair work with a lifting platform and a frame-type straightening jig was built in 1990, and finally, in 1991, an up-to-date paint shop was put into operation and two further employees were taken on. Today the firm employs two people in the office, two mechanics and a master mechanic in the repair shop, and two further staff in the paint shop, thus making a total of seven people.

The premises cover approximately 3,800 m^2 and, in addition to the buildings mentioned above, has about 50 parking spaces for second-hand vehicles and 70 parking spaces for customers' vehicles brought in for repair. The repair shop is operating at full capacity; about 8 vehicles per day pass through the repair shop. The bodywork department and the paint shop are also constantly working to capacity.

Advertising for the firm is controlled by Mazda Motors Germany. The firm receives an annual advertising budget in accordance with the manufacturer's marketing plan; this year (1992) this amounted to DM 28,000. This allows the financing of newspaper advertisements, brochures and other advertising activities. Other advertising material is also supplied by Mazda. Specifically targeted newspaper articles about the firm's new products appear at certain intervals in co-operation with other Mazda dealers.

The proportion of regular customers at the firm amounts to 95%. The firm is known for its expert, reliable work on vehicles and for its customer-friendly service. Random customers occasionally arrive from the nearby motorway. Usually these customers' vehicles have serious defects or damage, entailing lengthy repair.

The owner refers to the location of his firm as virtually ideal: it lies directly alongside a federal highway with a large volume of traffic. As a result, the filling station that still belongs to the firm receives above-average custom. The showroom is eye-catching and cannot be missed, as it is in a slightly elevated position opposite the roadway. The advertising impact of the showroom is also repeatedly confirmed by the customers. According to the owner, a large proportion of the vehicles are sold as a result of this advertising signal alone.

The firm does not sense any competitive pressure. On the contrary, it faces up to the competition with the necessary degree of self-assurance, on the lines of: "Competition is good for business. That is my attitude: if customers can't find a car at my rival's place, they will find one here. On the other hand though, pressure to sell on the part of Mazda is, of course, very high."

Mazda Germany has divided its distribution channels into two according to qualitative criteria: of the more than 1000 Mazda dealers, only about 400 are allowed to market the sports-car range ("Plus-X Programme"). They must exhibit particular eligibility for this, including a showroom, holding of stocks of spare parts for the range, appropriate technical equipment for servicing and repair, and the repair shop personnel's know-how. This is all checked before a dealership – such as in this case Autohaus M. GmbH – is permitted to market these vehicles.

The partnership interests of the GmbH (private limited company) are held jointly by Mr. M. and his two sons, who also work in the firm. Mr. M. senior is responsible for management of the firm as a whole and has the specific function of being in charge of commercial and administrative matters together with sales. He is assisted in this by two office staff, who, in addition to internal accounting and personnel administration, also perform the written work relating to the acceptance of repair jobs and the sale of spare parts. The elder son, a master motor-vehicle mechanic, is in charge of the technical department, which is divided into two areas:

- repair, servicing, maintenance, spare-part procurement
  (two mechanics, one of them training as a master: the younger son)

- body repair shop and paint shop
  (one mechanic and one semi-skilled worker)

The technical manager, the elder son, is responsible for accepting repairs and for carrying out repairs. "Sales, customer advice and so on, he does all that as well, by the way. It depends on what is needed at the time." It obviously does not make sense to enforce a strict division of labour given this size of firm. The younger son takes care of the procurement and ordering of spare parts. Both of them deputise for the senior partner whenever he is not on the premises.

Apart from one semi-skilled worker, all employees have relevant vocational training behind them, and three of them previously passed the Abitur (final school-leaving examination). Of the four mechanics, two are master motor-vehicle mechanics, and one is currently attending evening courses to attain the same qualification. The firm also trains motor-vehicle mechanics itself (currently two), but usually does not take them on subsequently, as it is not economic to increase the number of persons employed.

There is no staff committee.

3. Provision of continuing vocational training

3.1 Structure within the firm

Apart from the training available from the responsible Chamber of Trades, where the younger son is currently attending a master mechanics' course at evening school, Autohaus M. GmbH relies mainly on the continuing vocational training provided by the Mazda customer service training centre in Leverkusen. Given the size of the firm, in-house continuing training does not take place in any organized manner but usually on an ad-hoc basis to deal with problems as they occur.

3.2 Structure of the customer service training centre

Within the Mazda Germany corporation, each division is responsible for its own training:

- After-sales service (technology)
  with a standard range of 14 courses over a total of 38.5 training days (see Appendix 1) and special courses covering new technical developments or model changes (generally one to two days)
- Parts and accessories
  with a basic three-day course (see Appendix 2)
- Data processing
  with six courses over a total of 13 days (see Appendix 3)

Each of these divisions holds their training courses in Leverkusen. Some divisions, such as marketing, also make use of professional educational establishments, to whom they transfer responsibility for development of the content and implementation of the courses at other locations. In such cases Mazda takes care of organization and invitation of the participants.

The courses in the after-sales service (technology) division are devised and updated by the seven full-time trainers (master mechanics or technicians). This is done on the basis of specifications contained in Japanese training manuals from the parent company, which the German (and other European) trainers learn about in a kind of preliminary training at the Mazda Europe head office in Brussels.

The European training centre in Brussels is still accommodated at the main European establishment there; a large new school is currently being built. There is a regular team working at the customer service training centre in Brussels, among them experts from Japan who keep close contact with the development department at the parent plant. It is from these that the German trainers obtain the basic information from which the specific German course is then constructed.

The training manual is in English and is comparable to a repair shop manual; the focal

areas of interest to the German participants are filtered out, those that in the opinion of the trainers are important for the repair and servicing of vehicles. Important new developments, in particular, are constantly incorporated into current courses.

The customer service training centre is committed to the maxim that it is necessary to contribute to guaranteeing the high quality of vehicles through service. "Service on the vehicle must be as good as the vehicle itself. This means that the vehicle must always be serviced and repaired under economically sound conditions. The top priority in our work is customer satisfaction; that means that customers who opt for our cars must be satisfied with the service as well as the product. This is the basis for the way we decide on the form and content of our training programme." (Head of the customer service training centre)

The capacity of the customer service training centres, however, is highly limited, amounting to about 3,000 to 3,500 participants per year (for 1,000 dealers). This figure is greatly exceeded when a new model is due: in such cases the one-day, or at the most two-day, courses for that purpose are all pushed through within three months, while the specialized courses, which on average last three days, a few five days, are deferred during that time.

The run-up time available for technical training of the dealers and their staff before the introduction of a new model is not very long. Usually the first training courses are provided when the introduction of the vehicle begins, that is when the first demonstration vehicles are available to the dealers. The reason for this is the relatively long "translation time". "Unfortunately a certain length of time is needed before training can begin at the European head office and the manual (in English) is available. We are not able to start preparing our training documents until then. It is also very much dependent on when the vehicle appears on the European market. Assuming that we in Germany are the first to put the vehicle on the market, then time is extremely short. If we are somewhere in the middle of the timescale, we have a longer advance period. It is guaranteed, though, that at least one person from each dealership will have been here by the time a new model is introduced." (Head)

Every effort is made to keep the dates of presentation at the dealership and start of training as close together as possible. There is always a three-month gap between presentation to the press and delivery to customers. By that time the introductory training for the new model has generally been completed. These training courses all take place at the customer service training centre in Leverkusen.

The current focus in the customer service training centres's training strategy is on new products, with the objective of passing on knowledge about the repair, servicing and maintenance of the vehicles and of teaching the skill of making the benefits of innovative technology comprehensible to the customer. This aim is addressed by means of a broad range of specialist courses bolstering and further improving the mechanics' level of knowledge and by the rapid response which ensures that appropriate training is conducted when new products are introduced involving real new developments that cannot be covered by previous knowledge. Attendance at these courses is obligatory for at least one member of the dealer's staff.

A variety of indicators are used when planning the range of training on offer at the customer service training centre:

- A certain trend can be determined from the frequency of queries and recurring problems (the hot-line advice service for Mazda dealerships is also based in Leverkusen)
- The technical advisory field service is able to determine when visiting dealers where the main problems lie as far as the mechanics are concerned
- On the other hand, the response to the customer service training centre's course range signals current requirements:
  - What is accepted by voluntary response from dealers?
  - What does the field service have to draw dealers' attention to by express comment?

In addition, by way of preliminary instruction before a new model is introduced, each dealer receives a video tape showing the most important maintenance topics for the new technical developments, so that the technical staff at the firm but also the sales staff can familiarize themselves with the contents. This approach has proved necessary now that motor-vehicle technology is becoming ever more complicated.

There are therefore videos about the operation of power sunroofs and power windows, for example, or central locking systems and so on.

Moreover, these videos put the "multiplier", i.e. the person at the firm who has got to know the vehicle at the introductory course, in a better position to explain the technical details of the new model to all other members of staff.

The video tapes come from Japan. The trainers at the customer service training centre rework them for German conditions and prepare a German text in a joint process of discussion and in collaboration with dealerships which have the necessary know-how. "Even in technical information such as

this, mentality is very important when you want to explain something to a Japanese person, an American or a European. There are subtle details that you have to take note of, otherwise if you have German or European training you can work on the wrong assumptions when approaching the information originating from an American teaching film and let errors slip into your work. Just one example: the Japanese recently showed a video of how to repair a folding roof. The roof had been slashed with a knife, and a patch was simply attached from above and below. That is what they showed. You can show that to the Japanese or Americans, because they aren't so concerned about the visual impact, but if you were to suggest that to a German customer...!" (Head of customer service training centre)

As with most other manufacturers, there has been an enormous expansion in the breadth of technology used in Mazda vehicles today when compared with ten years ago. As a consequence, great demands have been placed on the willingness of staff to engage in continuing training in order to master the new technology. "Let's take as an example the transition from breaker-triggered ignition to today's breakerless semiconductor systems, largely determined by exhaust emission control. These systems are controlled by computer with the use of ignition maps, and operate without contacts. This is a move that demands a quite different approach. It used to be the case that you would have a look at the contact and see that it is burnt, so you would change it and set the correct contact gap. Easy to check electrically and mechanically by the way it looked. Today we have systems that need no maintenance and are also relatively insusceptible to failure. If I do get a fault there, I need a mechanic who knows exactly what's what. For many mechanics this means that they have a lot of catching up to do in terms of technical qualifications."

The dealers are faced with the problem that more and more different models are being built and, at the same time, each model is becoming more complicated. To cope with this, the mechanics require extensive specialist knowledge of details and interrelationships. This calls for intensive training. "Just one example: in the last year-and-a-half we have had five new engines. You can't say an engine is an engine; you have to go wider and deeper into the matter with the technical training courses. The technology has to be learned systematically, and trouble-shooting has to be taught systematically."

In view of this trend the question has to be asked whether the training capacity in Leverkusen is not too limited. According to information from the customer service training centre, this is not the case, at least not in those years in which no new models are introduced. Special courses can then be held to catch up on the training requirements that had to take a back seat in the years in which new models were launched.

It was stated that it is difficult to predict the course strategy for the near future; the customer service training centres is only able to respond to events. "We don't know what technological developments we can expect in the future; we concentrate on the models that are available on the market." With regard to methodology, there are thoughts of using more computer technology and other media for teaching instead of direct instruction at the central school. One idea is to offer employees the option of learning on the spot at their place of work, for example with a disk containing the most important technical information in graphical form. This would be a possible way of a large number of staff obtaining the necessary level of knowledge in the shortest possible time. At all events, these are ideas that are being worked on by outside companies who devise such teaching systems and who are attempting to sell them to Mazda.

A more company-related training concept of this type could also gain in importance for cost reasons. At Mazda, training is available at no charge for the employees of the dealers. Dealers only have to cover the wages, accommodation and travel costs of the participants. If training measures continue to expand, however, and the costs become too much for the dealers, meaning that they are no longer able to pay for continuing training, then thought must be given to finding a lower-cost training method. It is true that the number of dealers has grown and that hence the capacity of the school has indirectly been reduced, but that is not the real problem for training but rather the rapid pace of innovation and therefore the frequency of training required for each individual.

3.3 Other forms of continuing training

There are also opportunities for continuing vocational training with Chambers of Commerce or Trades, associations, and public institutions. At the moment, for example, the proprietor's second son is attending a master mechanics' evening course at the Chamber of Trades, every working day from 6.00 to 9.30 p.m.

4. Training practice at the firm

4.1 Training plans at the repair shop level

There is no specific planning of continuing training in the repair shop. However, complicated repairs are used for internal training, often with the aid of training material that the Mazda after-sales service organization has prepared (videos, course documents etc.).

2.

4.2 Link between training concepts and demand

All newly-recruited employees or apprentices taken on after their apprenticeships at Autohaus M. GmbH are sent as soon as possible, depending on the space available in Leverkusen, to the customer service training centre to attend the basic courses appropriate to their job. Later, too, they are registered for technical courses at regular intervals, according to what is offered by the customer service training centre and the quota apportioned to the firm on the basis of its number of staff (see Appendices for range of topics).

If Mazda does not offer any appropriate courses itself, employees attend seminars at outside companies if the contents are tailored to Mazda's needs.

4.3 Target groups of vocational training

The senior partner together with the two co-proprietors of the firm, his sons, choose which employees are selected to attend which training course. This decision is binding for the employees. If employees claim the need for new training themselves, they can attend the course provided that there are no operational reasons to prevent them. It is first checked, though, that they can actually cope with the performance expectations on the technical side.

The main emphasis of continuing vocational training at the firm is placed on the technical field, 90%, with only 10% on the commercial side.

4.4 Training plans

Motivation for continuing training is not really a problem. The senior partner does, however, make it plain in no uncertain terms that training is a requirement for each and every one: "If the staff of the firm decide that a certain employee is to attend a course, then he must do so. It is training that safeguards his job and is to the benefit of the firm." The only time that problems might occur is in summer, when staff shortages occur due to holidays. It may happen in such cases that there is no alternative but to miss a particular training event.

Changes to continuing training become necessary as new products arrive on the market; new technology necessitates staff training. As a customer, the firm has only an indirect influence on the structure of continuing training. A technical adviser, in some ways a district manager, visits the firm at regular intervals. If deficiencies or difficulties in dealing with the technology in the repair shop are detected, there is a discussion as to whether a course can be held on the relevant topic. "Otherwise courses are always entirely product-oriented. Training is carried out for a new vehicle or a new system or assembly so that the repair shop personnel can handle it for maintenance, servicing and repair. There is also constant reference to selling points in the form of beneficial technology, equipment and ride comfort."

Mazda introduced a diagnostic system a number of years ago. "This is a kind of memory in the vehicle in which faults are recorded and can then be called up with a digital code checker. It makes it possible to locate faults in various circuits and components. For example, you can determine whether a lambda sensor is faulty and if the car has been running with the fault for some time. It also helps to locate faults which the customer describes as: 'there was a sudden jerk about four weeks ago, but nothing since.' This device can then show where the cause of the fault is to be found." (Senior partner)

Mazda stipulates clearly which technical equipment has to be procured. When a new product is brought onto the market, the firm is obliged to buy the associated special tools to be able to perform repairs and adjustments on the vehicle. These include the relevant measuring instruments, gauges etc. The corresponding further training courses are also made available as soon as a new vehicle appears on the market, approximately at the same time. "It can happen, of course, that a course might be held up to four weeks later," was the comment of the owner.

The firm is not currently considering expansion, neither in terms of space nor staff numbers. The priority in the immediate future, it is said, is to keep control of costs. At times of high interest rates, intensified competition with ever bigger discounts on vehicles and ever smaller profits, it is necessary to look for even more rational working methods at the firm. An attempt must be made, we were told, to increase productivity in repair and sales. "We have to reach about 90%. The slack must be reduced. What bothers us is the extra work on vehicles that is effectively carried out as an act of goodwill. This time is then missing for the rest of the work on the vehicle. But you can't charge the customer for everything. Let's take the case that a customer wants an auxiliary heating system fitted. There is usually no space for it in the car. First you have to look at the components and study the fitting instructions. Then you need two days to install it. What appears on the customer's bill? Two or three hours' work!"

4.5 Costs of continuing vocational training

The amount of time expended on training per employee of the firm amounts to about one week or approximately 40 working hours per year and mainly takes the form of courses at the customer service training centre.

Mazda provides the training for the dealers' employees at no cost. Dealers only have to meet the costs of the wages, accommodation and travel expenses of the participants. The costs for training at other establishments are usually borne by the participants, unless the firm has an express interest in the employees attending particular courses.

4.6 Evaluation of costs

The firm's current training policy problems lie in the financial area. It has to pay for the costs of board, lodging and travel. Wage payments also continue for the days of the training course. A day at a seminar therefore costs DM 1,000. Extrapolation of this figure to take account of the average attendance at training events gives an annual cost to the firm of DM 35,000, or DM 5,000 per employee.

5. Evaluation of the training concepts

If the training activities undertaken by Autohaus M. since 1987 are looked at more closely, it is noticeable that the trend is for all employees to make slightly more use of the training on offer at the Mazda customer service training centre (with regard to the length of the courses), with the greatest concentration by far on the long-serving staff, the sons of Mr. M., who are also co-proprietors of the firm. It is difficult to determine whether it is the duration of their employment or their status in the firm which leads to this state of affairs; presumably it is both. These two people hold key technical positions in the firm, but at least from the choice of course topics it is not obvious that they are specializing in a particular area. Such specialization applies in particular to the mechanic in the bodywork and painting department; his courses did not form part of the standard programme at the customer service training centre. It is also noticeable, however, that new employees complete the basic course for their technical field within the first year of their employment.

It is also a matter of course and by now almost a tradition that the senior partner attends a dealers' conference and a seminar for sales personnel every year.

In the experience of Autohaus M., technical changes are causing the emphasis to increasingly shift from repair to electronics. It was said that only those who have acquired the necessary technical skills and have undergone continuing training are able to carry out repairs. A background of Mittlere Reife (the intermediate school-leaving certificate) or even Abitur (the final school-leaving certificate) makes it easier to cope with the tasks. This can apparently be seen in work on the vehicles. An unskilled worker is only able to carry out certain specific jobs.

There is said to be a major need for continuing training in the future as a result of foreseeable new technical systems, such as four-wheel steering, which are already being marketed by Mazda. Relevant courses are also available at the customer service training centre. Mazda makes use of appropriate measuring equipment from third-party manufacturers such as Bosch or Sun for the purpose of electronic measurement.

It seems that Mazda informs the dealership organization sufficiently quickly and thoroughly of the current technical innovations. Adaptation of the standard courses to technical developments in the medium term also appears to proceed satisfactorily. Mazda therefore also gives little thought to how continuing technical training might need to be configured to suit future requirements. The only visible changes in this direction are the video-based decentralized learning system and the beginnings of a computer-aided learning strategy, but both of these are founded on the basis of the central pillar of the customer service training centre. However, it does appear questionable to us whether Mazda's chosen form of centralized training of "multipliers" supported by decentralized accompanying material will be adequate in the future, when faced with an even broader range of products and accelerated innovation cycles.

Changes in content are usually introduced at the instigation of the technical side. The technical department has the task of gathering problems and facts from the dealerships (obtained via the field service and hot-line queries) and then reporting them to the manufacturer. They also learn from the guarantee department's reports what technical problems have occurred. The customer service training centre, too, tries to use its information from course participants to contribute to the encouragement of improvements to vehicles. There is very close contact between training staff and the technical department. As a consequence, the customer service training centre is always informed relatively quickly of the measures taken to counter technical problems, and can pass on that information in its courses. The prerequisite for this, however, is good co-operation between the technical department and the customer service training centre.

6. Conclusions

In Autohaus M. we have probably found an exemplary case of above-average training quality at a small dealership within the framework of the Mazda dealership network. This is indicated not only by the fact that it has qualified for the Plus X programme (sports cars), but also that it takes part in the Mazda organization's business management competition. It is also suggested simply by the firm's training figures: if it is assumed that Autohaus M. is an average-sized firm, given 1,000 companies and 3,000 course places it would be entitled to about three courses per year at the customer service training centre. Even if the

dealers' conference and sales seminars attended by the boss are disregarded, employees have always attended four or more courses in recent years.

