Innovation Networks and Regional Clusters in the Automotive Sector: The UK West Midlands

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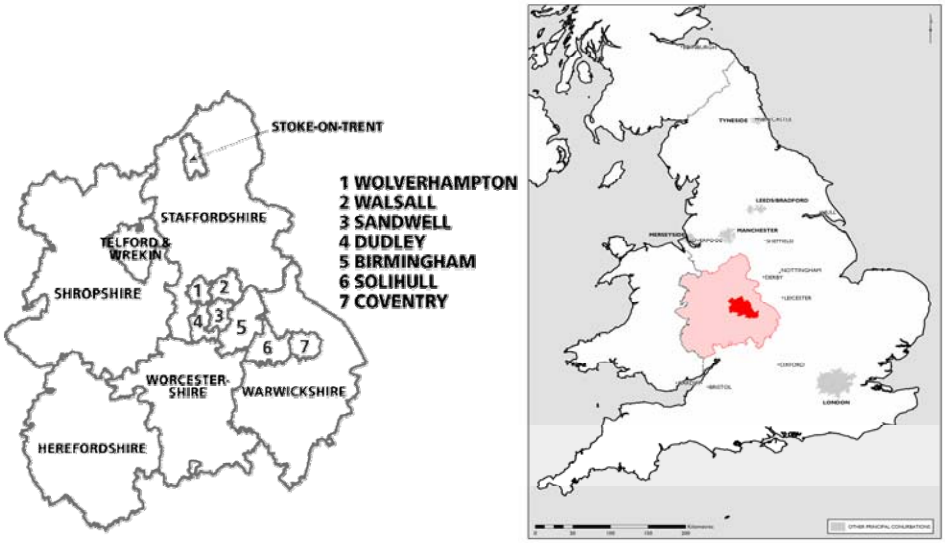
Introduction

This report looks at the automotive industry cluster in the West Midlands region of the UK and the way that the main trends and drivers of change are reflected in the cluster. Porter's 'diamond model' provides the framework. The role of government support is also examined and the report concludes with a SWOT analysis which explores the competitive advantage of the cluster.

The West Midlands

The region occupies a central position in England covering 13000 km². It is a mix of urban and rural communities with a total population of 5,4 million comprising 9 per cent of the UK population (ONS, 2006).

Figure1 Location of the West Midlands



The region was the birthplace industry and became famous for metal, leather, ceramics and glass products. Restructuring has reduced the number working in these sectors, but manufacturing still accounts for 16 per cent of GVA and 17,6 per cent of employment, currently at 2.4 million at approximately 211,000 business sites. Total regional GVA in 2005 was €118,6 billion out of a UK total of €1488,3 billion. This gives GVA per head at 89,4% of the UK average. Unemployment at 5,6% is marginally above the national average of 5,5%.

The Automotive Industry in the UK

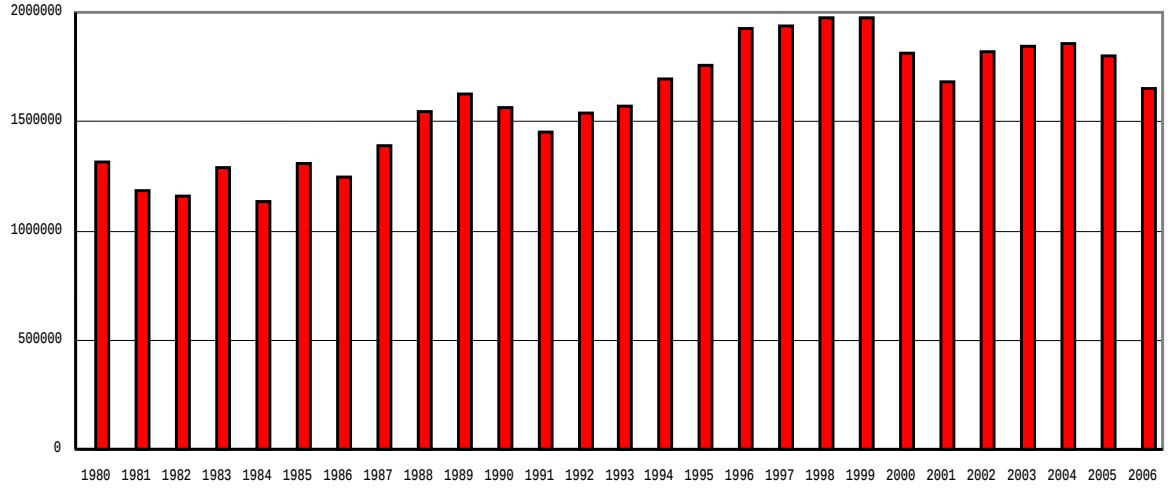
UK manufacture of motor vehicles and parts, (NACE 34), comprises some 3,300 businesses and a workforce of 210,000 (ONS, 2007) approximately 11% of total EU employment in the sector. A further 570,000 work in the motor trades which supply, service and repair vehicles in the UK. The sector contributes around £9 billion value-added to the economy, and accounts for 0,8% of GDP, 6,2% of manufacturing value-added and 11% of UK manufactured exports.

In 2006, the UK produced 1.4 million cars and around 208,000 commercial vehicles. Of these, 77% of the cars and 66% of the commercial vehicles were exported to a variety of markets. Europe is the main destination, with significant sales in North America and Asia, and specialist luxury marques sold worldwide.

The globalisation and consolidation of the automotive industry is well illustrated by the UK experience. The open nature of the economy and the 'Anglo-American' business model has encouraged these trends more than in other major European centres. Commentators have suggested that the industry should be described as the automotive industry in the UK rather than the UK automotive industry. It is vulnerable to global trends and decisions, not least because the design and purchasing authorities are elsewhere. However, there are also plus points. Overseas ownership has brought major investment, the innovative capacity of UK engineering is strong and there are a significant number of high value design and engineering businesses. Thus, despite many changes, the UK has maintained its position as a major vehicle producer.