Within the Mazda organization, this firm is certainly among the front-runners in continuing training for its size category, as is also shown by the fact that a third member of staff (out of seven) is on the way to qualifying as a master mechanic. This has to be rated as a special case, however, and probably only works because the functions of a master mechanic (or future master) and the status of owner are identical. Nevertheless, there is a remarkable concentration of technical competence in one small firm. Three staff members also have the Abitur and at least one other has the leaving certificate from a Realschule.

Despite this unusually good educational background, there is nothing to prevent the assumption being made that the system developed by this firm and the high frequency of training could not also be adopted by other companies. The limitation appears to us to be more an external matter: the capacity of the customer service training centre and the high costs associated with centralized training for many companies, especially those some distance away. However, it does appear questionable to us whether Mazda's chosen form of centralized training of "multipliers" supported by decentralized accompanying material will be adequate in the future, when faced with an even broader range of products and accelerated innovation cycles.

APPENDICES

Appendix 1

Dealer's stamp:

Mazda Motors (Deutschland) GmbH
Schulungszentrum
Postfach 100 960

5090 Leverkusen 1

Request for after-sales service courses:

I hereby give notice of my firm's requirement for courses on the following topic(s):

Course topics	Number of persons
1. "Basic course"	
2. "Electrical systems I"	
3. "Electrical systems II"	
4. "Electrical systems III"	
5. "Electronic fuel-injection systems I"	
6. "Electronic fuel-injection systems II"	
7. "RX-7 Turbo (FC and FD)"	
8. "Manual transmissions"	
9. "Automatic transmissions"	
10. "Four-wheel drive"	
11. "Running-gear alignment and balancing"	
12. "ABS systems"	
13. "Diagnostics and repair of supplementary, luxury and safety equipment"	
14. "Basic seminar on job acceptance"	

Place, date, signature

Scheduling of courses is carried out at the Mazda Training Centre after receipt of your request. You will be informed of the dates in an invitation that will be sent to you separately.

2.

Appendix 2

Mazda

Training Centre

	Parts and Accessories
	Basic course
Target group:	Employees of dealerships responsible for the following duties: Sale of parts and accessories Ordering of parts Inventory management
Training goal:	After attending this course it is intended that participants should be able to carry out their work even more productively and with greater relevance to service than before. The work in parts and accessories training is intended to train experts in stages for the field of parts and accessories.
Duration:	3 days
Contents:	Familiarity with models Catalogue training Ordering methods Information about organizational procedures at MMD Communication with MD

Appendix 3

Mazda

Training Centre

MACH
Seminar concept

MACH

Introductory seminar
(Planning and preparation for use of MACH, 2 days)

Basic training
(Practical introduction to the essential basic functions of the MACH programme, 3 or 2 days)

Continuation seminar:
Motor-vehicle sector and sales promotion, 2 days

Continuation seminar:
Inventory and materials management, 2 days

Continuation seminar:
Entry journal and accounting interface, 2 days

Special seminars
Specialized questions relating to the use of MACH

Mazda after-sales school
Leverkusen

Courses available

After-sales service (technology)	Parts and accessories	Data processing
14 courses over a total of 38 5 training days (see Appendix) + special course on introduction of a new vehicle model. 1–2 days training time	Basic course 3 days (see Appendix)	6 courses over a total of 13 days (see Appendix)

3. MERCEDES-BENZ AUTOHAUS K.

2.

Size of the Firm: IV

Car Maker: Mercedes-Benz

Type of Vehicle: A, B

Type of Firm: B

1. General description of the case

30 people work at the Mercedes-Benz dealer Autohaus K. KG in a small town in North Hesse (including the proprietor but not including apprentices). They sell and repair the entire range of Mercedes-Benz AG vehicles: passenger cars, trucks and off-road vehicles. The range of repairs covers all specialist areas and a variety of makes, as the firm also deals in second-hand vehicles which it also services and repairs. The firm trains its own employees.

Mercedes-Benz AG has its own Service Training Centre (STC) in Esslingen-Brühl, with branch establishments in Gaggenau and Mannheim, and 57 decentralized STCs in 39 countries. All after-sales service training for Mercedes-Benz AG around the world is controlled in Esslingen, and a major proportion of German training is conducted there. About 350 people are employed full-time in continuing training at Mercedes-Benz throughout the world, 123 of them in Germany.

A new project, a distance learning concept via satellite conferences with regional bases in Germany, is currently being developed, installed and tested. In future it is hoped to be able to train up to 300 participants at 15 stations at the same time. Mercedes-Benz AG has had experience with computer-aided forms of decentralized continuing training in the repair shop (combined video and PC schemes) for some considerable time.

Autohaus K. makes use of everything available from the customer service training centre, but mainly tries to send staff to courses in the region as provided by the STC at the branches.

2. General description of the firm

Autohaus K. KG is an authorized repair shop and dealership for Mercedes-Benz AG in a small town in North Hesse. There are a total of 30 employees (including the management) who sell, service and repair the entire range of Mercedes-Benz AG vehicles, from passenger cars through off-road vehicles to commercial vehicles. They also deal in second-hand vehicles of other makes, which in some cases at the customers' request are subsequently serviced and repaired at the firm. This service is part of the company strategy, binding customers to the firm for the longest possible time. Apart from painting work, which is contracted out to three other companies, all types of repair are dealt with in the repair shop; no particular specialities are highlighted. There is also co-operation with other companies in the field of special-purpose commercial vehicles.

The firm was founded as long ago as 1918 in a village to the south of Kassel, and in 1935 moved to a neighbouring village in which the proprietor had a farmhouse converted to a motor vehicle repair shop and car dealership. At that time the firm employed 10 people. In 1964 the firm moved to its present location, and at the same time became an authorized dealership and repair shop for passenger and commercial vehicles for Mercedes-Benz AG. The foundations were thus laid for the present-day firm. Major changes worthy of note since then are, in 1981, the installation of a brake test bench and enlargement of the truck shop, and, in 1984, the construction of a display hall and a vehicle test bench.

At the same time the firm has, of course, always implemented the constant changes necessary to stay in line with the manufacturer's models as they have continuously been updated; as a result of the rapid growth of electronic systems in the vehicles, particularly in luxury cars, it has moreover recently had to make considerable efforts entailing investment and raising the level of qualification. As do all Mercedes-Benz partners, the firm receives the necessary set of new tools virtually automatically when a new model is introduced. A computer system was purchased, and now all internal and external operations and services are processed electronically (repair acceptance, repair shop performance, staff work records, work costing, spare-part procurement, invoicing etc.).

The firm is located alongside a major trunk road close to a motorway and is therefore also easily reached by customers from the transport sector. With its imposing showroom building, company flags always flying, transparent company signs and illuminated advertising, it draws attention to itself and its products at all times of the day and night.

Thanks to its commercial vehicle branch and its location in the catchment area of a number of spas, it has a relatively large proportion of random customers, over 10% in fact: "Because we are in a health resort region, many customers come to us who link their stay at the spa with a visit to the repair shop. They come once a year and make up about 10% of the clientele." (Member of the management)

The managing director and proprietor, or general partner, of the KG (limited partnership) is Mr. K.; his daughter is responsible for commercial matters and co-ordination, and his son for repair shop supervision. They are assisted by an accounts clerk. At the next level, the firm is divided into a technical department and a commercial department, each comprising three sub-units (see organizational chart in the Appendix) On the

technical side there are the passenger car repair shop with two master motor mechanics and nine motor mechanics, the truck repair shop with one master mechanic and four mechanics, and the spare-parts store with three employees. In the commercial department a master motor mechanic (from the technical department), an after-sales service adviser and a clerical employee for invoicing work under a manager in the after-sales order acceptance unit, two car salesmen and a clerical employee work in car sales, and two clerical employees for finance and accountancy work in the accounts unit.

All employees have received relevant training for their occupation; about half completed basic secondary modern school (Hauptschule), while the other half have a leaving certificate from the other type of secondary school (Realschule) or a final school-leaving certificate (Abitur).

One of the employees comes originally from Turkey. The four female employees are all assigned commercial and administrative tasks. With regard to the age structure, two of the employees are not yet twenty, seven are over forty, and the rest are in the age group between 20 and 40. Overall, one of the features of the workforce is the length of service with the firm: of the ten employees who gave us precise details, only one had been with the firm for less than 15 years, but three for more than 25 years.

There is a company section of the IG Metall trade union with about 20 members from all departments and age groups. A staff committee with three members is also in place.

The working conditions conform to the collective agreement: 30 days' holiday, 37.5-hour working week, but with overtime in urgent cases, especially in the truck sector. "Transport and supply vehicles, for example, have to be ready to be put back on the road immediately. We work on two Saturdays per month, for example, because the commercial vehicles are only available for repair on Friday afternoons and Saturdays as they are in use during the week."

The firm trains its own staff. At the moment there are eight motor mechanics undergoing training. Apart from attendance at a Berufsschule (part-time vocational school), additional in-house training is regularly provided: two to three hours every two weeks. This is supplemented by "the 'K' courses, which are stipulated by the Central Association of the Motor Vehicle Trade (ZDK). They are held at the Chamber of Trades training centre in Kassel." Only about 10% of the apprentices are taken on in the firm, because far more are trained than are required. The department in which the person is to work makes the choice as to who is to be retained. "In the technical department it is up to the master mechanics, and in the commercial department all those who have dealings with the employee. So it is not the case that the boss says: 'That apprentice is staying!', but rather that those who know how the people concerned work always decide whether they are to stay on at the firm.".

3. Provision of continuing vocational training

3.1 Structure within the firm

Continuing vocational training within the firm is concentrated greatly on the courses available at the customer service training centre, above all on courses at the closer regional branches of the school. There are no fundamental problems of motivation among the employees, but importance is attached to everyone participating in continuing training more or less regularly, even if not to the same level of intensity.

The section head is responsible for selecting the courses and who is to attend; in the technical department, therefore, this is the repair shop foreman. In addition to selecting suitable employees for the training which necessarily accompanies the introduction of new products, his decisions are also based on any shortcomings detected in the employees' work. Wishes expressed by employees themselves are also taken into consideration, if this can be justified on organizational and financial grounds.

On many occasions, attendance at courses is taken as a prompt to hold in-house training: when someone returns from a course, it is arranged as soon as possible that at least the person's immediate working group and other specialists who would be helped in their work by learning about the contents of the course are informed of new developments by the person who attended the course. Other documents and supporting material (video films) produced by the customer service training centre are often also available in such cases, in addition to the course documents themselves.

3.2 Structure of the customer service training centre

The most important partner in continuing training for Autohaus K. is the Mercedes-Benz AG customer service training centre, the Service Training Centre (STC) in Esslingen-Brühl with its branch establishments in Mannheim and Gaggenau, and a further 57 decentralized training establishments ("satellite schools") in 39 countries around the world. (See Figs. 2 and 3 in the Appendix for details of staff and training activities.)

There is a long tradition of after-sales service training at Mercedes. Long before the Second World War there were training opportunities for chauffeurs to enable them to maintain and take care of the cars in their charge. "They were given

2.

the chance of being present during the production of "their car" so that they could get to know the technical ins and outs." After the war, the first courses for staff of the after-sales service and the sales organization were held as early as 1949. The big training centre in Esslingen-Brühl was opened in 1978; 400 people can be trained there at any one time. Training courses are also held at the branches, however, and media are produced to allow decentralized learning close to the workplace.

The original inducement for "mobile", i.e. decentralized, training was the need to support the partner organizations in other countries, now totalling 173.

In the course of time, the target group of the customer service training centre has expanded considerably and become more differentiated. The range on offer includes:

- Business conferences for managerial staff of the after-sales service organization, subsidiary companies and general agencies
- Seminars for managerial staff of dealerships and their customer-support personnel
- Briefing of training managers and instructors from decentralized training establishments
- Training for specific target groups, such as major customers, public authorities, authorized experts, and members of trade associations
- Development of teaching programmes for its own training courses and those of the decentralized training centres
- Pilot courses for new teaching programmes and teaching media still under development

The primary task, of course, remains the technical training of dealership personnel and sales training, comprising the following three main areas:

- Passenger car service training
- Commercial vehicle service training
- Service management training

To meet this aim, a host of different courses are on offer, and they are constantly updated or redesigned (by way of an example refer to the course plans for commercial vehicles (Fig. 4) in the Appendix). Particularly the extension of the use of electronic components in vehicles and their systematic integration in networks has recently necessitated a growth in training requirements for repair shop personnel and constant changes in the content of courses.

The after-sales service notices shortcomings in the understanding of these new systems in a number of participants, but in general is unable to make up for them. "The demands made of the employees at the authorized dealerships are constantly rising. We don't always have the qualified people at the dealerships, though, who we really need. This is a social problem. Because you get yourself dirty in the repair shop, the best people don't come to us. Today's technology can no longer tolerate unqualified staff." With regard to the younger generation, however, the matter is relatively hopeful. "They understand the new measurement techniques and what electronics is all about, either because of their own interest or because they have learned the fundamentals at school."

The STC's annual programme is initially updated according to the experience gained in the previous years, and is constantly adapted to new technical developments. Queries received in large numbers from the sales organization are also taken into account. It can even happen that the training plan is overturned in the event of an accumulation of technical problems at the dealerships, and a special scheme is fitted in to cover an urgent topic. These problems are detected by contact with the after-sales service managers at the dealerships, from observations made by the guarantee department, or from reports from the instructors in the decentralized STCs. Special schemes that are planned at least to a certain extent are those for model changes or major modifications to existing models which call for special training efforts in a short space of time for large numbers of people.

The trainers at the STC are generally professional practitioners with an engineer's training, broad background knowledge about automotive technology, teaching skills and knowledge of foreign languages. Special information weeks (for both technical training and foreign-language teaching) are planned and held for the trainers on their own; the STC is closed during that time. At the time of model changes, for example, when the introductory courses for the sales organization are being prepared, it may be the case that the school is closed for two weeks: first the trainers have to be instructed, and then the course documents prepared. This all has to happen within a very tight time schedule, because it does not make sense to begin internal training before series production has commenced. By then, however, the dealerships also want to be briefed on the new model. "We can only start preparing the training documents when the first cars are being built. Differences still appear between pilot production and mass production. That means that we can't start devising the training documents until six weeks before the start of production. Then the staff of the decentralized training centres come to us and get their material, above all those from other countries in the relevant languages. Between six and eight of our staff then also travel around and give instruction at our satellite schools, for example in the new electronics in the model."

Instruction of the trainers is prepared and performed by trainers with responsibility for

specific subject areas or by appointed training experts, who obtain their qualifications by close contact and constant talks with the development department and the component suppliers. The appointed training experts are obliged to keep themselves up to date in their fields.

Despite expansion of the training capacity, there are not enough places to train each member of dealership staff sufficiently regularly. For that reason, and because of the shortcomings noticed among some employees as mentioned above, the Mercedes-Benz STC has actively concerned itself with the development and use of new computer-aided media in recent years. As part of this, there is a teaching computer available at every dealership (see Fig. 5 in the Appendix for the configuration) on which everyone can choose and control their direction and pace of learning themselves, to suit their own wishes, abilities and opportunities (including time available). This method of computer-based learning, now referred to as computer-based training (CBT – see Figs. 6 and 7 in the Appendix), is intended mainly to cover standard topics that every employee has to master and which he or she can study at their place of work as required, according to the amount of time available. In future it is the intention that the STC's courses are to be stored on this medium and then made available to the dealerships for staff self-instruction when the course is no longer running at the STC (after about two years).

Mercedes-Benz is taking a spectacular step with its research project known as AKUBIS (a German acronym for automotive after-sales-oriented broadband information system) in co-operation with the German Federal Post Office, a Fraunhofer Institute and SEL. In this system, training is to be conducted in a direct dialogue transmitted by video between various locations, which can be far removed from each other. It will be possible to connect video conferences between the STC in Esslingen and up to 15 stations, using either a broadband network (ISDN) or satellite (to foreign countries) for transmission. According to present plans, up to 300 people could be trained simultaneously and enter into dialogue with the instructor in Esslingen (see Figs. 8 and 9 relating to AKUBIS in the Appendix).

A training unit might then look something like this: after an introduction to the problem by the instructor and initial queries from the group of participants in the remote video studios at an agency via the video dialogue system, the trainees would begin practical exercises that would have been prepared for that purpose at all conference locations; the conference connection would be interrupted to allow for that. After the exercises, the STC would go back on line, giving the opportunity for detailed discussion between the instructor and trainees anywhere in Germany (in principle anywhere in the world) of the experience and problems encountered during the exercises – which can also be illustrated by video presentations from the connected locations, as cameras and transmission equipment will also be available there. Mercedes-Benz hopes with this system to achieve cost-efficient training of a large number of people which will be effective within a short space of time. It is above all the large number of connections and the removal of the need for frequently time-consuming journeys, combined with the possibility of dealing with up-to-the-minute problems, that are given as reasons for the expected effectiveness of this system, which is to enter its final stage of completion this year. It is viewed by Mercedes-Benz as a pilot project with a high advertising impact (probably above all for domestic advertising). "We are still one step ahead:..."; "The only ones still in the race".

3.3 Other forms of continuing training

To our knowledge, no use is currently made of the possibilities for continuing training specific to the motor vehicle sector offered by the local Chambers of Trades or trade associations (such as training courses for master mechanics or service technicians). Neither do we have any information about attendance at general or commercially oriented continuing training courses provided by institutions such as the Chamber of Industry and Commerce, adult education centres or similar establishments.

4. Training practice at the firm

4.1 Training plans at the repair shop level

The breakneck pace of technical development makes in-house training unavoidable. It is mainly organized in conjunction with the attendance of courses at the customer service training centre by individual members of staff: each visit to a course is used for internal training. "When mechanics have been on a course, we get together again at the firm for an internal training event, with a small group of employees with relevant interests. The contents of the course are passed on to the other employees. That is the most important thing, that the knowledge does not remain a monopoly for an individual, but that the information circulates to all concerned." (Master mechanic)

In-house training following on from courses is supplemented by staff self-instruction with the aid of video tapes covering technical and marketing information, and tricks of the trade such as image training. The tapes ("at least two per month") are provided to the dealerships by Mercedes-Benz. They generally run for 15 minutes, and are watched by the staff during working hours or sometimes after the end of work; some employees also take them home.

There are no major problems of motivation for participating in continuing training. It does happen from time to time that individual employees approach a foreman with the idea of attending a course that would help them to deal with problems with which they are confronted as a result of the rapid changes in technology. On the other hand, however, the management does consider it necessary to constantly draw employees' attention to the need for continuing training, as they say that the only way of surviving in the face of competition in the future is by joint effort with work of an excellent quality.

4.2 Link between training concepts and demand

Employees have (sometimes unspoken) expectations that further training will give them personal advantages. This is particularly true of the "junior master mechanics", that is employees who have attained their master mechanic qualification but for whom no suitable post is available. The service technician job is seen as one way of solving this problem of qualifications not being duly acknowledged: "This creates an interim position between the ordinary motor mechanic and the master mechanic/foreman. We have informed our employees that this qualification exists, but so far none of them has shown any interest in the further training for it." (Member of the management).

In recent years the demand for further training has increased rapidly, both on the part of the firm and the individual employees. This is true above all in the area of improved quality of technical services carried out on the vehicle but also in the area of customer care, after-sales service and sales advice. "Technologically innovative products with complicated electronic systems designed to increase comfort, found for example in S-class cars, have inevitably given rise to an immense need for further training of mechanics in the repair shop. Primarily, what is required is systems analysis, troubleshooting for integrated electronic systems with fault storage, the ability to read circuit and connection diagrams and locating the computer systems, sensors and actuators in the vehicle. This has inundated us with new fields of knowledge to be mastered."

Inherent in this increase in technology is, however, the problem of a certain amount of selection: some employees, with the best will in the world, simply cannot keep up any more. Furthermore, even the firms themselves are always running to catch up. For example, the repair shop, like others too, has "a diagnosis procedure. We had to buy a new engine tester in order to be able to locate faults. One of the staff had to go on a training course. He then had to pass on immediately what he had learnt to a colleague." Also when a new model is introduced, the preparation time available is usually pretty short. There are opportunities for training beforehand but it usually all takes place at quite short notice. At least one employee has attended a training course, though, before the model arrives at the firm.

4.3 Target groups of vocational training

New employees or trainees who have been taken on from another firm are sent as soon as possible on the basic training courses offered by the customer service training centres: for instance "Parts and Accessories", in the case of staff on the commercial side of the business, or courses for up-and-coming sales personnel. Wherever possible they are sent on courses in the branch establishment in Kassel in order to save time and money.

These basic courses account for about 5% of the training in the firm. Another 5% take the form of management training, roughly 10–20% are sales training courses and the remainder, the vast majority, are technical courses.

Essentially all employees are eligible to take part in the courses offered by the customer service training centres. Capacity is however, limited, so most courses offered when technological innovations or new models are introduced normally concentrate on the foremen who then use in-house training to ensure the knowledge permeates to all parts of the firm.

4.4 Training plans

Virtually the entire continuing training in the firm – apart from the "private" activities of individual employees (e.g. the courses for master mechanics at the Chambers of Trades) or isolated exceptions – is based on what is offered by the Mercedes-Benz customer service training centres. No secret is made of the fact that preference is given to the decentralized courses in the branches which are geographically closer (Kassel, Hannover, Dortmund, Düsseldorf), although employees are, of course, also sent to Esslingen-Brühl.

The selection of participants in the technical department is made by the foreman responsible after consulting the annual plan issued by the customer service training centre. He recommends certain employees to the management for relevant courses. One of the criteria used by the foremen is the shortcomings he has noticed in individuals but the main one is the desire to keep the level of qualifications of his department up to scratch and make sure that his staff are qualified to deal with special developments (in the field of off-road vehicles, for instance).

4.5 Costs of continuing vocational training

On average the amount of time spent in continuing training is, according to the management, 56 hours per year for each employee: seven full working days a year.

They say that costs have rocketed in recent years. A member of the management estimates the rise in costs from 1991 to 1992 alone at some 30 to 40% and explained it by the increased demand for qualifications brought about by rapid changes in vehicle technology but also by the high costs of external training courses: continued payment of wages, travel costs and board and lodging.

4.6 Estimation of costs

We have no information about the absolute costs to this firm of participating in courses at the customer service training centres nor about other costs of continuing training. It is not known whether the costs are calculated to include in-house continuing training.

5. Evaluation of the training concepts

In the standard written questionnaire on participation in continuing training courses, those questioned have unfortunately given very different responses over recent years. Most confined themselves to referring to "the constant continuing training in Kassel and throughout the country" and mentioned at best only one or two titles of courses from the past two years. A few others named a whole list of courses from the same year: a fitter had taken part in four in 1992 and three in 1991, one master mechanic had even attended seven courses in 1992 (but only two in 1991). This survey thus provides a poor basis for an evaluation. One thing is, however, clear: all concerned took permanent continuing training for granted.

We gradually formed the impression that this firm mainly promotes concepts of decentralized training and learning on the job from colleagues, seeing it, however, as a complementary and economic way of passing on knowledge gained in centralized learning situations. This firm, in any case, strongly emphasized the costs involved in continuing training – not that they were considering not paying them, but saying that the limit was in sight beyond which they would not be able to cope with further expansion, either in costs or the number of continuing training activities.

6. Conclusions

In this case efforts are being made to conduct continuing training in a decentralized manner (across the globe) whilst maintaining the central role of the group in its control. This has been put into practice in training sessions in the branch establishments. It remains to be seen whether the ambitious project of global video projects will overcome the deficits in the repair shops which they themselves are seeking to overcome by means of "home made training drawing on the snowball effect" and the use of self-learning media. Initial attempts are being made this year. What does seem certain is that, even with AKUBIS, it will not be possible to regularly reach all the employees in the repair shops. We believe that an inflation of the system of this kind would not only cancel out the cost advantages aimed for, but would, without doubt, also cause considerable problems of organization and therefore fail in practice.

APPENDIX

2.

Figure 1 – Organization chart of the firm Autahaus K. KG

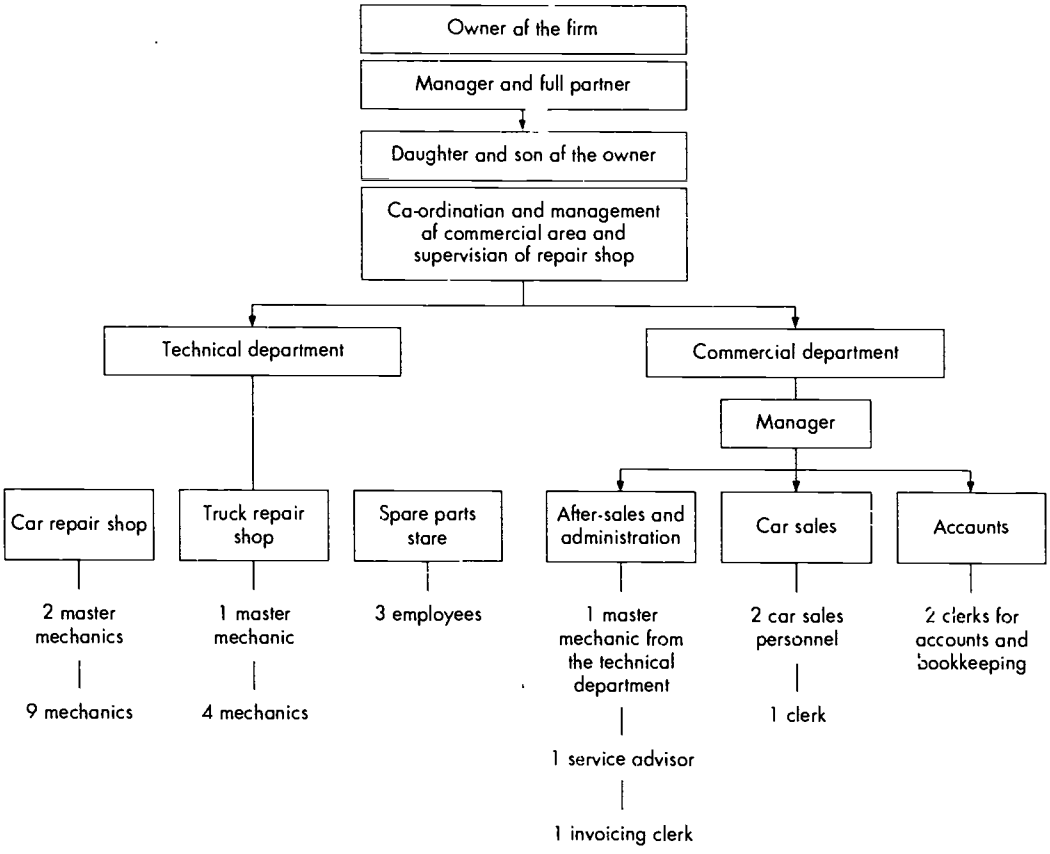


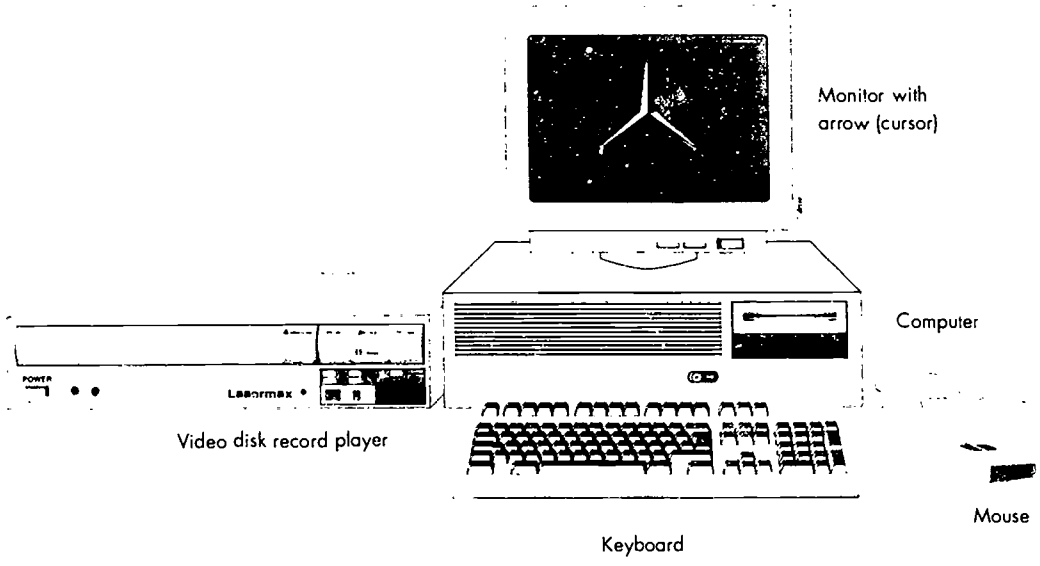
Figure 2 – Mercedes-Benz Service Training Centre

Central	Training Staff
VP/PST (67) and VN/TST (46)	113
UKD Gaggenau	6
KD Mannheim	4
	123
Decentralized	
In 39 countries 57 service training centres	232
Totcl	355

Figure 3 – Training activities Mercedes-Benz Service Training 1991

	Central	Service	Training	Schools		
	VN/TPT (not incl. non-technical topics)	VP/PST	UKD Gaggenau	KDR Mannheim	Decentralized Service Training Centres	Total
Courses	1,054	1,501	216	112	6,165	9,048
Course days (Activities)	3,630	4,733	630	292	18,797	28,082
Participants	13,081	21,061	1,943	1,642	63,145	100,872
Man training days (Effectiveness)	45,325	63,535	5,593	4,469	192,352	311,274

Figure 5 – How do you use the learning system?



Electronically-controlled Pneumatic Gear Shift – EPGS MB gear transmissions

Figure 4 – VN/TST – Training courses in the field of commercial vehicles: 1993

Category of course ►	◄—— Model-specific courses ——►				◄——	
Type of course ▼ / Topic ►	General	Pick-up trucks	Trucks	Buses	Engines	Manual gear transmission
Introductory course	Provided as required and for new models or aggregates included in the planning					
Basic courses for repair shop personnel in the MB organization (Key: Length of course (days) — Course — Page no.)	NAND Emergency service 4,5 | 112 NASU Exhaust emission testing 2 | 1·2		NNAW Special features of custom-built commercial vehicles 4 | 113		NPA Repair of aggregates 5 10 | 123	NGGR MB gears Heavy series 3 | 124 NNAN MB auxiliary drives 2 | 124 NKVI Retarders 2 | 125
Courses on innovations/changes for repair shop personnel in the MB organization		NTAN Pick-up trucks 2 | 113	NIAN Light, medium and heavy trucks 2 | 114	NOAR 0 404 2 | 114 NOAS 0 405, 407 408 2 | 114	NMNA OM 300 and 400 2 | 123	NGNA MB gears and EPGS 2 | 112
Courses for managerial staff and after-sales advisers in the MB organization	NANB After sales advisers 2 | 22 NFTM Driving trainers economic driving [illegible]	NTRM Master mechanics Pick-up trucks [illegible]	NANM Master mechanics Trucks 4,5 | [illegible]	NOMM Master mechanics Buses 4 | [illegible]		
Courses for commercial customers, government authorities and assessors	NAFK Managerial staff 4 | 47 NFFK Fleet manager economic driving	NTMK Repair shop staff Pick-up trucks 4 | 43	NAK Repair shop staff L/M Trucks 4 | 43 NMK Repair shop staff M/H Trucks	Bus training courses (see also brochure customer information After sales dept Mannheim)		

Courses specific to aggregates, systems and component groups →

	Automatic gear transmissions	Axles Steering	Brakes Air suspension	Electrics and Electronics Trucks	Electrics and Electronics Buses	Running gear adjustment	Body work Fittings	Accident repairs	Body painting
in appropriate numbers and correspondingly announced									
	NAGB Automatic MB transmissions as in registration 4 | 1 2 7		NBAG Brakes 4 | 1 2 9	NNEG Commercial vehicles electrics – Basics 4 | 1 3 2		SNFB SNFM SNFJ Running gear adjustment 3-5 | 1 4 2		SNUT Pick up trucks Repair of accident damage 4-5 | 1 4 4	SNL 1 Commercial vehicles, Repairs to paintwork Stage 1 4 10 | 1 4 6
	NAFB Automatic transmissions ZF / Voith as in registration 3 | 1 2 8		NBDP § 29 E and V (D) 4 | 1 2 10	NLEA Electrics and air conditioning – Trucks 4 | 1 3 2	NOER Electrics and air conditioning – Coaches 4 | 1 3 3			SNUF Trucks Repair of accident damage to driver's cabs 4-5 | 1 4 4	SNL 2 Commercial vehicles Repairs to paintwork Stage 2 4-10 | 1 4 6
			NBPS § 29 V Specialists (D) 4 | 1 2 11		NOES Electrics and air conditioning – City buses 4 | 1 3 3			SOUF Buses Repair of accident damage 5.10 | 1 4 5	
			NABS ABS ASR 2 | 1 2 12					SNUR Repair of chassis 4 5 | 1 4 5	
			NENR Electronic level control 2 | 1 2 12	NEDG Commercial vehicles electrics and diagnosis – Basics 2 | 1 3 4					
	NAGF Automatic MB transmissions as in registration 2 3 | 1 2 5	NALN Axles and steering 3 | 1 2 9	NBLN Brakes ABS/ABR air suspension 2 4 | 1 2 12	NLEN Electrics and air conditioning – Trucks 2 | 1 3 2	NOEN Electrics and air conditioning – Buses 2 | 1 3 3		SNKN Trucks and pick up trucks Bodywork and fittings 2 | 1 4 3		SNL 3 – Comm Rep to paint work Paint mixing systems Stage 3 4-10 | 1 4 7
							SOKN Buses Bodywork and fittings 3 5 | 1 4 3		SNL 4 – Comm Rep to paint work innovations/changes 2 | 1 4 7
									SNL 4 – Comm Rep to paint work for Germ states with regional package 2 | 1 4 8
								SNKU – Repair of accid damage to comm for after sales advisors expert 4 5 | 2 4	
								SNUK – Rep of acc damage to comm for after sales advisors 4 5 | 2 4	
			NBPK § 29 E and V Trucks (D) 4 | 4 4					SNUT Repair of accident damage to comm vehicles Information for assessors 1 2 | 4 6	
			NBOK § 29 E and V Buses (D) 4 | 4 5						

2.

Figure 6 – CBL (Computer-based learning system) – Learning concept

What are the target groups of the CBL system for teaching EPGS?

- Skilled repair shop employees
- Repair shop managerial staff
- Service advisors
- Fleet managers
- Sales personnel

} Only certain parts of the programme

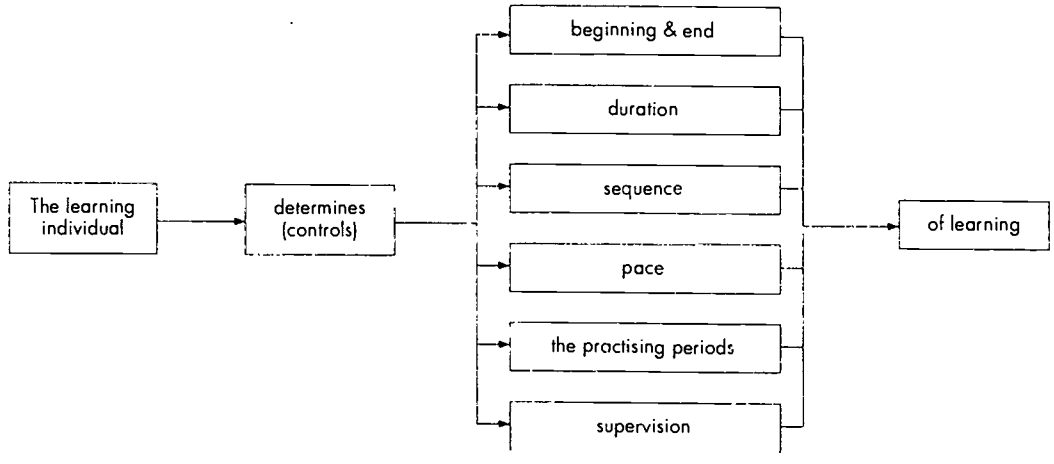
What are the teaching objectives of the CBL for EPGS?

The teaching objectives cover the theory and practice of:

- Driving with EPGS
- Naming the components of EPGS and identifying them on the vehicle
- Describing how the components and systems in EPGS work
- Devising methods for diagnosing faults (using the latest repair shop literature)
- Describing and carrying out test procedures for EPGS using the latest repair shop literature.

Figure 7 – What is the philosophy behind the learning system?

How can the individual control the learning process in the learning system?



Preliminary remark: "Learning" is a process, on activity such as "seeing", "recognizing", "feeling", "perceiving" of which we cannot be robbed. It is our very own activity and capacity to learn, in the same way as we breathe.
The philosophy of the learning system
Since learning is an activity pursued by our personality then we should be in a position to control this learning process

Figure 8 – AKUBIS: (automotive after-sales-oriented broadband infarmatian system)

Applications for after-sales personnel, parts management, sales staff, commercial arecs, management

Training	• Technical subjects • Non-technical subjects • Innovations/changes • Introduction of new models and aggregates/electronics • Training in behaviour • Communication with customers • Computer saftware
Technology	• Current technical problems and aids to solving them • Changes which have gone inta mass production/feedback from the field • After-sales activities/feedback from the field • Campaigns
Parts	• Marketing af parts. Presentation of new special extras • Presentation of new collections/feedback relating to new collections
Administration	• New computer programmes/up-dates
Conferences	• Conferences in the MBAG on a broad range af areas
Public relations	• Presentation of a new model, new colour, options etc. for foreign subsidiaries

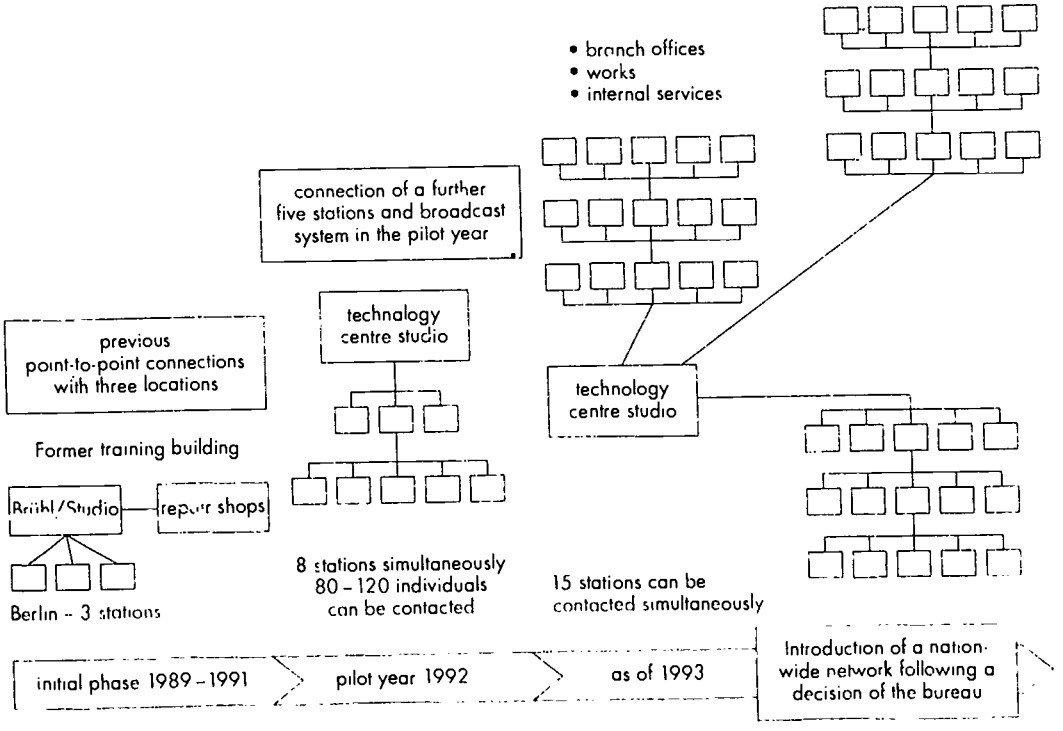
To compile this we contacted within Mercedes-Benz:

- MBVD/PN (car sales training)
- MBVD/PN (cammercial vehicles sales training)
- MBVD/PV (coordination systems for sales personnel)
- MBVD/OD (organization and data processing)
- ODV/R 1 (ODV/retail systems 1)
- ZBI/NDL (training for branch establishments and authorized dealers)

2.