The UK is also the centre of the world Formula 1 industry with most major teams being located in 'Motor Sport Valley' (Pinch et al, 1997), an area stretching south and east from the Midlands. The 'Valley' has around 2,500 businesses, with a turnover of approximately €7,5 billion, and employs over 40.000 people (including 25.000 engineers)

Figure 2 UK Vehicle Production - since 1980



Source: SMMT

Table 1. UK Vehicle Production (in '000s)

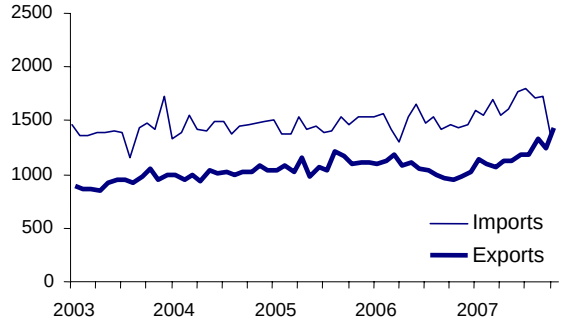
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Cars - home market	729	649	578	599	582	514	467	411	336
Cars - export market	1031	1150	1063	894	1047	1144	1180	1185	1106
Cars - total	**1761**	**1786**	**1641**	**1493**	**1630**	**1658**	**1647**	**1596**	**1442**
Commercial Vehicles - home market	123	110	96	97	77	86	81	76	71
Commercial Vehicles - export market	92	64	76	96	114	103	128	130	136
Commercial Vehicles - total	**215**	**190**	**172**	**193**	**191**	**189**	**209**	**207**	**208**
Grand Total - home market	852	759	675	696	659	600	548	488	407
Grand Total - export market	1124	1213	1139	990	1162	1247	1308	1315	1242
Grand Total - production	**1976**	**1976**	**1813**	**1686**	**1821**	**1847**	**1856**	**1803**	**1650**

Source: Office of National Statistics; Annual Business Inquiry

The table also shows how the balance has varied since 1998. However, despite strong export figures, the UK has a negative trade balance on vehicles and parts as illustrated in Figure 3.

However, as also illustrated, the increasing value of UK premium vehicle exports has narrowed in recent times.

Figure 3 UK Car Trade (£M)



The West Midlands Automotive Cluster

The region has a history of automotive production dating back to the first factory of the Lanchester Motor Company in 1895. This was followed in 1901 by the Wolseley Tool and Motor Company and the Rover Company. The Longbridge plant in Birmingham was set up by Herbert Austin in 1905 and grew into a major complex rivaling any in Europe. Other famous names included Triumph, Hillman, Standard and Jaguar. In fact Jaguar started in the north of England, but moved to the region in 1928 to be near other vehicle makers and suppliers. As in other clusters the supply industry grew alongside the car makers. Metal based trades dating from the industrial revolution were easily able to adapt to manufacturing automotive parts. The largest supplier was Joseph Lucas Ltd., which ceased trading under its own name in 1996. At the present day the company's legacy is in former sites now operated by companies such as Bosch, TRW Automotive, Denso and Delphi. The final collapse of MG-Rover in 2005 thus ended 100 years of car making on the Longbridge site. The closure of the PSA factory in Coventry in late 2006 effectively ended volume production.

Despite these high profile closures the region is still at the heart of the UK auto industry, with around 15% of car production, 28% of market value, and 28% of the UK jobs in the sector (ONS, 2005). The West Midlands automotive cluster can thus be described as 'mature' and, in common with other 'old industrial clusters', undergoing change (Rosenfeld, 2002). The remaining companies comprise

- Vehicle makers in the premium and upper premium sector
- The 'usual complement' of first tier suppliers adjacent to these remaining car makers
- Sports car manufacturers
- Niche vehicle manufacturers
- Engineering and engineering design consultancies (KIBS)
- Specialist suppliers to the motor sport industry
- An extensive supply matrix largely geared to the region's former high volume sector

The present production volume of around 15% of the UK total is considerably lower than the 30% of just a few years ago (EMCC, 2003). However, as might be expected, the high value of the vehicles produced is reflected in the market value of production at 28% of the UK total. As can be seen in Table 3 below, the total turn over of regional automotive companies (in NACE 34) is almost €17bn. The extensive supply base is reflected in the total for manufacturing of €66bn, much of which is automotive related. Some of other the key financial statistics, for the industry in the UK and the region are also shown. The location quotients indicate the concentration of the industry in the region. (Any value above 1.25 is significant.)

Table 3 West Midlands Turnover and GVA (2005)

	United Kingdom (€m)	West Midlands (€m)	UK Auto share of UK All Industries Total	WM Auto share of WM All Industries Total	WM share of UK	WM Location Quotients
Total Turnover						
Vehicles*	45661	12125	1,3%	4,5%	26.6%	3,41
Components**	13990	4739	0,4%	1,8%	33.9%	4,35
Total Automotive	59650	16863	1,7%	6,3%	28.3%	3,63
Total Manufacturing	643108	66486			10,3%	1,33
Total All Industries	3441603	268016			7,8%	
Approximate GVA at Basic Prices						
Vehicles	7909	1932	0,7%	2,4%	24,4%	3,30
Components	4257	1327	0,4%	1,6%	31,2%	4,21
Total Automotive	12166	3259	1,1%	4,0%	26,8%	3,62
Total Manufacturing	204182	20292			9,9%	1,34
Total All Industries	1099916	81458			7,4%	

(Source: ONS) Notes: **Vehicles* includes "manufacture of motor vehicles" (NACE 34.1) and "manufacture of motor vehicle bodies" (NACE 34.2). ***Components* includes "manufacture of parts for motor vehicles" (NACE 34.3)

Cluster Composition

The region hosts two major automotive assemblers Jaguar and Land Rover, both currently owned by Ford but now attracting bids from other car makers and private equity firms following Ford's decision to sell the two companies. There are, in addition, a large number of specialist and niche vehicles. Probably the best known is Aston Martin cars, formerly part of the Ford Premier Auto Group, now owned by a consortium led by the motor sport and engineering firm Prodrive. Aston martin's new production factory has recently been opened at Gaydon in Warwickshire, the company having moved to the West Midlands from their former HQ north of London. The region also hosts the BMW engine plant at Hams Hall just outside Birmingham. This is a new factory that produces gasoline engines for assembly factories in Britain (New Mini), Germany, South Africa and the US. At present it has just over 1000 employees and, in 2007, produced 260,000 engines.