Figure 9 – The AKUBIS concept for a national communication network is ready

We still have an advantage. Mercedes-Benz is the only company in the motor vehicle sector which has such an ISDN wideband network at its disposal



4. BMW AGENCY

2.

Size of the Firm: III

Car Manufacturer: BMW

Type of Vehicle: A, B

Type of Firm: B

1. General description of the case

The firm H. Automobile is an authorized BMW (Bayerische Motorenwerke, Munich) dealership and repair shop in a small town in Central Hesse. The firm was established in 1985 and employs nine staff, not counting the owner. The firm specializes in repairing BMW vehicles but also repairs other makes of second hand vehicle from their own sales department. The firm also sells new and used BMWs and used vehicles of other makes.

BMW has at present a central Service Training Centre in Munich and six decentralized training schools (five in Western Germany and one in Eastern Germany).

BMW provides its dealerships with "TIPs" (Training and Information Programmes). The company produces around twelve of these TIPs per year for use in the dealerships.

Another special feature of the car manufacturer BMW is that it is currently developing a new diagnosis information system (DIS) which is to be used in the dealerships from 1994. This DIS is intended to enable the staff of the dealerships to provide qualified and economic servicing of vehicles, in other words maintenance, service, fault detection and repair of integrated automotive electronics. The development of an information system of this kind is a response to the rapid increase in technological changes in the motor vehicle sector.

The training courses attended by the employees of firm H. are primarily those offered by BMW. The firm itself plays a part in the initial training of its employees.

2. General description of the firm

Autohaus M. GmbH is an authorized dealership and repair shop for the car manufacturer BMW (Bayerische Motorenwerke, Munich). It consists of a motor vehicle repair shop with a spare-parts store, an office and administration building (for customer reception and administration) and a showroom for the car sales department. The prestigious building and showroom pavilion are eye-catching and a good advertising feature for the firm.

It is at a well-chosen location on a major trunk road and therefore easy for customers to reach. There are no other vehicle repair shops or sales centres nearby to provide competition.

This firm both repairs and sells cars. It markets the entire range of BMW models and also sells second-hand BMW vehicles as well as other makes. The repair shop primarily repairs BMW cars but in individual cases does accept other makes of vehicle if they have been sold by its own sales department. The repair shop does not have any particular specialization but most of its work is in the area of automotive electronics and the drive train (gears, engine including ignition and fuel-injection). Body painting jobs are passed on to other specialized firms. The spares for their own make of vehicle are either collected personally from a BMW branch establishment in Kassel (approximately 70 kilometres away) or ordered by fax and delivered the next day.

The technical equipment in the repair shop meets the standard required of a small firm authorized to carry out repairs of this make of vehicle. The manufacturer, BMW, imposes certain standards of technical equipment on its appointed firms; for example, the company automatically delivers a corresponding set of tools whenever a new model is introduced if there have been any changes. In this context the firm's last major investment was the purchase of a new measuring device for carrying out electronic measurements on vehicles.

The firm deals with around five or six vehicles per day. 95% of the customers are regulars; the other 5% are one-off customers who for the most part have had a breakdown on the nearby trunk road which has a heavy traffic flow.

The firm was founded in 1985 by Mr H. The workforce initially comprised seven employees: Mr H., his wife who was in charge of the administration, a master motor-vehicle mechanic, a mechanic, a bookkeeper and two car salesmen. In 1986 the number of employees increased: an additional mechanic for the repair shop and an office clerk were taken on. At the end of the eighties they were joined by another motor mechanic.

The internal organization of the firm is as follows (cf. figure 1 in the Appendix): beneath the management level (proprietor of the firm) there are three departments:

- technical department (repair shop)
- customer after-sales service, sale of spare parts, administration
- car sales.

Apart from the proprietor, Mr. H., the firm employs at present nine people (not counting trainees): four employees in the repair shop (one master motor-vehicle mechanic and three motor-vehicle mechanics), three employees in the department dealing with customer after-sales service, sale of spare parts and internal administration (the proprietor and head of the firm, Mr. H., a

bookkeeper and a clerk; from the point of view of his function the master mechanic would have to be included in this category) and two sales personnel in the car sales department.

There are also currently three trainees in the firm: a young woman is being trained as an office clerk and two young men are being trained as motor-vehicle mechanics.

As the organization chart shows, the proprietor is responsible for the management of the entire firm and in particular for the areas of organization, customer service, administration and vehicle sales. He accepts the incoming jobs, is responsible for procurement of spare parts and decides which employees should take part in the continuing training courses at the central customer service training centre and the decentralized continuing training courses offered by the manufacturer. The two car salesmen are responsible for negotiating sales of both new and used cars. The master motor-vehicle mechanic is the foreman in charge of the technical department (motor-vehicle repair shop); he is responsible for the distribution and supervision of the workload, organizing continuing training within the firm and manages the customer after-sales service.

All employees have relevant vocational training behind them: the three mechanics have completed their training and have the journeyman's diploma issued by the Motor Vehicle Guild, the foreman has passed the master mechanic examination of the Chamber of Trades, one mechanic is currently attending the master mechanic's course at the Chamber of Trades. The proprietor has undergone commercial vocational training, the bookkeeper is trained as a commercial employee for industry and the clerk has completed the commercial training for office workers. Both car salesmen have commercial qualifications (one of them in the wholesale sector, the other in the technical-commercial field).

With regard to age structure there is a clear division into two groups: the employees who have been with H. since the firm was founded are 40 years of age or older (the proprietor and foreman are over 50; the bookkeeper, at 39, is a little younger), the employees who came to the firm in 1986 or later are, in contrast to this, all under the age of 25.

The employees are paid in accordance with the collective agreement. Hours of work and annual holiday are similarly in line with the provisions of the collective agreement. All employees work full time, i.e. 37.5 hours per week.

The employees are not trade union members nor is there a staff committee. All personal and professional matters are dealt with by talking directly to the proprietor or – in the case of the technical department – to the foreman.

3. Provision of continuing vocational training

3.1 Structure within the firm

The firm relies almost exclusively on the continuing vocational training provided by the BMW Service Training Centre. This comprises, on the one hand, the courses they offer but also the media they distribute for learning in the repair shop (TIP). In addition to this, whenever an employee attends a training course the opportunity is used for in-house continuing training to take place. This is both necessary and sensible because the majority of continuing technical training focuses on the foreman. It is the proprietor who decides which employees and how many of them should take part in training (the foreman proposes people from the technical department). The staff are not offered any other continuing training opportunities – for reasons of cost and also because of the small number of employees in this particular firm. Individual employees do, however, make use of other continuing training courses offered in the region (e.g. by the Chamber of Trade and Industry) "off their own bat" (and at their own expense).

Of the continuing training courses attended by employees over recent years, 10% were in the management field, another 10% were sales courses and 80% were technical training courses.

3.2 Structure of the BMW Training Centre

The manufacturer BMW has a central training school in Munich which provides all types of training courses; some seminars are, however, also run decentrally at 31 specially selected and equipped repair shops (external training centres) and at six regional training centres (five in Western Germany, one in Eastern Germany; cf. figure 2 in the Appendix). Each of these training centres is responsible for the authorized dealerships within a radius of 120 kilometres. From the middle of 1993 teaching will continue at only six decentralized training schools and the central training school.

The training courses offered cover both the after-sales service area (discussions with customers and advising customers) and the technical work of the repair shops.

In addition to this the manufacturer provides training and information programs (TIPs) for the employees of all authorized dealerships. These teaching programmes on video or teaching computers have a dual function: firstly they enable employees in the repair shops to familiarize themselves through independent study "on the

job" with new technical developments introduced by BMW (for example new engines, automatic parking distance devices, a new sliding roof etc.) and secondly they are intended to enable employees to prepare themselves before they take part in seminars at the training centres. This preparation is obligatory for all participants.

In each firm an information representative (IR) is responsible for liaising with the central service training school in Munich. His or her job is described as follows: to deal with all correspondence with the manufacturer BMW, to select suitable employees from the firm to participate in courses at the training centres and ensure that the participant follows the preparation required using the TIP. A reporting form, which has to be completed at regular intervals, asks for details of problems which arose during the use of the teaching material. There are specific questions concerning the participant's assessment of the quality of the course attended.

The TIP consists of a teaching film (approximately 25–30 minutes long), which can be viewed and worked through by the employee using a teaching computer and a video recorder at the workplace and a written instruction programme which has been developed to accompany the film. The learning steps in working through a particular subject are technically programmed and the success of the participant is displayed on the computer screen. These learning protocols are reported back to the training centre.

Approximately 12 TIPs are produced each year. The number and content of the teaching programmes depend on the volume of technical innovations which are launched in that particular year. The dealership receives the TIP video automatically.

3.3 Other forms of continuing training

The BMW Service Training Centre also offers evening seminars for employees wishing to qualify as diagnosis technicians in the field of electrical systems and electronics. They involve 120 hours of training, and classes are three hours twice a week.

A certificate from the firm is awarded on completion of this form of continuing training. Any regional opportunities for continuing training, apart from those offered by the training centre (at the Chamber of Trades or Adult Education Centres, for instance), are not included in the firm's continuing training plans. There are, however, employees who voluntarily use relevant continuing training facilities outside working hours and at their own expense. In this context the example of a commercial employee is striking: she reported that she has been attending evening courses related to her profession at the Chamber of Trade and Industry for years without interruption.

4. Training practice at the firm

4.1 Training plans at the repair shop level

The firm's plans for continuing training are based entirely on what is offered by the BMW Training Centre and follow what is provided there and whatever is necessitated by the latest changes. The concrete decisions on which employee will be sent on which course and when, are taken by the proprietor after consulting the foreman in charge. It is usually the foreman who attends courses about the latest technical changes; he then passes on the knowledge he has acquired to the other employees in the form of a short training session.

Apart from external training courses, the firm also makes extensive use of the TIP, seeing it not only as part of the obligatory preparation for the courses at the training centres but also as a medium for ongoing further training in a form which is closely related to what goes on in the repair shop and as a way of finding solutions to problems as they arise. The TIP is also used as a way of passing on the knowledge acquired by one of the employees who has attended a training course: it helps him to impart what he has learnt to others in the firm.

4.2 Link between training concepts and demand

The foreman chooses courses to be attended on the basis of his experience of the capabilities of his staff but also his knowledge of their shortcomings. He and the proprietor also take care to ensure that each employee "stays on the ball" within their particular function, in other words that their qualifications are constantly adapted to the new demands arising in an area of work. For reasons of cost it is not possible for employees to take part voluntarily in extra courses at the BMW training centre.

Once a month the service representative (sales advisor) from head office visits the firm. This visit is also used to inform the firm about training courses on offer and to pass on to the training centre the firm's wishes for particular topics to be covered in the continuing training courses.

4.3 Target groups of vocational training

Essentially, all employees may take part both in in-house continuing training in the firm and in the courses at the training centre; the decision, however, about who should be selected to attend the external training courses is taken by the management. Almost all the employees of firm H. have attended continuing vocational training courses in recent years. Only the bookkeeper reported that he had not attended any form of continuing training course. All other employees have undergone continuing training, predomi-

nantly within the BMW organization, as far as we could gather from what they told us. All continuing training courses mentioned by the employees took place outside the firm.

An important exception to this was the clerk, who since 1990 has attended several evening courses (ten in all), each lasting between one and four months. These courses, which were run by the Chamber of Trade and Industry, covered topics such as "Accounting", "Personnel management", "Sales", "Business organization", "Statistics" etc. They were all courses which did not provide a certificate.

No information was available concerning the volume of and participation in internal continuing training, apart from the use of the TIP video which the firm is obliged to report to headquarters via the information representative (in this case the repair shop foreman). In 1991 eight teaching films were each used by three employees and in 1992 (up to September) six employees had used four films. We can assume that all employees, in particular those in the repair shop, regularly took part in the internal training courses.

Apart from this general programme offered by the training centre to employees and management (on the structure see figures 3 to 8 in the Appendix) in technical subjects and sales, the foreman also takes part in one-day meetings of master mechanics four to five times per year in which the service representatives from the distribution centres demonstrate new technological features on the vehicles. Following each of these meetings the opportunity is taken to hold a short internal training session.

4.4 Training plans

Each year every authorized dealership in the BMW organization receives an overview of the continuing training on offer at the central and decentralized training schools (cf. the relevant parts of figures 7 and 8 in the Appendix). They contain the entire programme available to management and skilled workers in the technical field and in the commercial and administrative area.

The aim of the firm is to use continuing training to ensure that the qualifications of the employees remain at a level which enables them to be able to service and repair the vehicles economically and to be able to master the ever more complex systems which are now found in new models as a result of constant technological innovations. The employees themselves also see continuing training more as a necessary tool to keep up their standard of qualification rather than as a means to gain promotion within the firm – in this small firm promotion chances are not possible anyway as there is no foreseeable mobility for years to come. The job of diagnosis technician, the courses in vehicle service technology (recognized by ZDK) and the BMW service technician diploma are qualifications which offer the mechanic good career prospects (see figure 7: seminar programme for '93, nos. 13 and 14).

The firm's concept of continuing training has not fundamentally changed in recent years; the only difference is the employment of the new media (TIPs) provided by the training centre which can be used in close conjunction with the daily work of the repair shop. It is, however, becoming necessary to take action at increasingly short intervals to keep up with the latest technological developments. For this reason the intensity of training needed is increasing and thus the numerous decentralized training opportunities available within the BMW organization are very welcome.

The training centre's continuing training concept has a modular structure structured along the lines of the different subjects (cf. figures 7 and 8, annual plan for 1993); there are, however, other concepts which are designed to aid career development and for some skilled employees can even lead to a (company) diploma (cf. figures 3 to 6 in the Appendix).

In addition to this, it is also the job of the training centres to prepare dealerships for the launching of new products. This takes place in close consultation with the relevant department. First of all, TIP films are produced and, parallel to this, the technical courses for the decentralized training schemes are developed. Approximately two months before a new product is marketed, training can begin – in the case of the introduction of the "Seven Series" six months were even available – and each firm is obliged to send one employee. This initial instruction normally lasts one or two days. After this round of teaching has been completed, more in-depth courses to cover repair procedures or look at certain assemblies or technical systems are offered and all standard training courses in the annual programme which are affected by the innovations are revised accordingly.

The future development of continuing training will to an even greater extent than in the recent past concentrate on repair shop personnel mastering integrated electronic systems and their components, automotive mechanics will increasingly take a back seat. "We started with seven different systems to which diagnosis procedures could be applied (1985), now there are between 20 and 25 and that figure will have probably risen to 60 by the mid-nineties. Apart from that, there are of course constant changes and improvements, such as the ABS system, airbags or automatic parking distance systems. Technological changes of that kind are first of all presented in preliminary

training courses and are then integrated into the seminars." (Member of the service training staff).

BMW vehicles had five times as many electronic functions in 1990 as they did in 1983 and by the year 2000 there will be 6.5 times as many as the 1983 figure, after which they will probably remain constant. The top model of 1976 had four electric motors, today's equivalent, the 750, has 73. A similar increase can be seen in the case of control devices, connections and switches. Previously one simple circuit diagram was sufficient for the whole car, today the number of diagrams needed for the 750 i, for example, would fill the drawer of a filing cabinet. Furthermore, there is hardly a single independent electronic system any more. Today virtually all electronic systems are integrated.

One response to this development is the DIS concept (diagnosis information system) which should be installed in all repair shops by 1994. This is an expert system for diagnosis of complex systems. The mechanic can work on the basis of his experience, following his intuition, yet at the same time using machine-guided fault detection techniques. The mechanic says for instance: "I am sure that the fault is here." If his hunch is not confirmed he can go back and let the machine guide him. (Figures 9 and 10).

4.5 Costs of continuing vocational training

The costs of in-house training are borne by the firm; they are not, however, specifically accounted for as such, which makes it difficult to assess them accurately: often the training takes the form of short instruction sessions, sometimes spontaneous instruction when a complicated repair arises.

Since the proprietor considers participation in external training courses to be indispensable, all costs incurred are paid for by the firm. This includes the cost of the course (there is no charge for those at the training centres), travel expenses, board and lodging and payment of wages. For financial reasons the firm is unable to sanction additional training courses which an employee might attend voluntarily. The proprietor considers the qualifications demand to be adequately covered by the continuing training courses offered by BMW to its authorized dealerships in centralized and decentralized training schools which his firm take advantage of. He does not believe that there is a qualification deficit amongst his employees.

4.6 Evaluation of costs

On average the firm calculates external training at a total of six working days per employee per year. For reasons mentioned above no estimate of the amount of internal training was available. We were unable to obtain an assessment of the cost to the firm of continuing training.

5. Evaluation of the training concepts

The vast majority of employees at firm H. have attended training courses run by BMW either at their central training school in Munich or in one of the regional training centres. Without exception they were courses to enable employees to up-date their skills; in other words none of the courses were being used to prepare an employee for promotion. One exception was the "private" activities of a mechanic, who was following a training as a master mechanic, and the clerk who was attending courses at the Chamber of Trade and Industry.

The majority of courses between 1987 and 1992 were attended by the repair shop foreman: he completed 14 training courses in this period, each lasting between one and five days. The mechanics on the other hand attended a five-day course every two years at best; one of them had not been on a training course since 1986.

The head of the firm, Mr H., attended seven five to eight-day courses during this period. The two salesmen took part in three and four BMW sales training courses respectively, each lasting several days. The last one was a course in 1991 to train in selling the new product, the BMW 3 series.

The courses attended by the technical employees of the firm (master mechanic and mechanics) were almost exclusively on technical subjects. The courses provided for them are virtually all designed to familiarize them with technological innovations, such as engines, new diagnosis procedures, new models of vehicle etc. The two salesmen took part in training courses in selling. The subjects covered by the courses which the proprietor attended related to the different aspects of his job: they included sales techniques as well as seminars for employers, a seminar on taxation, on service reception etc.

As a rule, a certificate or sticker specific to BMW is issued to testify attendance at these courses and is intended to be filed in the employees "training passport".

In addition to this, the employees of the firm also used BMW's self-teaching programme (TIP). A total of 12 films had been used, eight in 1991 and four up to the date of enquiry in 1992. Three employees made use of the eight TIP films available in the firm in 1991. In 1992 six employees had to date viewed four TIP teaching films.

These TIP programs are principally used in the firm during working hours; a film lasts between 25 and 30 minutes. The use of these TIP courses is recorded by the firm's information representative, in the case of firm H. by the repair shop foreman. The report is then passed on to the main service training centre to enable them to deduce what

qualification needs firms still have from frequency of use and the problems people encountered in the course of the self-study programme.

The firm's expectations of continuing training are that it should ensure the quality of work in the repair shop and the efficiency of both the repair shop and the sales personnel even given the increasing complexity of products. They believe that this is the only way to ensure good service and customer satisfaction.

The close interplay between internal and external training, centralized and decentralized courses, seems to suit the needs of this small firm particularly well. In particular the up-to-date standard of the self-teaching programs can be of value to small firms which do not have special trainers, enabling them to qualify their employees regardless of the scarce capacities of the training centres. There is possibly a negative consequence in that they might believe the TIPs could replace entirely the work of the training centres, as is suggested by the fact that external training courses concentrated on the foreman. It would certainly have dire consequences for the efficiency of the firm if they put their faith in the long term in ensuring comprehensive qualification for the foreman and confined continuing training for the mechanics to video and computer-aided training.

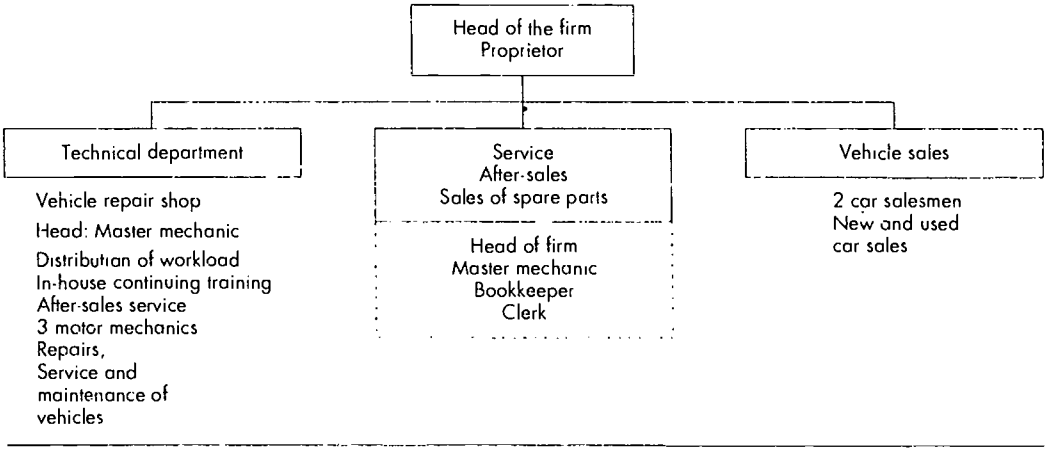
6. Conclusions

In the central training school in Munich basic seminars and advanced training courses which do not need a huge amount of media support are held. A new training centre with increased capacity is to be opened in Munich in 1993.

The policy of the firm under investigation here showed clear tendencies to shift the emphasis of training for their employees towards in-house schemes. The role of the central service training department focuses more on designing the courses, preparing the dealerships for new developments, producing new media to support the work of the decentralized training institutes, co-ordinating schemes, and identifying and counteracting any diverging developments. External observers are having more and more doubts as to whether new media alone, with knowledge passed on within the firm via an employee with a multiplier function, which is what largely happens in this firm, will really be able to deal with future requirements.

The long-term polarization of the qualification structure within the workforce which this will probably cause would counteract the trend for each individual to be able to work in a highly-qualified independent manner. This is being identified as a necessary tendency by many experts. This media-aided decentralization of the work of continuing training down to the repair shop level also conceals the inherent danger that important groups of employees will be deprived access to essential continuing training.

Figure 1



2.

Figure 2

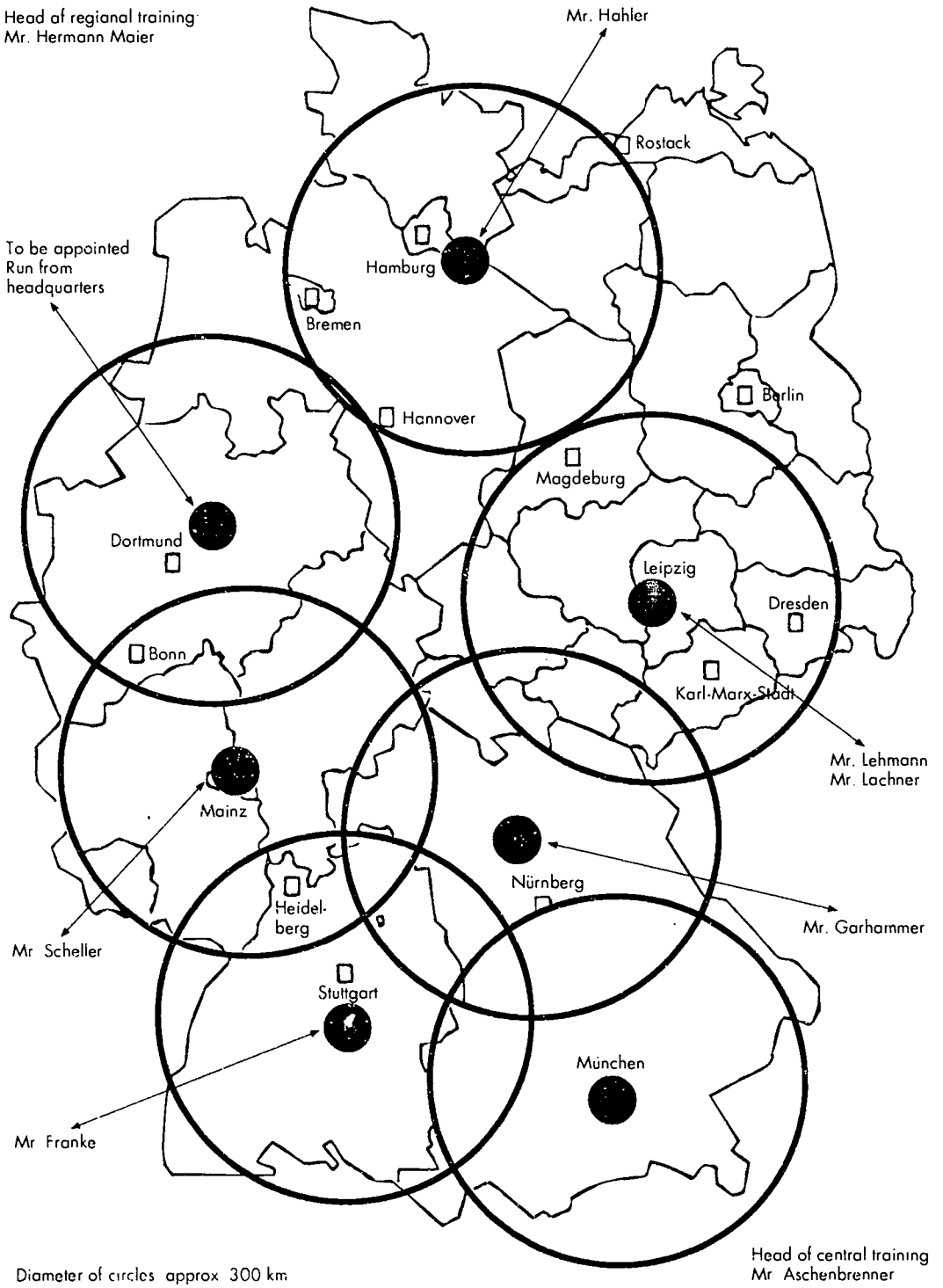
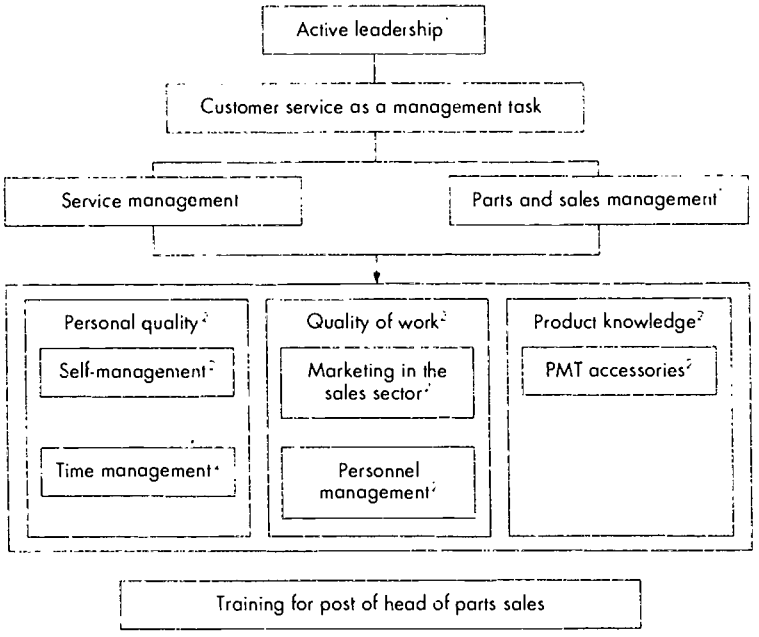

Head af regianal training
Mr. Hermann Maier
Mr. Hahler
Rostack
To be appointed
Run from
headquarters
Hamburg
Bremen
Berlin
Hannover
Magdeburg
Dortmund
Leipzig
Dresden
Bonn
Karl-Marx-Stadt
Mr. Lehmann
Mr. Lachner
Mainz
Nürnberg
Heidel-
berg
Mr. Garhammer
Mr Scheller
Stuttgart
München
Mr Franke
Diameter of circles approx 300 km
Head of central training
Mr Aschenbrenner

Figure 3 – Training service (after-sales/parts), Training programme for managerial staff – 1993



2.

[1] These programmes provide basic training for all personnel at managerial level in the area of service (after-sales/parts)
[2] These training programmes offer personal qualification tailored to your individual situation

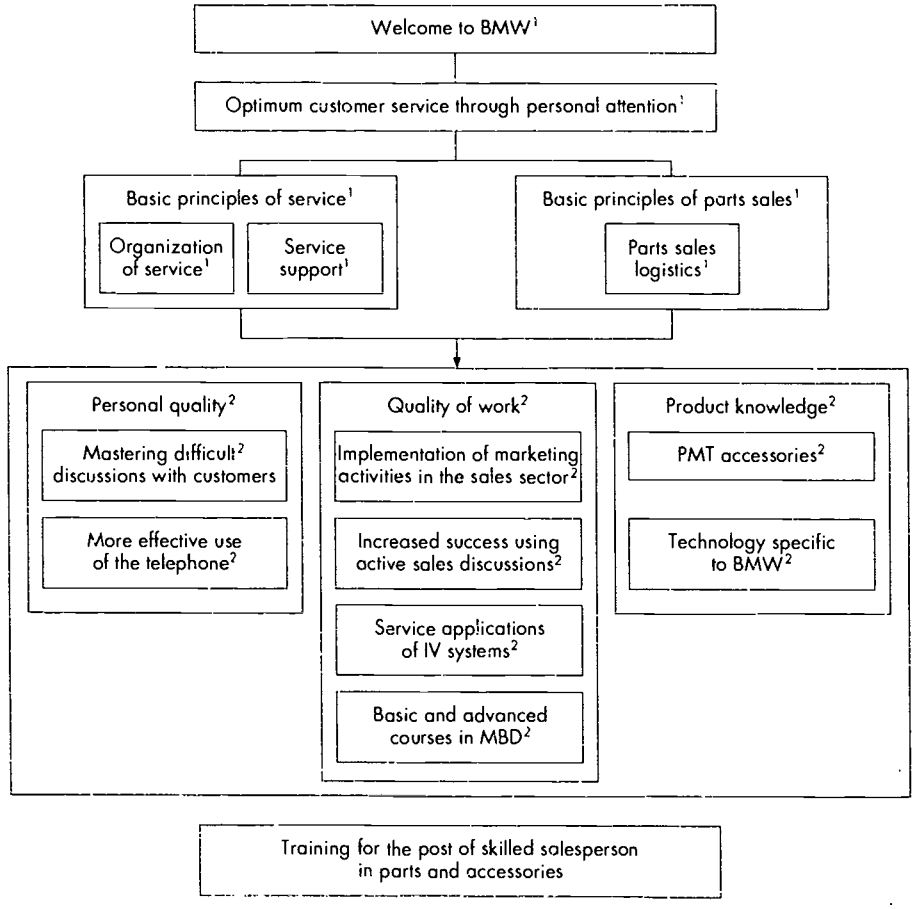
Figure 4

R1-M-42 Programme 1993	Managerial staff in the service field	Manager of firm	Service manager	Repair shop foreman	Parts sales manager	Sales manager	Owner/ managing director
Personal quality	*Basis* Customer service as a management task	A	A	A	A	A	A
	Active leadership	A	A	A	A		
	Service management	B	A	B			B
	Management of parts sales department	B			A		B
	Individual qualifications Self-management	B	B	B	B	B	B
	Time management	B	B	B	B		
Quality of work	Marketing in the sales sector	B	B	B	B		
	Personnel marketing	B	B	B	B		
Product knowledge	Product marketing Accessories training	B	B	B	B	B	B
Training	Manager of parts sales				C		

A: necessary for qualified performance of job
B: individual supplementary qualification courses
C: comprehensive training scheme leading to diploma

2.

Figure 5 – Training service (after-sales/parts)
Training programme for non-managerial staff in service, parts sales and administration – 1993



[1] These programmes provide basic training for all personnel ot managerial level in the area of service (after-sales/parts)
[2] These training programmes offer personal qualification tailored to your individual situation

Figure 6

R1-M-42 Programme 1993	Non-monogerial staff in the service field	Service advisor	Commer-ciol service employee with customer contact	Commer-cial service employee without customer contact	Service foremon	Solesper-son for ports ond acces-sories	Orders clerk	Inventory cierk	MBD clerk
	Basis Welcome to BMW	A	A	B		A	B	B	B
	Optimum customer service through personal attention	A	A		A	A			
Basic principles of service	Orgonization of service	A			A				
	Service support		A						
Basic principles of parts sales	Basic principles of parts sales logistics					A	A	A	A
Personal quality	*Individual qualifications* Mastering difficult discussions with customers	A	B		B	B			
	More effective use of the telephone	B	B			B			
Quality of work	Implementation of marketing activities in the sales sector	B				A			
	Increased success using active sales discussions	B				A			
	Service applications of IV systems	A	B		A				
	Basic and advanced courses in MBD								A
Product knowledge	Product marketing training for acces-sories	A				A			
	Technology specific to BMW		B			B			
Training	Skilled salesperson in parts and accessories					C			

A: necessary for qualified performance of job
B: individual supplementary qualification courses
C. comprehensive training scheme leading to diploma

2.

Figure 7 – Overview of seminars for 1993, Service Training Centre, central, service

Title	Seminar no.
Service practice I	0024
Service practice II	0025
Service practice III	0026
Service practice IV	0027
BMW Service test	0003
Automotive electrical systems and electronics	0004
Diagnosis training I	0030
Diagnosis training II	0031
Diagnosis training III	0032
Running gear, suspension geometry and alignment	0039
E36 entire vehicle	0037
Fuel mixture	0006
Automatic transmissions	0038
Gear box, rear-axle and transfer gear boxes	0007
Body work maintenance I	0008
Body work maintenance II	0009
Repairs to paintwork I	0010
Repairs to paintwork II	0011
Air conditioning	0012
BMW vehicle service technician	0013
BMW service technician diploma	0014
Technology for foremen and service advisors	0016

Figure 8 – Overview of seminars for 1993, Service Training Centre, decentralized, service

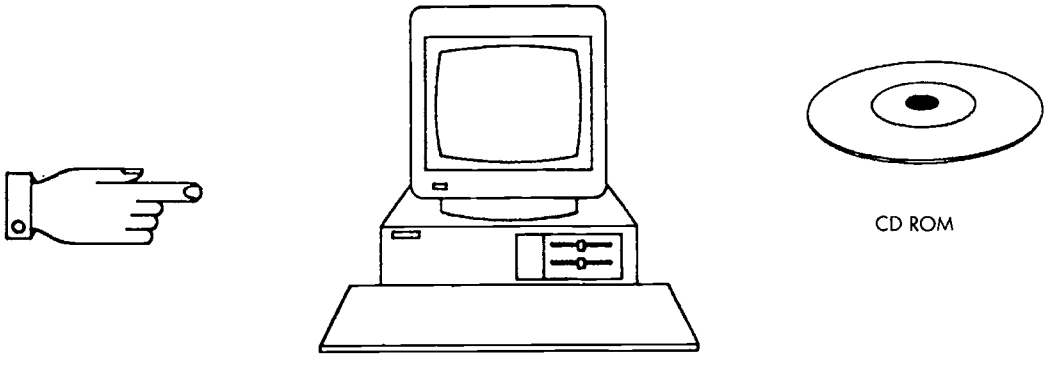
Title	Seminar no.
Basic training for new BMW employees	..01
Basics of vehicle technology for non technical staff	..02
Diagnosis systems	..03
Diagnosis for spark-ignition engines	..04
Diagnosis for diesel engines	..05
Diagnosis for running gear systems	..06
Diagnosis for electrical systems and electronics in vehicles	.07
Current issues in diagnosis	..08
Exhaust fumes technology	. 09
Technology for service advisors	..10
Information representatives	. 11

NB: STC South 05 .
South/West 06 .
Central 07
West 08 .
North 09 .

e.g Seminar no for Diagnosis systems in Central STC = 0703 (07.. for Central STC, 03 for seminar on diagnosis systems)

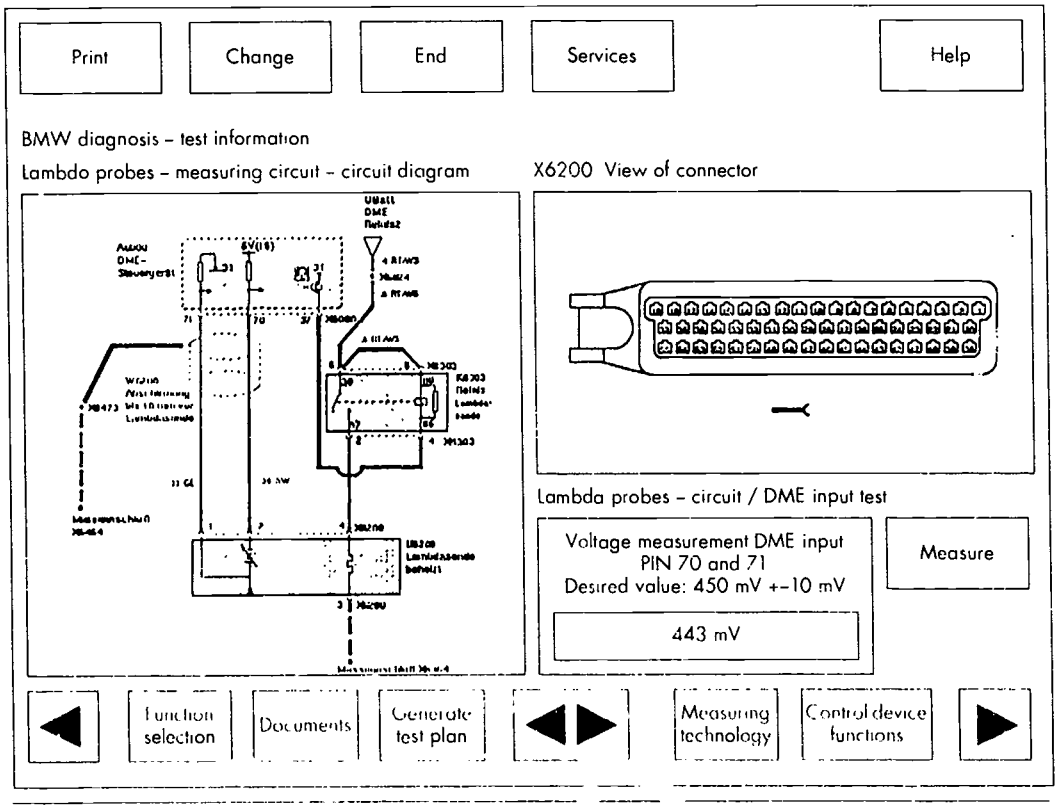
Figure 9 – Memory requirement for technical information and data on a CD ROM to be run on PCs in 1994

Solution:
Technical Information System



1 CD-Rom ≙ approx. 270,000 DIN A4 pages
1 CD-Rom ≙ approx. 550 MB
1994 approx. 4–6 GB

Figure 10 – Diagnosis information system using a circuit diagram, connector assignment and voltage measurement



5. VW-AUDI AGENCY

2.

Size of the Firm: V

Car Maker: VW-Audi

Type of Vehicle: A, B

Type of Firm: C

1. General description of the case

This firm is an agency solely for VW-Audi in Groß Gerau, a town in the southern part of the Rhine-Main region, sufficiently far removed from the conurbation to be in rural surroundings.