Table 4. Major West Midlands Automotive Manufacturers

Manufacturer	Locations	Employees (Sept. 2007)	Vehicles Produced	No. of vehicles produced (2006)
Jaguar (Ford, USA)	Birmingham and Coventry	5000 (Hourly-3070, Salaried-1930)	S-type XJ, XK series	65425
Land Rover (Ford, USA)	Solihull and Warwickshire	8000 (Hourly-5000, Salaried-3000)	Range Rover, Discovery, Defender	87164
Aston Martin	Warwickshire		DB9, Vanquish, Vantage	7052

There are also a significant number of less known specialist or sports vehicle producers, including LDV (light vans), London Taxis International, Dennis-Eagle (public service vehicles), JCB (construction), Morgan Motors and Westfield (both sports cars). The most significant of these are shown in Table 5 below.

Table 5: Niche / Specialist Vehicle Manufacture in the West Midlands

Manufacturer	Location	Employees (Dec. 2007)	Vehicles Produced	No. of vehicles (2006)
Dennis Eagle	Warwick	600	Refuse vehicles, refuelling tankers	N/a
JCB	Staffordshire	3,000	Construction and agricultural vehicles	N/a
LDV	Birmingham	900	Vans, minibuses (plus supplier of pressed panels to Land Rover)	13,000
LTI Carbodies (Manganese Bronze, UK)	Coventry	450	Taxis (black cabs)	3000
Morgan Motor Co	Worcestershire	160	Niche sports cars	750

Also located in the region are producers in each of the main component groups: the driveline; chassis and under-body; engine components; body panels; interior trim; electrical components and design and engineering. Major firms include: GKN (drive shafts, universal joints, chassis manufacture and other products); Wagon (body manufacturing and engineering, doors and door systems/mechanisms, glazing);TRW (research, engine management and injection systems, steering); Bosch (Automotive Lighting); Denso (starters and alternators); Delphi (engine management and injection systems; Valeo (suspension systems); Lear Corporation (seats and interiors); Unipart Group (exhaust systems and fuel tanks); Wagon (bodies, doors/door systems); Rockwell (body/chassis systems and brakes); Dana (axles); Siemens-VDO Instruments (electronics); and SP, Goodyear and Pirelli (all tyres). Most are multinationals in non-UK ownership.

The most significant companies are GKN and TRW. Both are global but have their origins in the region. The former, GKN, remains in British ownership having evolved from early interests in primary metal and general engineering. Nowadays the largest part of the business is in driveline components and systems with some 43% of the global business and supplying all the major car-makers. GKN has its HQ in the region but its purchasing reflects both the changing nature of the industry and the decline of UK manufacturing. At the beginning of the 1980s some 80% of purchasing was in the UK but the figure is now 25% - with no significant amount from the region.

TRW, a US owned business specialising in safety systems, took over much of the former Lucas Company and manufactures braking systems, electronic control units and engine valves in the region. The West Midlands also hosts one of TRW's two European research centres. However some research capacity has been moved to the German based research centre in order to be nearer to the 'centre of gravity' of the industry. Several other significant suppliers occupy former Lucas sites including Bosch (Germany – automotive lighting), Denso (Japan – starters and alternators) and Delphi (USA – diesel engine fuel systems). Other big suppliers, like Lear, Johnson Controls and Dana are present, as they are in most automotive regions, to supply bulky components to the local car factories. They are not particularly embedded in the West Midlands.

Significant second tier suppliers include Sarginsons Precision Components, Zeus (aluminium castings), Brandaur (pressings), Radshape (sheet metal forming) and Premier Stampings (die forgings) and Triplex (glass) amongst many others. All these are in the 'traditional' materials processing industries for which the region is well known. The size breakdown of the companies classified as automotive suppliers (NACE 34) is shown in Table 6.

Table 6. Number of WM automotive component suppliers, 2005 (Source: ONS)

	Great Britain	West Midlands	Share of GB	Location Quotients
1-10 employees	965	161	16,7%	1,97
11-49 employees	340	111	32,6%	3,64
50-199 employees	212	78	36,8%	3,95
200 or more employees	107	37	34,6%	3,83
Total	1624	387	23,8%	2,79

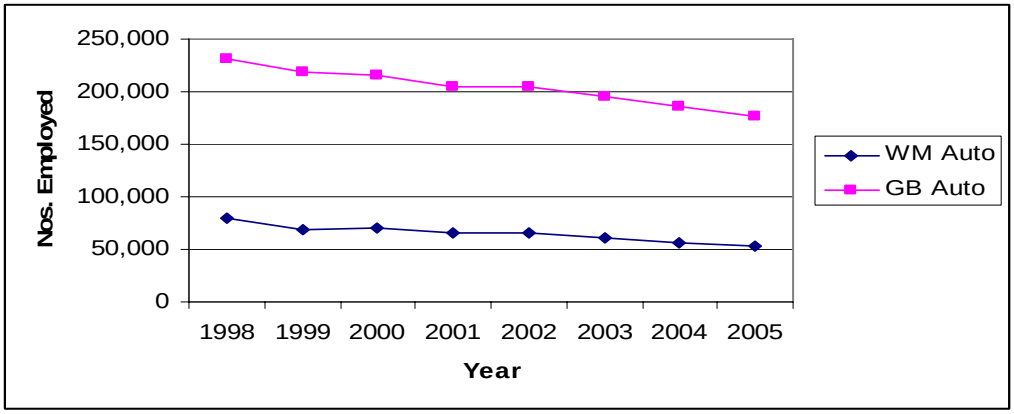
As can be seen, 90% of firms are small or medium sized enterprises employing less than 200 workers. In addition, there are a large number of material processing companies that are classified under different NACE codes, for example for casting of forging, but still supply the sector. It is estimated that there is a total of around 1500 firms in the regional supply base, (AWM, 2007).