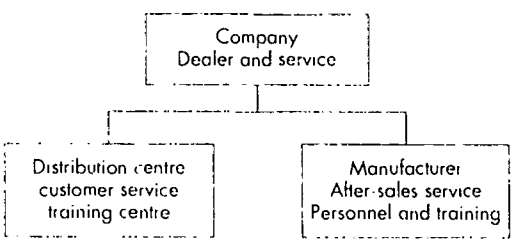
The basis for this case description was provided by a detailed interview with the manager of the firm, who is also the owner, and conversations with the training foreman and staff. The training passports of a number of members of staff were also examined. The results of the evaluation are included in the Appendix.

The firm is integrated in the distribution network of the VW-Audi organization; an interview was therefore also conducted at the distribution centre for the Rhine-Main region, and the associated customer service training centre was visited. Two training executives were available for interview, the head of the customer service training centre and the head of service and marketing.

It also proved possible for one of the interviewers, in another connection, to take part in a 1-day training event at the distribution centre's customer service training centre.

In addition, a lengthy talk was held with the head of the central after-sales service at the manufacturing plant, together with two of his members of staff.

The case can be represented diagrammatically as follows:



The case description is based on the information given during these talks and the insights so obtained.

The characterization of the case focuses on the VW-Audi agency in Groß Gerau, while the distribution centre and manufacturer are also included in the observations particularly in the six subsections on the labour/management dialogue (Sections 4.1 to 4.6).

2. General description of the firm

2.1 Main details of the firm

The firm takes the form of a private limited company (GmbH), and is an authorized VW-Audi dealer. All VW and Audi vehicles are included in the firm's range, through to commercial vehicles of up to 5.5 t. Seat and Skoda, which also form part of the VW programme, are not marketed by this firm.

Repairs and sales

The firm's activities are not restricted to the sale of new vehicles (sales volume approximately 400 vehicles per year), but also include the following:

- a large second-hand car dealership (sales volume approximately 500 vehicles per year)
- a repair shop with the standard set of VW equipment
- a body repair shop
- a paint shop
- a filling station

All types of servicing and repair work are carried out in the repair shops. Between 40 and 50 vehicles pass through the repair shops every day.

Location and distinctive features

The firm is located in Groß Gerau, directly on the major trunk road from Darmstadt to Rüsselsheim.

The following distinctive features are worthy of note:

- There are no further possibilities for expansion whatsoever. All available space is either already built on or used as parking space.
- The nearby car manufacturer, Opel, in Rüsselsheim, proves highly attractive to local specialized personnel in the motor vehicle sector on account of its lucrative pay.
- The majority of the customers come from the predominantly rural surroundings (despite the location on the southern periphery of the Rhine-Main region) and can only be retained if good, reliable and personal service is provided.
- The owner has undertaken major experimentation in inventory management and teamwork in the past.
- The firm has intensified in-house training on account of the scarcity of training opportunities at the distribution centre.
- The numerous engine versions (up to 150) and associated spare-part types and settings were recorded on computer at a very early stage on the initiative of the owner (long before this was permitted by the manufacturer). The repair shop

staff were therefore able to have printed copies of the correct values at their disposal immediately, without being held up by waiting times and search times. According to the owner, the manufacturer and distribution centre did not permit the use of computers until about four years ago.

Size of the firm
The firm employs a total of 53 staff, which puts it in size class V.

2.2 Brief history of the firm and latest strategies and developments

The firm is roughly 100 years old. It began with mechanical engineering and the construction of saw frames around the turn of the century, and until after the Second World War generated electricity for the region of Groß Gerau. The electricity generation business was sold to a utility company after the war. A haulage business with a number of trucks was run in parallel.

By 1949 a metalworking shop had been set up and the haulage business expanded. The VW agency was taken up in 1949, and 10 people were employed. Two years later the firm was established on the present site, and was progressively enlarged by the acquisition of further land.

Between 1950 and 1980 the workforce grew to 50, and has remained virtually constant in the past 5 years. There has been no large-scale personnel turnover. All departments were affected by the increase in staff numbers. A certain degree of specialization occurred over that period, with concentration on sheet metal working and bodywork (accident repairs), the paint shop and the breakdown service. The full range of repair work was then finally covered in the firm.

The firm's status as an authorized dealer means that the equipment must be supplied entirely, down to considerable detail, by Matra on behalf of VW. Major items of equipment include modern compact testers, fault-readout units and, for certain types of customer vehicle, SUN testers.

2.3 Structure of the firm

Organization
The firm is made up of the management and the following departments, shown in the diagram.

The servicing and repair department is the largest department, and comprises vehicle repair, body repair and paint shop, spare-parts supply, and the filling station.

All types of VW and Audi vehicle are serviced and repaired. Other makes of vehicle are the exception, mainly being dealt with when taken by the firm as part payment for new vehicle purchases.

Employment structure
The servicing and repair sector has the highest number of employees (10 mechanics including body specialists, 3 body painters, 13 apprentices, 4 storekeepers). Body repair work is always carried out by a motor mechanic.

Of the two master mechanics in servicing and repair, one is at one and the same time repair shop foreman/training foreman and problem solver. The second master mechanic is deputy to the other in his capacity as repair shop foreman.

The problem solver is a position introduced in the VW organization for the purpose of accomplishing difficult tasks. The training foreman conducts in-house training.

Organization of work

Dealerships
The individual specialist sections of the servicing and repair department have their own repair shops and rooms, but co-operate at a technical level wherever necessary. The firm operates with staggered starting times for various groups of employees. This makes it possible to extend the opening times to stretch from 6.30 a.m. to 6.30 p.m.

Mechanics begin and end their working day in the repair shops at three staggered times. This provides for better distribution of the "rush

Figure 1 – Organizational Chart

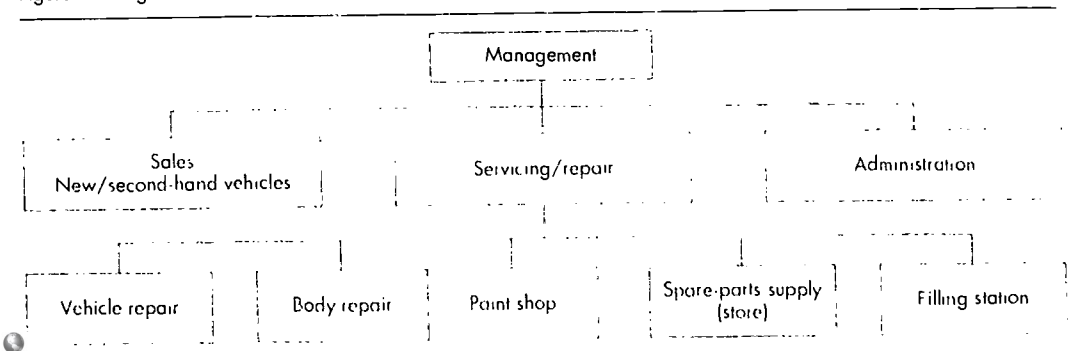


Figure 2 – Employment structure

Position	Number	Professional background	Length of employment (years)	Nationality (other than German)	No. of female staff
Management	1	Master mechanic and management training	More than 30 years		
Sales					
• New vehicles	3	1 commercial clerk	20 – 40		
• Second-hand vehicles	1	2 motor mechanics 1 master mechanic			
Administration					
• Invoicing, cash desk • Accounting	8	All with commercial training	6 empl. fewer than 5		7
After-sales service	3	2 service foremen 1 service adviser	More than 5 years (average 15 years)		
Servicing and repair					
• Foremen	2	Master mechanic	More than 5 years	3	
• Vehicle repair (mechanic)	10	Motor mechanic	(average 15 years)		
• Body repair (coachbuilder)		Motor mechanic			
• Paint shop	3	1 foreman			
• Store	4	2 body painters			
• Filling station	2	Motor-trade clerk (part-trained)			
Apprentices					
• Motor mechanics	13	Less than 5 years			
• Commercial clerks	1			8	
Total	53				

hours". The repair shop foreman shares out the jobs among the individual mechanics. The intention behind the staggered working times is to avoid idle periods in work distribution and to offer customer-friendly opening times.

This concept has so far proved worthwhile. The introductory phase lasted two years. This method of organization was introduced after the firm had abandoned the team concept, which was originally rated positively. The major reasons for the change were:

- As the firm does not shut down for annual holidays, the teams were repeatedly broken up during the times when individual employees were on vacation; customers also then suddenly missed their familiar contact person
- There were frequent problems of co-operation and co-ordination within the teams, brought about by the close collaboration required
- Staggered working times were already common at this time, and they made co-ordination within and between the teams more difficult. One of the reasons given for this was that it was not possible to make the teams sufficiently homogeneous on account of the personnel structure.
- The customers from the rural area were happier with the conventional concept than with the team concept.

The team concept was tested for almost a full year[5].

The service foremen and service advisers keep in close contact with customers and accept their vehicles for servicing and repair. Their individual duties are:

- making appointments for repair work
- clarifying the extent of the servicing and repair work with the customer

[5] According to a sales representative, the team concept has been adopted by some 25% of VW repair shops

- handing over the repaired vehicle to the customer

Many customers attach importance to being served by the same after-sales service adviser every time.

Two repair shop foremen are responsible for proper processing of the jobs. One of the two foremen also has the role of training foreman and problem solver. Both of these functions are customary in VW-Audi agencies.

In order to be able to respond sufficiently flexibly to technical demands in the repair shop, there is multiple staffing in certain important areas. For example, there are four specialists for electrical and electronic diagnostics, three body painters, and two sheet-metal workers. It is the aim of the firm to increase the number of employees for individual duties so as to allow for rotation and to ensure that sufficient skilled staff are always on hand. It is also the intention to secure staff satisfaction by providing more varied work structuring. This is only possible with the aid of additional training measures.

An estimated 25 per cent of cases are classified as difficult, and for these cases especially there has to be a sufficient number of people available to solve the problems. According to the repair shop foreman, these cases are related to electronics and peripheral devices, and primarily occur in new, unfamiliar models at the time of model changes.

Sales

Sales activities for new and used vehicles are handled relatively independently by the sales personnel, who have been with the firm for a very long time (two of them for about 30 years). Three of the four salesmen have a background as motor mechanics; the other was trained as a commercial clerk.

The repurchase of second-hand cars as part of the process of selling new cars is just as much a task of the sales personnel as the preparation of offers for financing.

Given the wide range of models it is difficult for the sales staff to be able to answer all customers' technical questions immediately; they often find it necessary to consult the relevant brochures.

According to the information of one salesman, the cars are primarily sold by word-of-mouth advertising relating to product quality, by advertising efforts on the part of the firm, and (particularly important) by the quality of after-sales service in the repair shops.

It is estimated in-house that as many as 3/4 of new vehicles can only be sold if the after-sales service proves satisfactory to the customer.

In relation to the customer, the objectives of the flexible work organization model described above, concerning the deployment of individual members of staff, were as follows:

- to promote close contact between customers and the after-sales service advisers
- to safeguard reliable customer support in the long term

According to the owner, the fruit of this approach is a large number of regular customers, good results from the image analysis performed by the manufacturer, and long periods of employment with the firm for many staff members.

2.4 Workforce

Development and age structure of the workforce

The number of employees reached its present level in the early 1980s, as already mentioned. There have been no notable changes since 1985. A table providing an overview of the workforce, showing their functions, sex, nationality and length of service, is included in Section 2.3.

It is striking that many of the employees have been with the firm for a considerable time. The core workforce has been at the firm for some 30 years. The oldest employees (6) are about 50 years old. The majority, if one disregards the apprentices, are between 40 and 50 years old. Almost all passed through their training periods at the firm. The age structure also has the effect of attracting older customers. It is 4 years higher than the average for the VW-Audi organization. The owner of the firm is now concerning himself with measures to attract young people.

Working conditions

The working hours and length of holiday are regulated by collective agreement. The hours of work are fixed at 37.5 hours per week, with 30 working days holiday. The business is open from 6.30 a.m. to 6.30 p.m. every day. The firm does not close for annual holidays.

Pay structure

Payment is performance-related. For top employees it can be as much as 30% above standard rates, reaching about DM 25.– per hour. The basis for pay increases is provided by an in-house bonus system. This is intended to motivate employees. Pay increases are always agreed in talks with employees.

According to the owner a high level of pay is necessary because the employees would otherwise drift off to the nearby Opel plant.

Training standards of employees

All employees at the firm have obtained a training qualification, most of them at the firm itself (see

Section 2.3). In the technical field, this is training as a motor mechanic, which is a prerequisite for recruitment. A commercial traineeship is a prerequisite in administration.

The owner of the firm is prepared to depart from these prerequisites if it is ensured that a worker is adequately qualified.

In addition to the two foremen who have their particular functions (training foreman and repair shop foreman), there is also another master mechanic.

It is usually the case that only staff who have been trained at the firm are taken on.

If there is a need to recruit staff, the head of after-sales service, the foremen and the owner discuss how many and which newly-trained personnel should and can be engaged.

Employee representation
The size of the firm means that the existence of a staff committee is mandatory. It consists of three people and a youth representative. The staff committee is involved in important decisions relating to personnel. One member of the staff committee is a trade union member.

3. Provision of continuing vocational training

3.1 Structure of the firm

The firm conducts a great deal of continuing training on its own premises and takes every opportunity to participate in continuing training schemes at the customer service training centre in the distribution centre.

Participation in the courses offered by the distribution centre is obligatory for the sales, marketing and management personnel. In the technical field it is primarily the training foreman and, if the capacity at the customer service training centre so allows, the mechanics who attend the courses.

In-house technical training is undertaken by the training foreman, who trains all employees. The materials for in-house training are provided by the manufacturer (video recordings, self-study programmes, repair guides). The focal areas and extent of this training can be derived from the evaluation of the training passports in the Appendix.

3.2 Structure of the customer service training centre

The structure of continuing training at VW can be represented in simplified form in a diagram:

Manufacturer	Management training Training the trainers
Distribution centres	Training for training foremen Mechanics/managerial staff/ technology; marketing, logistics
In-company	Training personnel by training foremen Main areas: service technology/bodywork/paint-work

Instruction covers the training of technical personnel, training foremen and after-sales service managers, and the training of sales staff and management/marketing personnel (partly performed externally).

The customer service training centre at the Dieburg distribution centre in the Rhine-Main region has at its disposal three instruction rooms, three trainers, the VW self-study programme (SSP), videos, recent versions of vehicles, testers, and standard training equipment[6].

36 people can be trained per day from the roughly 400 dealerships in the area served by the school.

The manufacturer considers 2.5 man training days (MTDs) training per year necessary for technical training, but, because of capacity shortages, specifies only 1.5 MTDs and recommends 4 hours in-company training per month.

According to information provided by the firm, however, usually only 0.5 MTDs per year remain available for firm personnel, which is considered clearly too little.

The VW organization's training requirements in the fields of technology and dealing with customers amount to 155,400 MTDs per year for all dealership personnel (from office staff through to after-sales service managers); due to capacity limitations, however, only 74,000 MTDs currently take place (refer also to the pyramid in the Appendix).

3.3 Structure of continuing training centres run by trade associations

Continuing training centres run by associations (chambers/guilds) provide continuing training, train service technicians, and offer additional

6 The SSP is a series of booklets prepared according to a didactic system; it is intended for self-study by employees.

courses on all conceivable topics related to motor vehicles. More details are enclosed in the sector report.

There was no indication of advantage being taken of these opportunities in the training passports belonging to the staff of the firm in question.

Other courses are available from the Chambers of Trades, the Chambers of Industry and Commerce, adult education centre and numerous other establishments. The majority of these courses are not so much concentrated on vehicle-specific topics but rather on subjects such as "Fundamentals of Electronics", "Working with PCs", "Office Organization" etc.

Employees are free to decide themselves whether to attend such courses. There is no financial support from the firm for attendance.

The newly-introduced service technician training course has attracted the interest of the firm. The owner sees in this an opportunity to promote the further training of employees and to reduce in-house continuing training efforts.

4. Training policy of the firm

4.1 Training plans at the repair shop level

The firm examined here undertakes intensive in-house continuing training. This is considered a basic prerequisite for good service and the retention of customers for the firm.

The training foreman plans the main areas of training and sets the dates.

Training is carried out in accordance with the following concept:

- New recruits to the operation work for a number of weeks under the supervision of a master mechanic and are then instructed in various fields in-house by the training foreman. The new recruits are then also registered for courses at the customer service training centre.

- The training foreman holds company training courses to accompany the introduction of new models.

- During times of low workload in the repair shops, the training foreman instructs individual groups with the aid of the SSP. At such times particular emphasis is placed on training mechanics with a limited breadth of knowledge in various specialized areas, primarily in order to diminish their fear of things new.

  In addition, as many staff as possible are trained in electronics and diagnostic techniques and are familiarized with other new technological developments (see Appendix: excerpts from training passports).

  On account of the lack of capacity at the customer service training centres, such periods are also used by the training foreman to pass on knowledge obtained in courses to other members of the workforce. This takes place in small groups directly on site, and is highly practically oriented. The participants then have to prepare a report so as to reinforce what they have learnt. Instruction is followed up by application in practice.

  No more than 1/6 of employees engage in self-improvement at home with the aid of the SSP.

Due to the lack of capacity at the customer service training centre, mentioned earlier, it is primarily the training foremen and after-sales service managers who are trained there.

Notwithstanding the training measures at the firm, great importance is attached to the customer service training centres because:

- that is where the ins and outs of new systems can be learnt most quickly
- a systematic introduction to symptomatic trouble-shooting is essential; this is not something that repair shop personnel can learn by self-education
- general self-education is too complex and expensive

In summary it can be stated that a great variety of training activities take place at the firm with the aim of being able to offer customers sound service even for the very latest products.

The capacity limitations at the distribution centre customer service training centres, and in the VW organization as a whole, force the firm to take such action because otherwise it would not be possible to guarantee reliable service and the result would be loss of custom.

The central company philosophy is: "Performance deficiencies throughout the firm must be kept to a minimum; training plays an important part in achieving this."

According to the owner, the training activities at the firm will be increasingly necessary because "VW has been indulging in experiments in the continuing training sector for 10 years and still has no efficient concept". This situation has frequently been the subject of analysis, but the works representatives try to cover too broad a scope with their ideas for implementation while the dealerships' actual problems and proposals are rarely taken into account. In other words, feedback from the dealerships to the manufacturer is unsatisfactory.

2.

4.2 Link between training concepts and demand

Analysis of required skills

As mentioned in 4.1, the main areas of interest of new employees, in particular, are established by the foremen (by observation) and in talks.

In-house training and registration for courses at the customer service training centre takes place in accordance with the company philosophy, which aims to ensure that each employee is capable of employment in a number of fields.

Relationship between required skills and training concepts

In line with the manufacturer's philosophy, every new employee has to attend basic training courses (see 4.4).

The firm (i.e after-sales service manager and training foreman) decides on the basis of their main areas of work which continuation courses staff should attend.

4.3 Target groups of vocational training

Participation of company staff

Basically it is possible for all employees to participate in continuing training at the firm and at the distribution centre. Priority, however, is given to those who work as the problem-solver or training foreman, or who have to deal with particularly complex technical matters (electronics, diagnostics etc.).

There is a range of general initial and continuing training schemes available at the distribution centre for specialists and managerial staff

- in sales, service and accessories
- and specifically for commercial vehicle experts in the sale of commercial vehicles, service technology, body maintenance and painting

Companies are able to select from the range on offer (see Appendix, overviews).

Representatives of the firm generally attend courses for after-sales service advisers and master mechanics/training foremen on the topic of dealing with customers. Interest in these courses, however, has become very low, because "the contents of the courses in this field have become banal". The opinion of the staff is that "it is always the same old claptrap".

This course is held three times per year, each time lasting half a day for 6 participants. In 1991 it occupied about two days per man, in 1992 noticeably less.

The company workforce (storekeepers, office workers, after-sales service advisers) took part in external courses on customer care held at other companies a number of years ago, with great success.

The owner estimates the share of training as follows:

- management/customer care 20%
- technology 80%

There is no precise recording of such figures.

Company employees' interest in attendance of courses is divided:

- top-line mechanics wish to attend all available courses
- other mechanics often have only little interest in courses

There can be no obligation for all employees to engage in continuing training, as demanded by the manufacturer and distribution centre, because there is insufficient capacity at the customer service training centres.

4.4 Training plans

Each firm receives the VW/Audi training programmes for every calendar year. They contain the full range of programmes for managerial staff, specialized staff in sales, repair shops, service and accessories, and marketing.

Management training is offered by an external company.
The training organization is described below.

Objective of training

As mentioned earlier, training in modern technology, primarily electronics and diagnostic techniques, is of central importance at the firm. Mechanical engineering has become an insignificant subject there. The main areas include diagnostic technology and handling the latest test equipment, likewise trouble-shooting for ABS, Digijet, Mono-Jetronic, electronic ignition, electronically-controlled transmission shift etc.

Further training relating to new technical components and systems is intended to ensure that repair shop personnel are able to service and repair vehicles with modern electronics efficiently so as to continue to offer reliable service to customers.

The sales and after-sales service staff must be in a position to explain the special features of new products with extensive electronic systems to customers, to their satisfaction.

Development since 1987

The training concept has not changed since 1987. The contents, however, are adapted to the new

requirements every year. The programme now takes account of all systems that have achieved production readiness for vehicles, or whose use has been extended, as a result of technical development in recent years, for example central electrical systems, circuit diagrams, testers, electronic injection, electronic management systems, ABS, semiconductor and breakerless semiconductor ignition systems, central hydraulic systems, automatic transmissions, and air-conditioning systems, to name but a few.

Relationship between training and careers

There is no relationship between continuing training and professional careers. Continuing vocational training is considered necessary in order to be able to meet the challenges of technical developments and to safeguard jobs. Further training and the successful application of newly-acquired skills and capabilities result in better pay above the agreed scale.

Description of the training system

The system of in-house training has already been described.

In the following there is an outline of the current concept as stipulated by the manufacturer and distribution centre/customer service training centre.

The training system comprises three stages (see also Appendix):

Stage 1: Basic Training – intended for all
Objective:
Above all for new employees and to extend range of skills

Stage 2: Continuing Training I
Objective:
Improving and extending skills and expertise

Stage 3: Continuing Training II – Stage 2 is a prerequisite
Objective:
Development of trouble-shooting strategies

In the technical sector, mechanical engineering is now less important than it used to be in all training schemes. Electronics and diagnostic technology are of central importance.

There is a similar graduated system for sales and marketing to that shown above, but apart from basic training and continuing training there is also a degree of specialization. This specialization (for example in business administration or personnel, or, in the case of sales staff, in products or second-hand cars) is not, however, based on the basic and continuing training courses (see also overview Appendix).

It can be seen from the contents of the courses and the vertically graduated concept that the courses can be divided into two categories, in similar fashion to the current form of company organization:

- courses covering topics involving customer contact
- courses dealing exclusively with motor vehicle technology

The seminars covering customer contact are designed for staff from after-sales service, sales, and company organization; seminars with technical content are primarily intended for mechanics but also for repair shop foremen.

When new products are introduced, training of personnel of the various companies takes place when the product is available. Efficient, product-oriented training is not possible before that.

Plans for the future development of training

All three establishments consulted, namely the firm, distribution centre/customer service training centre and manufacturer, clearly recognize the high demand for continuing training on account of the rapid developments in

- motor vehicle technology
- repair shop technology (test equipment etc.)
- after-sales information systems involving electronic data media

The manufacturer concludes from this that dealers' managerial staff and mechanics require training at short intervals (at least twice per year).

Given a total potential number of participants of 36,000 people in Germany, and a training time of 2.5 MTDs per person, the total requirement is 90,000 MTDs per year.

In the estimation of representatives of the distribution centre and manufacturer, the only way of coping with this demand is to increase the relocation of training to the dealerships.

A model that is so far still at the discussion stage has been developed for practical implementation; its basic features are described below. The model, known for short as T-TiB (a German abbreviation for Technik-Training im Betrieb – in-house technology training), is based on the following ideas:

- training is to be conducted by full-time T-TiB trainers (supported by the distribution centre and manufacturer)
- suitable conditions for theoretical and practical work

  classroom for 12 people
  workshop for practical exercises

- dealerships and repair shops specify the training programme and cover the costs

The co-operating companies are to agree on a permanent T-TiB base for training, with classroom and workshop area. This is where the T-TiB trainer is to work.

Some 400 VW-Audi mechanics are to be linked to each T-TiB base. The manufacturer is covering the initial investment for T-TiB training. It is intended that these funds be recovered by payment for the training services.

The customer service training centres shall continue to hold courses, but possibly to a reduced extent. These courses will build on the T-TiB courses.

There are also thoughts of incorporating training in the electronic network for the parts catalogue and literature at some future date.

Curricula
The contents and levels of the courses are largely determined by the self-study programme, the video programmes, and other written documents (such as repair manuals). These documents are drawn up by the manufacturer. It is up to the training staff to select the methods used in the courses.

Feedback system
There are three different types of specialist adviser in the VW organization, for:

- technology
- accessories
- marketing

These advisers visit the companies regularly, and are intended to provide advice and support in technical discussions in the event of problems.

Companies are called upon to stipulate the necessary focal areas of training in conjunction with the specialist advisers.

The specialist advisers also carry out a check of work quality. They report their findings to the relevant department at the manufacturer.

The firm examined here still sees certain deficiencies in the feedback system. They say that to date there has been no noticeable improvement in the extent of training at the customer service training centre, and while there is support for trouble-shooting with new products, it is often necessary to approach a number of people in order to obtain adequate assistance.

One reason for gaps in the flow of information may be that as a result of feedback returning to various departments, no single department has a full overview of the problems that are troubling the companies.

Qualifications of training staff
The trainers at the customer service training centre are generally qualified mastercraftsmen or foremen and have a good command of the technology, and are given training in teaching methods by the manufacturer.

Advance training of training staff and employees
When new technical developments are introduced, trainers are invited to visit the manufacturer for training on the new products.

A more recent variant of this is that trainers meet in small groups to familiarize themselves with new developments and are then trained at the manufacturer so as to further deepen their knowledge. Trainers receive instruction about four to five months before the introduction of a new product. The employees of the companies are not trained until the product is available.

Participation of trade union and other representatives
Trade union representatives are present at all levels investigated: firm, distribution centre and manufacturer. They are informed of training activities but do not exercise any influence over them.

Employee representatives are included in the planning of the overall concept at the manufacturer level.

Collective agreements about training
There are no such agreements.

4.5 Costs of continuing vocational training

All costs of in-house training are covered by the firm. There is no precise assessment of these costs.

The firm does not have to pay fees for employees' attendance of courses at the customer service training centre. It does, however, have to compensate the participants for loss of earnings and travel costs.

According to an estimate by the service manager, the costs incurred by the customer service training centre for holding the courses amount in total (personnel, facilities, maintenance, new acquisitions, catering) to about DM 1 million per year. This figure has to be financed from the trading volume of the sale of spare parts by the distribution centre.

4.6 Evaluation of costs

There is no more specific evaluation of the costs of continuing vocational training.

5. Evaluation of the training concepts

5.1 Evaluation of the staff questionnaire

Refer to the Appendix: "Evaluation of Training passports".

5.2 Best practice, standard practice

The firm examined here carries out training on-site with the prime aim of keeping customers satisfied by a good standard of service, and thus binding them more closely to the firm.

The objective of the training scheme is to improve the skills of individual employees on as broad and varied a basis as possible. The customer service training centre concentrates on the aim of achieving higher qualifications, above all in new technologies such as electronics and diagnostic technology, and on providing an adequate range of leadership, marketing, management and sales training courses.

5.3 Future requirements of continuing vocational training

Need for mobility

By broadening the range of skills of as many employees as possible it is intended to ensure a reliable level of service at the firm and enable staff to be employed in a number of fields.

In the opinion of representatives of the manufacturer and the distribution centre, the in-house training policy is generally transferable and will in future be a necessary way of meeting training requirements.

The high cost of in-house training does, however, constitute an appreciable burden for the firm in question.

The tendency on the part of the manufacturer is to extend in-company training by introducing a modified form of organization. This would have the effect that the manufacturer would be further distanced from the training activities, whereas the individual firms would be more closely integrated in troining schemes than before.

6. Conclusions in the context of best practice and normal practice

The interviews and discussions held at the manufacturer, the distribution centre and the firm gave a clear indication of a tendency to transfer certain parts of the training programme to the companies.

The manufacturer is concentrating on the performance of tasks such as:

- overall co-ordination of the training procedure (help with problems, financial assistance etc.)
- preparation of media for training
- the provision of product information
- limited training of the trainers from the customer service training centres

The customer service training centre offers important courses, above all on recent developments, for sales, marketing and managerial staff, but for cost reasons is unable to expand the amount of training to the necessary degree. This is why the training foremen and problem-solvers are the primary targets for training. Standard training relating to conventional technology is to be transferred to the companies to an even greater extent than before. The firm is facing up to this challenge, as far as it is able in terms of cost and capacity, for two reasons:

a. In order to be able to cover costs on work in the workshops, or even operate at a profit, appropriately qualified skilled staff must be available so as to be able to perform efficient servicing and repairs, even on high-tech vehicles.

b. The only way of retaining a large number of regular customers over a long period of time is to provide good service and good, but above all reliable, customer support both at an organizational level and at the servicing and repair level.

The transfer of training activities to the firm has the effect that there is less and less communication between company staff and the manufacturer, the consequence being, on the one hand, that important information is not available to the manufacturer and, on the other hand, that the firm cannot receive sufficiently targeted support from the manufacturer or the customer service training centre when confronted with unfamiliar faults in new products.

The result of this is the establishment of an informal information network between individual firms who provide mutual support in trouble-shooting and diagnosis whenever the manufacturer or customer service training centres is unable to help.

To enable the manufacturer and distribution centre/customer service training centre to achieve a certain level of information despite this, additional specialist advisers must be deployed for the fields of technology, organization and marketing. Considering that these advisers also check the quality of work, however, they are at one and the same time partners of the firm but also inspectors reporting to the manufacturer. To a certain extent this diminishes the collaboration that is potentially constructive for both sides, which has the aim of providing successful training and efficient service in all areas.

From the discussions with those parties mentioned above it can be concluded that continuing

vocational training is characterized by a relatively large amount of experimentation in content and organization, and no "ideal" model has yet been implemented.

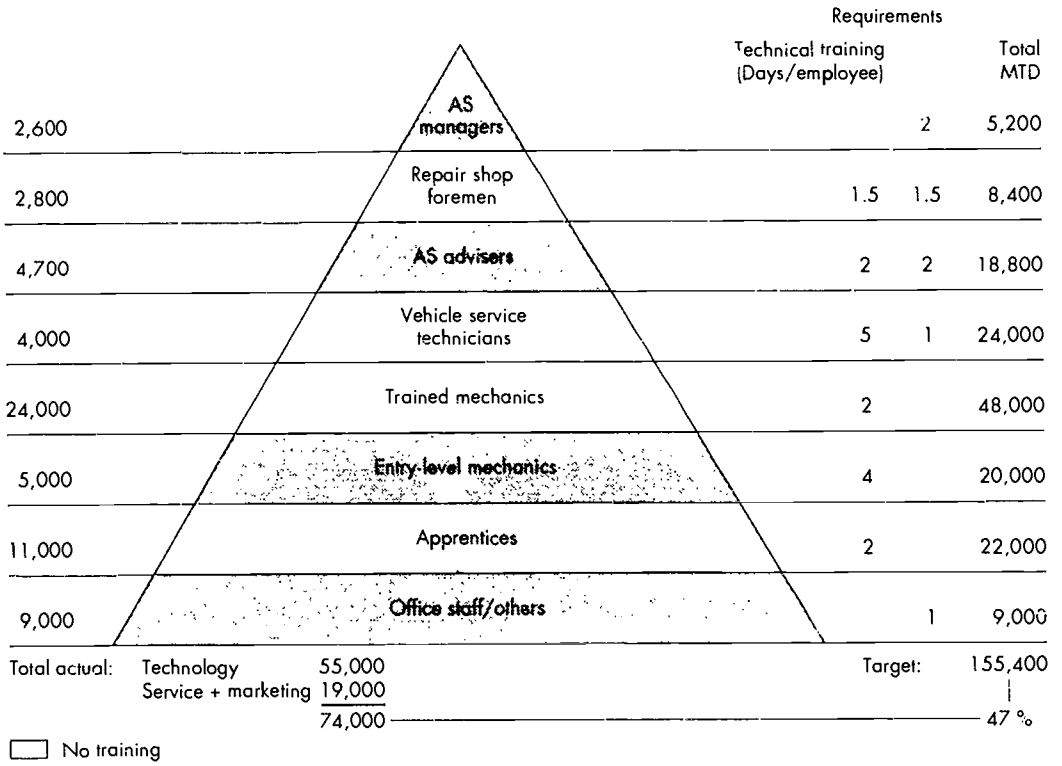
Alongside the concept described above, the service technician training programme newly-introduced to the motor vehicle sector (see sector report) is seen by all sides as offering an additional opportunity to play a certain part in meeting requirements.

Finally, it can be stated that continuing vocational training is aimed at and capable of considerably increasing the quality of training in the context of conditions as they exist in firms. It is necessary, however, to safeguard the general conditions that make this possible, for example qualified trainers, training materials and premises. This concept at the same time offers the opportunity for practical evaluation of the products. The extent to which this proves successful is dependent on whether it is possible to develop a relationship between the manufacturer and dealerships that is more strongly oriented towards feedback and co-operation against the widespread trend of a control-oriented tradition.

APPENDIX

2.

Overview of required training capacity



Source: VW-Audi course programme

Overview of the range of continuing vocational training schemes available in the VW-Audi organization

Source: VW course programme

The initial and continuing vocational training programme for managerial staff and specialist personnel in sales

- Training of sales staff:

  Basic training, stage 1 (2 weeks)
  Basic training, stages 2–4 (3 × 1 week)
  Second-hand car seminar
  Action training/regional product training
  Training in dealership business
  Special training

- Information on the seminars "service technology, car bodywork and paintwork"

Basic training
It is aimed at new employees, e.g. who have been recruited from competitors' firms, or at former employees who have not had experience of Volkswagen and Audi products for some time.

This basic training is also aimed at employees who need additional technical training, e.g. moving from mechanical to electrical engineering, car bodywork repair and paintwork.

Continuing training, stage 1
Repair shop staff can improve and extend their training in routing repair shop work. Training at this stage is organized for different components, e.g. engines, fuel and ignition systems, transmissions, car bodywork, electrical system, paintwork.

Continuing training, stage 2
Stage 2 is designed for employees who have to meet particularly high levels in motor vehicle repair. It enables participants to develop independent trouble-shooting skills. Training is devoted to dealing with customer complaints under the heading:

Clear-cut recognition of the source of trouble and its correct repair

2.

A prerequisite for stage 2 is knowledge of the skills imparted in stage 1.

- information on seminars for publicly-owned undertakings

When notifying the training needs of vehicle fleet owners (publicly-owned undertakings) the following should be taken into account:

an expressed need for training does not always involve course attendance. It is possible that this lack of knowledge can be made up through customer service literature (repair manuals, self-learning programmes, etc.) or the provision of video training sessions.

to guarantee the success of a course, participants should only attend courses relative to their routine tasks.

- Technical courses:

Basic training, Stage 1
General product technology
VW/Audi inspection service
Audi V8 inspection service
Engines (spark-ignition and diesel)
Mixture formation, carburettor engines
Mixture formation, fuel-injection engines (naturally aspirated and turbo)
Mixture formation, diesel engines(naturally aspirated and turbo)
Ignition systems

Manual transmissions
Transmissions (manual and automatic)
Running gear, general
Running gear, specific
Temperature regulation (air-conditioning systems)

Vehicle electrical systems 1
Vehicle electrical systems 2

Continuing vocational training, Stage 2
General product technology
Systematic trouble-shooting on carburettor engines
Systematic trouble-shooting on fuel-injection engines
Systematic trouble-shooting on diesel engines

Manual transmissions
Systematic trouble-shooting on air-conditioning systems

Vehicle electrical systems 1
Systematic trouble-shooting on electrical and electronic systems

- Notes on the service technology, bodywork and painting courses

Basic training
This is intended for new employees, coming from competitors for example, or for former employees who have not worked on Volkswagen or Audi products for some considerable time.

Basic training is also intended for employees whose range of technical skills is to be expanded, for example from automotive mechanics to automotive electrics, body repair or vehicle painting.

Continuing vocational training, stage 1
This is the stage at which specialist repair shop personnel can improve and extend their skills for day-to-day repair work. Training at this stage is oriented towards component groups, for example engines, fuel and ignition systems, transmissions, bodywork, electrical systems, paintwork.

Continuing vocational training, stage 2
Stage 2 is intended only for employees who have to meet particularly demanding requirements in vehicle repair. Stage 2 gives participants the ability to develop trouble-shooting strategies themselves. The topics are based entirely on customer complaints, the underlying philosophy being:

Unambiguous identification and correct repair of all causes of faults

Familiarity with the relevant topics from stage 1 is a prerequisite for participation in stage 2

- Notes on courses for publicly-owned enterprises

For the purpose of registering the requirement for courses among fleet owners (publicly-owned enterprises) with the responsible distribution centre, we ask you to note the following:

A request for training does not always mean that participation in a course is necessary. The provision of after-sales literature (repair manuals, self-study programmes etc.) and the loan of operational training video tapes can often make up for any existing deficiencies in knowledge.

In order to ensure the success of the courses you should make certain that the course participants are assigned specifically to those courses for publicly-owned enterprises from the range on offer that match their duties in their particular enterprise.

- Bodywork and paintwork courses:

Basic training, Stage 1
Bodywork
Assembly and adjustment work on vehicle bodies
Body in white
Sliding/removable roofs
Non-positively mounted bonded glasswork
Golf Convertible
Audi Convertible
V.A.G. jig system 1365

Painting
Vehicle paintwork, painting of
plastic bolted-on body parts
Shading

Continuing vocational training, Stage 2
Bodywork
Systematic trouble-shooting on bodywork, leaks, noises

Painting
Defects in paintwork and how to correct them
Individually designed vehicle paintwork

Courses for publicly-owned enterprises:
Inspection service for Polo/Golf/Passat type series
Inspection service for Audi 80/100 type series
Industrial engines

Demand-oriented action training:
As a supplement to initial and continuing vocational training, service technology training will also respond selectively to major events in 1992. You will be informed in good time of the dates and topics covered.

In-house training/self-study programmes:
This training channel gives every firm the opportunity of conducting individual or group training events via their after-sales training foreman, in accordance with their particular requirements.

In-house training mainly uses video as its medium, although there is also provision where needed for the use of accompanying material such as exercise booklets, self-study programmes, and training or demonstration parts.

Learning from self-study programmes can take place outside working hours. If they have difficulty understanding the material, learners can turn to the after-sales training foreman, who also sees to it that it is possible to consult the self-study programme at the firm when necessary.

The initial and continuing vocational training programme for managerial staff and specialist personnel in the fields of service marketing and logistics (for after-sales service organization, parts service and accessories)

- Specialist Training (Basic Training):

	Service
Finding the correct part number	PS
Finding the correct replacement part number	PS
Auto-part data acquisition and evaluation	PS
Determining the correct service order	AS
Organization in the company office	AS

- Specialist Training (continuing vocational training):

Marketing:	Service
Parts service marketing	PS
Service marketing	AS
Advice and sales in service	AS/PS
Service to the customer	AS/PS
Telephone communications	AS/PS
Poster typefaces	Accessories
Presentation of goods	Accessories

Business Administration:	Service
Commercial inventory management	PS
Contribution margins in the parts service	PS
Cost-effective repair shop management	AS
Analytical instruments for cost-effective company management	AS
Contribution margins in the service field	AS

Personnel:	Service
Planning, organizing and holding in-house training events	AS
Time scheduling and coping with stress	AS

Organization:	Service
Orderly parts storage	PS
Rational work organization in service	AS/PS
Location	PS
Handling exchanges	PS
Team concept as an organizational form	AS

Working Groups:	Service
Parts service working group	PS
Repair shops for after sales service managers	AS
Regional training for after-sales service managers	AS

In-house Training:	Service
Training within the firm	AS/PS
Support in the firm	AS/PS

As a supplement to initial and continuing vocational training, service marketing and logistics training will also respond selectively to other major events.
You will be informed in good time of the dates and topics covered.