The region also has a thriving for high value services sector. Businesses offering engineering design and technical development include, Pro-Drive (Motor sport, aero-dynamics, engine and powertrain development, design/styling of niche sports saloons), Zytek (automotive control systems, powertrain management and hybrid-electric vehicles), Ricardo (transmission systems) and MIRA, whose major research and testing facilities, covering almost all aspects of vehicle engineering, lie on the region's eastern border. This concentration of companies, and skills, is held in high regard within the region and by the major international players in the industry.

Employment

Employment (under NACE 34) has declined from 146.000 in 1971 to the current level of around 53.000. This change has not just been due to the major closures but also to on-going productivity gains, and the reduction in the numbers of supply companies, in line with overall UK and global trends.

Figure 4. Trends in UK and WM Automotive Employment



Source ONS

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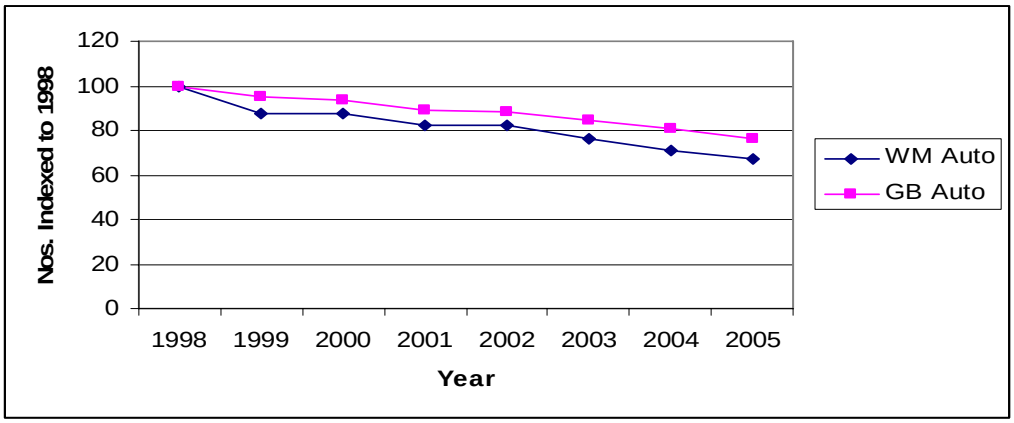
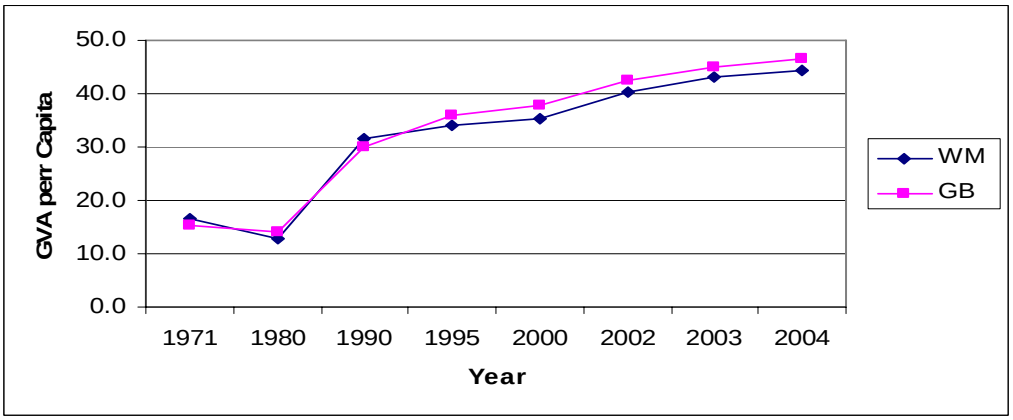
Figure 5. Trends in UK and WM Automotive Employment Indexed to 1998



Source ONS

Figure 5 shows the same decline indexed to the 1998 figures. This illustrates that, although the national and regional trends are similar, West Midlands' automotive employment has declined more quickly than nationally.

Figure 6 GVA per head for West Midlands and GB (Indexed to 1995 prices)



Source ONS

However, as illustrated in Figure 6, the decline in employment is in part due to increasing productivity. A well known 'rule of thumb' statistic connected with the auto industry is that

firms' need a 5% annual productivity increase just to maintain their position in an ever more competitive market. Often labour productivity is seen as a route to cost reduction above other efficiency gains.

Context of the West Midlands Cluster

Although centred on the West Midlands the 'cluster' extends into adjacent regions, as observed by Bailey (2007) who reports on approximately 40.000 automotive related employees in the adjacent East Midlands region with some 9.000 in auto assembly (including the Toyota plant at Burnaston) and 8.000 in manufacturing parts and accessories. Some 20.000 are employed in the South East region including almost 5.000 at the BMW 'Mini' factory in Oxford plus around 1.600 in the motor sports cluster as part of 'Motor Sport Valley' (Pinch, Henry and Turner, 1997; Pinch and Henry, 1999); 13,000 the South West (which includes the Honda plant at Swindon); 12.000 in Wales (suppliers for Honda and engine manufacturing for Ford and Toyota); and 24.000 in the North West (15,000 in motor vehicle assembly via GM and Jaguar/Land Rover in Merseyside, VW Bentley at Crewe and Congleton and Paccar trucks in Leyland, and 9.000 in manufacturing parts and components).

Thus the West Midlands 'cluster' forms part of an inter-regional or national network covering several other regions. The transfer of some Land Rover production by Ford from Birmingham to its Halewood plant on Merseyside, and the sourcing of engines by Ford from Wales and by BMW from Birmingham for MINI production in Oxford are all indicative of these linkages.

Supporting and related industries

The large number of materials processing and general engineering firms in the region provide a significant base of expertise but, for the most part, reflects traditional skills. Even the design and engineering services sector is largely concerned with the mechanical parts of the vehicle. However, an increasing proportion of added value is in the electrical and electronic parts of the car and West Midlands industry has relatively little involvement in these areas (MacNeill et al, 2002). The strength of the electronics sector in Germany, USA and Japan gives their car industries a considerable advantage (EMCC, 2003). Many of the new electrical/electronic or telemetric devices are at an early stage of development and the lack of a significant 'home owned' electronics or telemetry industry puts the region, and the UK as a whole, at a disadvantage. However, the region does host Qinetiq, a former Defence Research Establishment, which now works commercially on communications and electronics including automotive applications.

Universities and other institutes

UK Government policy has sought to encourage universities to capitalise on their intellectual resource and enter into collaborations with industry. (UK Department for Trade and Industry, 1998) The region has a medium level university research infrastructure. These include Birmingham and Warwick (both in the second division of UK universities outside the elite group of Oxbridge and the two leading London institutes) plus the universities of Aston, Keele, Staffordshire, Central England, Coventry and Wolverhampton. Most have expertise in some areas relating to the automotive industry – ranging from technology to business management. Highlights include:

- Warwick (University) Manufacturing Group - has a long history of industrial collaboration, in particular with Rover. Primarily work was in the area of manufacturing techniques and technologies, rather than vehicle technologies, and in the graduate and post-graduate level training of managers. Although the relationship declined during the BMW time in the region, it was revived through the Premier Automotive Research and Development Programme (PARD), supported by AWM

and DTI (BERR) who provided funding of €13m and €26m respectively. Private sector resources, of both cash and 'in-kind' added a further €90m. Cooperation has covered various technologies including advanced materials (composites and alloys of aluminium and steel plus formability), joining and assembly technologies, electronics (testing rather than development) and hybrid systems – including work on the new Land Rover concept hybrid which, at the time of writing, has just been exhibited at the January 2008 Detroit Motor Show.

- University of Birmingham - has research on materials for engines and body structures, particularly on formability and on alloys of aluminium, magnesium and titanium and on safety (particularly vehicle design for pedestrian safety. There is also work on fuel cells, hydrogen storage and telemetry (including aerials and radars with the new 'intelligent cruise control fitted to Jaguar some models was part-developed in conjunction with the University.
- Coventry University is very well known for courses on automotive design. Courses are highly regarded by the industry and involve placements in automotive design houses and other businesses.
- Birmingham City University has set up its Faculty of Engineering as a limited company to offer courses and consultancy, particularly on process improvement and lean manufacturing. In addition it has recently installed a full environmental test cell for heavy diesel engines in close cooperation with JCB and other major companies.

Other important intellectual resources include RAPRA Technology an independent research organization that carries out polymer research, testing, consultancy and training (part of which covers the automotive sector, particularly in respect of environmental sustainability) and Qinetiq. The latter is a former Defence Research Establishment, now largely privatized, housing more than 2000 scientists - most with PhDs – working on communications and electronics. Qinetiq's automotive work includes sensors for safety and navigation systems and displays.

The Motor Industry Research Association (MIRA), situated on the region's eastern boundary, dates back to the foundation of the Institution of Automobile Engineers in 1899 is another important intellectual resource as an independent provider of product engineering, research testing and certification to the worldwide automotive industry. The company and has world-class facilities including high-speed test tracks.

The SMMT Industry Forum is a department of the national Society of Motor Manufacturers and Traders. It is a national body, but based in the region, and is a private sector initiative that aims to develop and sustain competitiveness in the UK based vehicle and components industry. Its original focus was on helping firms to improve Quality, Cost and Delivery and improve their partnerships with customers and suppliers. However it played a leading role in the development of the Automotive Skills Academy – which later became the Sector Skills Council for Manufacturing.

Competition in the industry

The automotive industry faces further globalisation, consolidation and value chain restructuring, cost pressure and innovation (See Wells & Nieuwenhuis, 2001). The West Midlands cluster illustrates these challenges – particularly globalisation and consolidation[1] with Ford currently dominating vehicle manufacture. Ford acquired Jaguar, with its plants in

[1] The post-war industrial boom, and the implementation of Detroit style mass production, had already led to major consolidation. Leyland Motors was formed from the merger of Austin, Morris, Pressed Steel Fischer and Jaguar and British Leyland by the inclusion of Standard Triumph and Rover. The other local assemblers, Hillman and Singer, were bought by the US Chrysler Corporation, later sold to the PSA Peugeot Citroën and 'finally' closed down completely in 2007.

Birmingham, Coventry and Liverpool, in 1991 and bought the Land Rover plant near Birmingham, plus it's Technical Centre in Warwickshire, from BMW, in spring 2000[2].

Takeovers have brought a number of benefits, not least new investment. Ford has invested more than €1000 million at Jaguar, and at least €300 million at Land Rover. Successful models, such as the Jaguar S-Type and the Range Rover and Discovery, have enabled local factories to compete. Together with Aston Martin this production places the region in the profitable and expanding premium market segment. However, overseas ownership has also made local production vulnerable to global decisions involving plants elsewhere. The region recently lost the Massey Ferguson tractor plant when the US parent company, AGCO, moved production to Beauvais, France with 1000 redundancies and the end to sixty years of production. The flexibility of UK labour laws is seen, by Trades Unions, as making it easier and cheaper for multinational companies to close UK plants. This was seen as a contributing factor in PSA's decision to close the Ryton plant and concentrate production of the Peugeot 207 at Poissy, near Paris, and the new factory at Trnava in Slovakia.