2.

Specialist Training (Basic Training)

- Finding the correct part number

Objective
Teaching the skills of finding part numbers quickly, correctly and reliably

Content
The means available for finding part numbers
- Spare part reference books and what they contain
- Microplan films and their layout
- The MPF reader and how to use it
- Working with the ETKA keyboard
- What ETKA offers

Finding the correct part number with MPF or ETKA
- Basic data
- Structure and meaning of part numbers
- Determining part numbers
- Special points when determining part numbers

Practical exercises with MPF or ETKA

Participants
New employees who have been working in the parts service for less than 6 months and apprentices

Location
Distribution centre

Duration
Dependent on the needs and existing knowledge of participants

Costs
The distribution centre bears the costs of holding courses. Travel costs, and if appropriate board and lodging are covered by the firm.

Seminar code
G1 TNB

Evaluation of Training Passports

- Main elements of training

1. In-house

Proportion in %	
1. Product training	38%
2. Carburation – particularly electronically controlled fuel-injection systems and diesel mixture formation	20%
3. New components (e.g. airbag, multifunction display)	14%
4. Measurement technology (testers, suspension alignment etc.)	9%
5. Circuit diagrams / on-board computers	8%
6. Transmission – manual – automatic	5%
7. Motor mechanics	3%
8. Bodywork	3%
Total	100%

Product training and mixture formation are ranked highest.

2. Customer service training centre

Proportion in %	
1. Customer support	53%
2. Trouble-shooting Mixture formation (diesel/petrol engines)	13%
3. Components (various)	13%
4. Air-conditioning systems	7%
5. Electrical systems	7%
6. Bodywork	7%
Total	100%

Product training and carburation are ranked highest.

Extent of training

Customer service training centre

Average participation in the full range of courses available by employees of the firm between 1989 and 1992:
- between 1 and max. 1.4 MTDs

2. In-house training

a. Regularly documented training by training foreman (usually in small groups) between 1988 and 1992:
- average 1 MTD

b. Training in the form of instruction directly at the object in question while working on a job – calculation of job cost accounts is reduced accordingly (referred to in-house as W6)
- estimated figure approx. 1.5 MTDs (this figure cannot be calculated precisely)

3. Total amount of training

a. Customer service training centre	approx. 1.2 MTDs
b. In-house	approx. 2.5 MTDs
Total	3.7 MTDs

This data was obtained from the training passports for the period from 1988 to 1992 and entered in the enclosed sample of the questionnaire.

No significant changes in the amount of training could be detected during the period in question.

6. CONCLUSIONS FROM THE CASE STUDIES

Despite careful selection, we are still not really in a position to register and describe all the differences and various facets of continuing training practices in the sector on the basis of five case studies. There is no question that anyone expects that from the case studies. Nevertheless, we should ascertain which part of the sector our selected cases are in fact representative of and to what extent they reflect conditions in the sector as a whole.

Of course, we can use the case studies to illustrate continuing training in the sector, but the selection cannot make any claim to be statistically representative of the sector. The cases have, however, been selected on a basis which permits qualitative statements.

Our sample differs from the sector as a whole in the following respects:

- our firms have more employees than is usual in the sector;
- our employees are older;
- our sample includes too few independent dealerships for the total number of firms;
- of the firms in our selection which are under contract to a particular make of vehicle the upper segment of the market predominates;
- it is not possible to make any comment on the particular problems of eastern Germany.

As far as the age of the firms is concerned (year of establishment), the structure, the organization of the work and the level of union membership, we have probably chosen the "social average."

Despite this slight imbalance in our choice of firms, general conclusions can, of course, be drawn on the basis of the case studies which apply to the whole sector.

For all dealerships, including the "independent" ones which are not linked to a particular make, the capacities for continuing training are limited. This applies less to the commercial and customer service qualifications. In this area there are fewer quantitative problems as it is more a question here of training courses which are not linked to a make of vehicle but are offered by independent institutions and the local Chambers of Trades. Here the difficulty for the dealerships is probably more of a financial nature since these courses have to be paid for. We do not want to speculate any further and will confine ourselves to continuing training for technical staff about which the people we talked to in our study commented.

The situation of the independent dealerships which are not linked to a particular make of vehicle is especially precarious, as they are basically excluded from the training provided by manufacturers. They have to fall back on the courses which component manufacturers (particularly Bosch) and suppliers of parts and equipment offer – frequently in co-operation with the local Chambers of Trades. They do benefit in this sense from a training which is not linked to a particular make but it is very much based on the parts or components and teaches little about systems. It is very difficult to predict whether this deficiency will in the long term reduce the importance of the independent dealerships, and thus their numbers, or whether the number of people they employ will simply drop. They will have a good chance of surviving in certain areas (such as repairing accident damage or older models).

But the manufacturer-based organizations are also faced with a similar problem: the capacity of the central customer service training centres does not fully meet the repair shops' demand for continuing technical training. Nevertheless, manufacturers and importers seem to have no desire (and certainly no concrete plans) to adapt the capacity in the customer service training centres to meet the demand of the dealers. What is happening instead is that the limited capacity is being used increasingly for three target groups:

- to provide a basic training for young skilled workers in their first journeyman's year or other new workers;
- to train specialists;
- to provide training that will be passed on to colleagues.

This concentration on certain central target groups is accompanied by different forms of organizational decentralization of service training – particularly in the case of German manufacturers. On the one hand, many manufacturers are moving their courses from the central training facilities to well-functioning repair shops or branch establishments and create as a side effect (limited) opportunities for the dealer to influence the structure of the training (BMW, VW) ("need-oriented regionalization"). On the other hand, technical communication networks are used to reach greater numbers of participants ("physical-technical decentralization"), which is what Mercedes Benz is, for example, trying to do with its major project, AKUBIS.

In view of this situation the internal training within firms in their own repair shops is gaining considerably more significance. It is particularly being supported by the manufacturers (and importers) by specific use of media such as manuals or teaching books, videos, video discs, computer-based learning programmes or teleconferencing. Use of these media is intended to ensure that uniformity of methods within one make is maintained even when the training takes place in individual repair shops.

There are different approaches to whether the use of these media is compulsory. Some manufacturers require participants in the central training courses

to prepare themselves beforehand using the videos supplied (BMW), others produce the material solely for the personal use of their repair shop staff or to reinforce internal training (Mazda) and others see the videos simply as a fall-back which the mechanic can call upon if he is uncertain about something. Mercedes Benz, for example, makes videos of completed courses at their customer service training centres and distributes them to dealers.

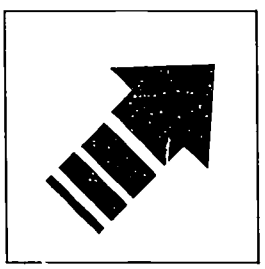
Correspondingly these media are formalized to different degrees within the continuing training system of the individual manufacturers. For Mazda, for example, they are used purely at the discretion of the dealers they send them to. In addition, the introduction of new models or important technical innovations are accompanied by a centrally produced video. BMW, on the other hand, requires that the information officer appointed in each dealership reports annually to the central customer service training centre about the use of the self-study programme in his dealership and experiences with it, whereas in VW dealerships the training supervisor decides on the use of the video (e.g. to reinforce his own internal training work) and which employees should participate in the video training.

Despite this widespread decentralization there are no specialist trainers in the repair shops – not even in the large firms in our sample. Only VW has taken a step towards professionalization of internal training by appointing voluntary training supervisors (who are simultaneously problem-solvers). BMW have professional trainers in their branch operations (i.e. the middle level of the dealer structure).

There is a close link between the organization of work and qualifications. For example, the differences in the organization of training have consequences for the organization of work and the structure of qualifications on the repair shop level. Concentrating continuing training too much on particular people leads in the medium term to a polarization of qualifications and impedes the establishment of homogeneous teams. It then becomes obvious that complicated tasks will be carried out by the special problem-solvers and the other employees will mainly deal with routine work. In other words, if a firm wants to implement a team concept on the repair shop level (as VW has, for instance) it must make sure that it creates equal qualification opportunities for all members of the team and maintains this practice in the long term.

TRENDS

PART 3:



Conclusions

Bibliography

1. CONCLUSIONS

This study has examined the development of work and continuing vocational training in the motor vehicle repair and sales sector. In this sector the firms are organized in such a way that they are involved in the sale, servicing and repair of motor vehicles. This sector is closely linked to the most important industry in Germany's economy, the motor industry. The job of every sixth employee depends directly or indirectly on the motor industry. Nevertheless, the developments and structures in this sector, which is downstream of car manufacture, have been largely cut out of the public and academic debate, although clearly one sector could not exist without the other.

Despite the fact that modern vehicles and their aggregates are now of better quality, last longer, need fewer repairs and that intervals between services are longer, the complexity of the car means that the dealership in its role as mediator between manufacturer and customer is more crucial than ever. Nevertheless these two sectors are far from being accorded equal significance and equal rights: both economically and functionally, the motor vehicle repair and sales sector depends on the manufacturers, be they German or imported makes. This is documented in the contracts, for example, with which the manufacturers/importers intervene in the internal organization of the service companies linked to them, sometimes influencing even the smallest details.

1.1 Economic developments and employment

The number of motor vehicles on the road in Germany is at present over 46 million; every second inhabitant (statistically) owns a car. This would suggest that the market is to some extent saturated. Whereas the number of vehicles registered in 1991 rose to 4.5 million, it dropped the following year to around 4 million and is expected to be well below this figure in 1993.

At the same time there was a parallel development in the manufacture of motor vehicles. After the boom years of 1989 to 1991 (in each year over 4.85 and in 1991 more than 5 million vehicles even), production dropped again in 1992 to an estimated 4.7 million and will plunge even further in 1993 since at the beginning of the year there was a drop in orders of over 20%.

This development has, of course, had consequences for employment: whereas in 1991 there were still 780,000 people working in car factories, this figure had dropped to 725,00 by the end of 1992. Experts are predicting that in the next few years there will be a further shedding of between 300,000 and 1.7 million jobs in the motor industry and supplier industries. According to a report in the Süddeutsche Zeitung, the Association of the Motor Industry has predicted between 40,000 and 50,000 redundancies in 94 alone.

The consequences that this will have for the development of the market in the sales and service area of the motor vehicle sector cannot be estimated with any degree of precision, as developments in this area are influenced by numerous factors, some of them conflicting, and are only in a very indirect way dependent on the number of vehicles on the road. Although the number of dealerships rose by a third between 1979 and 1990 (virtually steadily by 3% each year to 44,500), the number of employees fell in the same period dropping from over 400,000 to 335,000 in 1984, and since then it has been rising again slowly to its present level of just over 350,000. This means that the average size of firms shrank from 12 to 8 employees; a consequence of redundancies particularly in the first half of the 1980s (and of course a reflection of the fact that new businesses are always smaller initially). At the beginning of 1993 there were clear indications that this sector would not experience any more growth; on the contrary firm closures are becoming increasingly more commonplace.

But it is other factors which will influence the development of the sector in a lasting way:

- With higher quality of vehicles and their aggregates, the intervals between services get longer and the time a vehicle spends in the repair shop shorter;
- This means that the time and money spent servicing and repairing each car is reduced;
- If the sales crisis is accompanied by an increase in the useful life of cars, the volume of repairs would increase for the cars which would by then be older;
- There is a direct link between frequency and gravity of accidents and repair works, albeit modified by the customers (quality) expectations;
- New environmental and safety standards will increase the work for businesses and organizations involved in checking that they are adhered to and making necessary adjustments to vehicles.

These development options overlap with changes in the requirements made of repair shop personnel. Electronically controlled components have entered virtually all areas of automotive technology and are little by little being integrated into complex systems. This applies both to transmission systems and engine management and the area of safety and comfort. Thus, higher qualifications are being demanded of repair shop employees particularly with regard to fault detection and analysis. Industry is using increasingly efficient diagnosis systems to try and give the employees who mostly have a predominantly mechanical

training a tool with which to master these new demands: an attempt to use electronic aids to master increasingly complicated electronics. A clear increase in training courses in the customer service training centres to teach people how to use modern diagnosis technology and to develop an understanding for "integrated" automotive technology is evidence of this.

1.2 Vocational training and selection of personnel

Traditionally this sector has been characterized by its great efforts to improve qualifications for employees but in recent years this emphasis has been reinforced as a result of the wider variety of models and the forced technical changes. Only about 7% of employees have no relevant vocational qualification but one in every five employees is engaged in vocational training. Almost a quarter of employees in technical or commercial occupations have a mastercraftsman diploma. Almost all employees in the after-sales department and repair shop take part regularly in continuing training, either in courses offered by the after-sales divisions of the manufacturers or importers, in courses provided by the suppliers or Chambers or in-house training courses.

Despite this high proportion of skilled workers and the high continuing training density (ratio of participants in continuing training to employees), many people in positions of responsibility within the sector do not consider the training activities to be sufficient.

The first problem is that young people with good qualifications from school do not seem to find the occupation of motor mechanic attractive. It is by far the most frequently chosen training occupation (1992: 30,000 trainees in 32,000 training firms) but over 60% of the trainees come from Hauptschulen. The auto-electrician training is of only marginal significance. The firms manage to keep only a minority of these trainees in the long term, and often it is the better trainees who leave for other jobs or further study at an institute of higher education.

This prepares the ground for the negative selection which some people in the training profession complain of. Participants lack basic knowledge, which they were not taught at school or in their subsequent training and which, of course, cannot be corrected in short continuing training courses. Thus, more emphasis is placed on specialist training and training which employees can pass on to their colleagues (snowball effect), since in any case the customer service training centres do not have sufficient capacities to cater for all employees. Thus, a polarized qualification structure is gradually being created in the repair shops which cannot be matched by the computer-aided self-instruction programmes which all firms use, nor by intensified internal training. Opposite trends are, however, being seen in firms which are more interested in deploying their staff across the board in order to be able to react flexibly to unexpected demands and technical changes. A particular expression of this is the team concept which is practised in a small number of repair shops.

With increasing frequency it can be observed that qualified employees who are interested in further training, having completed their mastercraftsman diploma, remain without a suitable job for quite a time due to a lack of vacancies in the firm in which they trained. This, of course, does not make continuing training more attractive to people nor increase their willingness to participate. At the same time, however, permanent technological innovations and the increasing complexity of the car require that everyone working in repair shops undergo permanent continuing training.

1.3 Change in the work of the motor vehicle repair shop

The change in the work of the motor vehicle repair shop has been influenced by numerous factors. The central influencing factors are the new forms of technology used in cars which have developed into a systematic technology, the new tools needed for repair work and servicing including modern test and diagnosis systems, as well as environmental and exhaust emission regulations and higher customer expectations.

The area of motor vehicle mechanics, which dominated all other areas of work in this sector until well into the 1960s, will have lost its leading position before the end of the 1990s. This role will be taken over in the future by servicing and maintenance as preventive measures. The area of electrical and electronic systems will not play the central role which had been generally expected of it. Its share in the overall volume of work is already dropping and the emphasis here is now on electronic testing and diagnosis procedures. The bodywork area will continue to increase in significance.

A new area of work which is crystallising under technical aspects is the use of modern testing and diagnosis equipment. The modern motor vehicle repair shop is primarily designed for diagnosis and servicing and only secondarily for mechanical repairs. Diagnosis with the aim of detecting faults and correcting them by replacing components is predominant. From 1.12.1993 new exhaust emission regulations and the testing procedures connected with them, will further expand the diagnosis area of work.

The result of this is that the motor mechanic must be able to use modern testing and diagnosis systems to check complex and inter-connected vehicle technology. He must be able to analyze the diagnosis results in order to deduce where the

faults lie. He must adhere to mandatory diagnosis procedures such as the exhaust emission test and correctly analyze any defects found in order to efficiently rectify faults. This is the only way to satisfy the ever-higher expectations of customers and keep them as potential buyers.

In the bodywork area it is primarily the materials and paints, the working methods – e.g. increased use of straightening equipment and different spray painting procedures – support from data bases and increasing environmental and safety regulations that are changing.

It is essential that this extensive range of work on the modern vehicle be mastered efficiently in order to guarantee high customer satisfaction and ensure that the repair shop continues to develop and offer a high quality service.

In conclusion it must be said of the change in work that considerable structural changes are taking place in motor vehicle repair shops which, above all, are due to the reduction in traditional repair work, whereas work in the areas of servicing and maintenance and bodywork are showing an upward trend. Due to the tendency now to replace parts rather than repairing them and as a result of improved working techniques, i.e. rationalization, a mechanic today can look after many more vehicles than 15 years ago.

Challenges in areas such as diagnosis technology, environmental regulations and use of data bases through on-line networking with the manufacturer mean that the tasks which repair shop staff have to carry out are becoming much more varied than ever before. The response to this can only be flexible employees who can be deployed in a broad range of jobs. This demand in turn has implications for the way work is organized.

1.4 Organization of work and the repair shop and perspectives for continuing training

Traditionally a model of horizontal division of work has dominated, oriented to the main elements of the vehicle:

- automotive electronics
- automotive mechanics
- bodywork and body painting

Whilst the body and body painting areas (partly for reasons of worker protection) are often separate from the other areas of work, the first two areas are continually becoming more closely linked and particularly intensive further training is required in the area of electronics. Dealerships are trying to cope with this development in various ways (partly under instruction from the manufacturer) and are sometimes adopting a mixture of ...ys:

- Maintaining and to some extent refining the specialization of staff;
- Creating the job of all-round mechanic and providing training (partly with skills in electronics);
- Creating a multi-disciplinary team
- Deployment of highly qualified problem-solvers.

In this there is a close link between the organization of work and continuing training. Someone who thinks he can meet the growing demands, particularly in systems analysis and fault diagnosis, with only a small number of specialists should concentrate his continuing training on this group. Someone, on the other hand, who prefers a team approach to work organization must not only ensure that more employees gain adequate technical qualifications but must also encourage skills such as team spirit and capacity for interdisciplinary co-operation, skills which should be given special emphasis in the initial training as there is not normally a place for them in continuing training courses – except in the further training for gaining promotion to foreman or service technician.

Generally speaking, it now seems to be accepted that a polarized qualification structure amongst dealership personnel will not be able to meet the demands of increasing systems integration. The pathway of continuing technical training across the board is not, however, possible, due to the limited capacities of the customer service training centres. Thus all manufacturing companies and importers are developing different concepts for computer-aided, in-house continuing training using self-study programmes developed centrally or are providing intensive further training to some employees who can then teach others.

Building on the experience of different after-sales organizations in training company-specific service technicians as an intermediate position between foreman and skilled worker, the parties to the collective agreements in the motor vehicle repair and sales sector have agreed to advocate a service technician training which would be valid throughout the sector and not linked to any particular make of vehicle and for which a state-recognized diploma would be awarded. At present, however, people are still being given manufacturer-specific training for this position and it is not state-recognized. The introduction of the service technician is meant to solve two problems: training highly qualified problem-solvers in the repair shop, who can relieve the foreman of these responsibilities and the creation of an attractive (also in terms of pay) new position, which will put a halt to the fluctuation in staff, particularly qualified skilled workers. This diploma can also loosen the grip of one particular make of vehicle on the employee which, at present, has become entrenched due to the fact that continuing training

3.

has been virtually exclusively manufacturer oriented. However, at the same time there is a risk that many dealerships will concentrate continuing training so much on these key positions that they will create or stabilize a situation where the workforce is inflexible and has a polarized qualification structure and thus, where efficiency is relatively vulnerable (e.g. due to absence of these specialists or fluctuation).

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