In addition, losses at Jaguar and Land Rover have made local factories vulnerable. In the short term Ford decided to make the Jaguar X-Type and the Land Rover Freelander models in Liverpool, decisions that resulted in an estimated 1000 job losses in the region. (Also, given that approximately half of Jaguar's sales are in the USA, it would not be surprising to see some future production outside the UK.) However, global loses at Ford itself brought the position of its former 'Premier Automotive Group' into sharp focus. Aston Martin was sold in March 2007 for €634 millions, to a consortium led by the motor sport and engineering consultancy Prodrive and later in the year the company announced, that Jaguar and Land Rover would also be sold.

Initially, there were concerns that the firm might be taken over by a private equity company. However, at the time of writing, announcements by Ford have confirmed 'preferred buyer status' on Tata Motors, the largest Indian automotive manufacturer, and part of the global Tata Corporation whose interests range from engineering to tea production. In reaching this point Tata has seen off several rivals, including Indian the rival carmaker Mahindra & Mahindra and the private equity company One Equity.

MG-Rover was the last UK owned volume car producer. The company was really an anomaly – since it was essentially, a regional company competing with global rivals. It was part of the Rover Group taken over by BMW in 1994 but was sold in 2000 when, with public and political backing, the site and business was acquired by the Phoenix Consortium for just €15. The Consortium, led by two former Directors of the company, pledged that MG-Rover would continue as a small, but significant, volume producer. However, the company experienced continued difficulties with high production costs and falling sales. At the time of its collapse in 2005 MG-R was producing just over 100.000 units a year when it needed to be around 2 million to generate cash for new model development. The company therefore sought alliances and joint ventures with the aim to develop these in countries such as Poland, China, India and Malaysia, where labour is cheaper and markets are growing. Interestingly the first of these was with Tata to import a small car, badged as the "City Rover", for the European market. However, the car was over-priced in a competitive segment and achieved only minimal sales.

Not surprisingly, much media attention focused on the short-term failure of the Phoenix management over the proceeding five years and the tiny size of the firm. However, from a wider perspective, MGR can be viewed as the unsustainable rump of a government-created

[2] Ford started by branding Jaguar and Land Rover, along with Aston Martin, Volvo and Lincoln, as the Premier Automotive Group (PAG). They operated as separate companies for production and marketing but were to share platforms and components with each other and with the rest of Ford. However, the group was split up when it seemed damaging to Lincoln, one of Ford's core brands. Jaguar and Land Rover were then merged as a single company in 2002.

giant which never sufficiently integrated activities and which was never in a position to recover the rising costs of new model development. (For details of the firm's collapse, and the events leading up to it, see Holweg and Oliver, 2005; or Bailey, Kobayashi and MacNeill, 2008).

Nanjing and Shanghai Motors

At the time of its final sale, the Longbridge site, most of the assembly facilities, and the rights to manufacture the MG brand, were sold to Nanjing Automotive Corporation (NAC). As a result some limited production of the MG-F model has re-started at Longbridge[3] and production of the MG-7, more or less the same as the MG ZT based on the Rover 75 saloon, began at Nanjing in China in March 2007. However, the main part of the IPR and the rights to build Rover cars was sold separately to the rival Shanghai Automotive Industry Corp (SAIC). SAIC models include the Roewe 750, a Rover 75 derivative with a slightly longer wheelbase, based on designs purchased from Rover in 2004. At that time MG-Rover directors had hoped cooperation with SAIC would lead to joint ventures or even a take-over by the Chinese firm.

However, there is a 'final' twist. Manufacture of virtually the same car by two companies made no sense and, with a strong steer from the Chinese Government, SAIC and Nanjing announced, on 26th December 2007, a deal to combine their assets, with SAIC as the dominant partner. The company has indicated that they see Longbridge as a platform for entering the European market and, according to the UK Department for Business, Enterprise and Regulatory Reform *"this is potentially good news for the UK auto industry and, in particular, for Longbridge. Whilst Nanjing's initial plans were for limited production of the MG TF, the site has floor space to build up to 250.000 cars a year and a modern, water-based paint shop, put in by BMW, which can support that level of output. SAIC presently have some 300 engineers (mostly at Leamington, and mostly ex-MG Rover) developing a new medium car. Facilities remain for many of these jobs to be brought back onto the Longbridge site which thus has the potential to be a significant car plant once again, with the capability to design and develop new models. Realisation of the site's full potential will take some time, but the merger news appears to be a positive step towards that goal"* (BERR, 2007).

Supplier and related industries

The trend towards a new regime of governance in the automotive industry has seen increasing out-contracting, the development of hierarchy classification of supplier relationships and a shift of responsibilities from final manufacturers towards mega suppliers and system integrators, (Naschold et al., 1999, p. 5), to off load risk and costs. Many of these major suppliers such as TRW, Bosch and Johnson Controls are present within the West Midlands supply base.

As discussed above, many of the major suppliers in the region are under Japanese, North American, German or French ownership. There are nonetheless some UK 1st tier international firms, such as GKN and Wagon, which have their headquarters in the West Midlands. A particular issue is the changing geography of the supply chain with vehicle makers and major suppliers sourcing on a European or global scale. (Bordenave and Lung, 1996; Lagendijk, 1997). The region's smaller, (2nd, 3rd, 4th tier), suppliers are particularly vulnerable in the face of this increased competition. Many make simple, single process, components which are cheap to manufacture and can be transported, without significant costs, from low wage areas. In addition, several of the major car producers are urging their first tier suppliers to reduce costs by sourcing parts from low cost economies in C&E Europe and China. The platform strategies of the vehicle makers adds further pressure since parts made in China (for

[3] The remainder of the site is planned as a high technology business park plus retail and educational facilities and housing under the Longbridge Area Action Plan. The development is forecast to bring over 1000 new jobs to the area.

example), in close proximity to vehicle builders, can be shipped back to Europe for the same platforms – if not the same identical models. Interviews conducted in the course of the research have confirmed the very real threat posed. However, this is not to say all these smaller companies will go out of business. Much sourcing continues to be local in order to facilitate just-in-time routines. Future purchasing patterns, therefore, depend not only on costs but also on convenience and reliable quality. In addition, as the industry develops a 'post-Japanisation' paradigm for supply chains, the capacity for innovation will become more important (Bailey et al, 2008).

Strategies and business models

As discussed above, most of the leading companies in the West Midlands' automotive industry are in overseas ownership. This reflects both the open nature of the UK economy, compared to other major European automotive regions, and a business model where shareholder value has major importance. The latter has often resulted in the lack of long-term investment strategies[4] and, as in the case of Lucas[5], attempts to boost the company's value through investments in non-automotive sectors. The industry has also had history of poor industrial relations. Hence, many companies lost stock value and became vulnerable to take over or closure[6]. The UK situation contrasts strongly with the non shareholder-value orientation of many of the major firms in rival areas such as in the Baden-Württemberg cluster (EMCC, 2003b)

These changes have inevitably impacted on the job market with rationalisations accompanied by lay-offs. Local production is vulnerable where multi-national firms have alternative facilities available. 'Internal markets' operate within these businesses and the future of West Midlands production depends on the ability of local plants to achieve cost, quality and delivery performance that compete with factories in other regions – often with lower wage costs. For example, GKN have switched 20% of parts manufacture to lower cost economies in India, China and Thailand. (Macalister, 2004)

A key issue is the continued development of the successful 'innovation based' industries, for example in design, development and motor sport and the ability of the other supporting industries to meet the demands of the 'lean' manufacturing model. Both depend on factor conditions such as knowledge and human resources as discussed in the next section.

Capital Resources

In the Anglo-American business model equity capital plays a dominant role. The UK also has the largest Venture Capital sector in Europe. However, relatively little finance goes to technology-based businesses, (Department for Trade and Industry, CIS3, 2001). For smaller businesses, (and almost 90% of regional firms in the sector are SMEs with below 200 employees), bank lending is the most likely option. This is expensive and banks are often conservative in their approach to an industry known for small returns on investment. In the Community Innovation Survey for the UK, (Department for Trade and Industry, CIS3, 2001), the availability of finance was identified as one of the most significant impediments to

[4] Investment failed to match that of rival companies. In the 1970s British Leyland's fixed assets per person were the equivalent of €1400 compared with VW's €5600 and Ford's €8400. (Gwynne, 1996)

[5] Lucas sought to boost shareholder value by investment in aerospace. This proved unsuccessful with aerospace cut backs following the end of the cold war. The company was first merged with Varity (US) and then taken over by TRW (US). In both moves pressure from shareholders was a major influence.

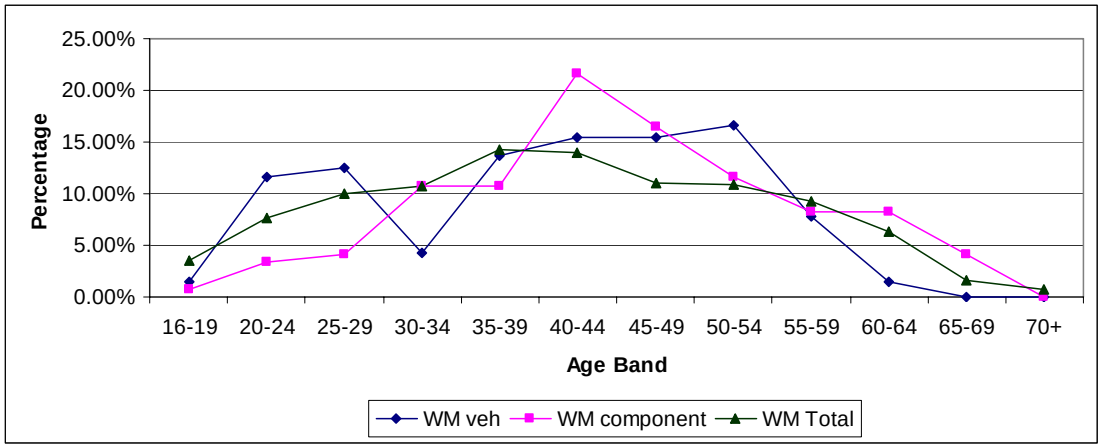
[6] Another recent casualty of low equity value was the Mayflower Corporation, the owners of Mayflower Vehicle Systems and Transbus Europe's third largest bus company. Financial difficulties were disguised and discovery led to the company going into receivership. The bus building part of the group, Alexander-Dennis, has actually prospered since it became independent.

innovation activity. This was reported as most significant by over 50% of businesses - more than twice the EU average.

A study of the West Midlands automotive and engineering workforce, (Birmingham and Solihull Learning and Skills Council, 2003), showed that three-quarters of employees were male. The 2007 UK Labour Force Survey shows a spread of ages with more than half the workers (57% in car makers and 51% in suppliers) between the ages of 25-44. This suggests a young, male workforce but with 41% over the age of 45, (45% in the suppliers), the industry has an ageing workforce. Figure 6 shows the distribution pattern and illustrates the slightly higher age profile of the industry compared to the West Midlands labour market as a whole.

The industry has a distinctive occupational structure, with over half the jobs in the industry being either in the skilled trades (25%) or operatives (30%). Managerial (12%), professional (10%) and technical (10%) staffs total a third of the workforce. Of the skilled trades, nearly 30% are welders and 6% are vehicle body builders. Some 23% of operatives are assembly line workers and 37% machine operators, with 32% being process operators.

Figure 7. Age profiles WM Vehicle and Components Industries (2003)



Source: UK Labour Force Survey, 2007

Skills, Recruitment and Training

On the Innovation Scoreboard in 2006, the UK is amongst the EU leaders for the number of Science and Engineering graduates and the proportion of people undertaking tertiary education. (Inno Metrics, 2007). However, whilst there may be a potential supply of qualified labour, the industry is often seen as insecure and, therefore, a low priority as a career choice for young people. A report published by Birmingham and Solihull Learning and Skills Council (2003) highlights this issue and identifies a specific shortage of skilled and semi-skilled (blue collar) workers in the West Midlands. Almost 30% of the (270) firms in the sector surveyed reported skills shortages that they felt their current staff would not be able to meet these. Reasons for shortages were cited as:

- The changing nature of the industry and the need to introduce new production methods, IT systems and working practices such as team working, cell working and flatter management structures.
- A requirement for increased design and development skills as companies seek to add value to their products – and capture outsourced work from customers
- A high turnover in people – particularly amongst skilled and semi-skilled operatives.
- The poor image of the industry – particularly amongst young people.

These shortages are most felt by the smaller firms. Larger firms, especially the car manufacturers, have the prestige and glamour to attract recruits. Non-the-less even these

businesses report certain shortages – particularly amongst design, software and electronics engineers, (MacNeill et al, 2002).

The qualifications profile of the workforce is shown in Table 8. The table illustrates a good level of qualification in the industry compared with WM and UK manufacturing though a lower proportion of higher level qualifications compared to the UK labour force as a whole.

Table 7. Qualifications - West Midlands Auto Industry Employees.

	WM vehicles	WM components	WM Manuf.	UK Manuf.	WM Total	UK Total
Degree or equivalent Higher Education	34,70%	7,5%	18,10%	26,40%	32,80%	32,70%
GCE A or equivalent	21,70%	30%	23,90%	26,40%	20,60%	23,10%
GCSE grades A-C or equiv.	8,70%	17,50%	20,50%	19,90%	23,20%	22,40%
Other qualification e.g., apprenticeships	8,70%	20%	15,40%	14,40%	11,20%	12,20%
No qualification	26,10%	22,50%	20,20%	11,80%	10,90%	8,80%

Source: UK Labour Force Survey, 2007

Wage levels

The UK Earnings Survey (ASHE, 2008) shows that in January 2008, the average full-time adult male earnings for the assemblers and routine operatives in the vehicle and metal goods industries was €681 per week and for women was €572 per week. The average number of hours worked by men was 39,1 hours per week in vehicles and 39,7 in components. For women, the figures were 37.3 hours and 37.5 hours respectively. From the UK Labour Force Survey (2007 figures) the average for all grades in vehicle manufacture was €19,3 per hour (€17,8 in the supply industry). The average figure for blue-collar grades (male) is thus approximately €35.400 per annum – and the average for all grades in vehicle production €38.500 pa. These are considerably less than comparable salaries in Germany, as shown in Figure 7 below. According to the UK Department for Business, Enterprise and Regulatory Reform, Belgium, USA and Canada also have rates higher than UK. However, at the other end of the scale, wages in Eastern Europe and Taiwan are around a quarter of UK levels and in Korea around half UK rates. For Western Europe as a whole rates range between 75% and 95% of UK rates.

Figure 7 Automotive Wage Rates

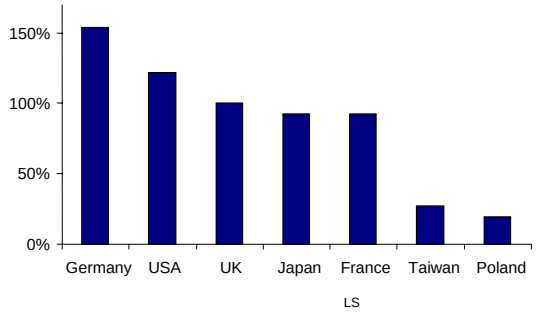


Figure 8 Eastern Europe Wage Rates compared to the UK

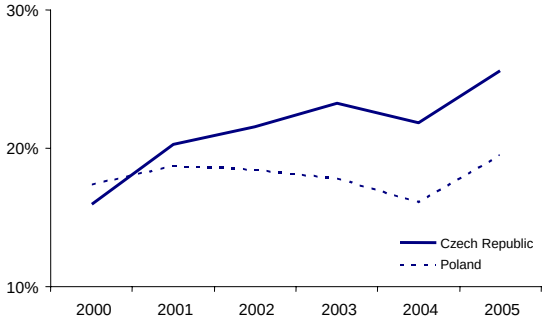


Figure 8 above indicates some convergence in Poland and the Czech Republic as the auto economies develop, suggesting that Eastern Europe is starting to see some erosion of its cost advantage. But with current wages at €4 per hour or less and continuing pressure on the

supply industry to reduce costs there is an inevitable trend towards production of parts in these and other lower cost economies.

Working Practices

To reduce its fixed costs the industry has moved towards flexible labour market practices such as the use of temporary/agency workers. Employing such staff reduces the full-time workforce and enables firms to cover seasonal and other fluctuations in workflow. A recent study in the region has shown that the practice is more common among 1st tier suppliers than among assemblers or small lower tier suppliers. Some 11% of the assemblers, 16% of 1st tier and 10% of lower tier suppliers use temporary/agency workers (Birmingham and Solihull Skills Council, op cit). However, the UK Labour Force Survey (2007) indicates that the number of workers involved is, at present, relatively small. In the region only 8,7% of those employed in vehicle makers, and 2,5% in suppliers, were in this category. The low figure could be interpreted as reflecting the lower levels of protection for permanent employees in the UK labour market when compared to other Member States.

Structure of Industrial Relations

For the large companies negotiations on pay and conditions are between the trades unions and employers. In the automotive industry the main union is UNITE which was formed in 2007 through the merger of the Transport and General Workers Union (T&G) and Amicus. With over 2 million members UNITE is the UK's biggest general union. Plant level bargaining is the norm – although the Union side always seeks wider agreements. For example, in early 2004, the unions represented workers in industrial action at Land Rover seeking the same wage levels as those at Jaguar - also part of Ford.[7]

In 2007, according to the UK Labour Force Survey, approximately 61% of employees in West Midlands based vehicle producers were Trades Union members. Within the supply industry the figure is lower at 34% reflecting a lower proportion in smaller companies. In the UK as a whole the figure for vehicle makers is approximately 40% - illustrating the lower level of TU representation in the 'green field' car factories in other regions. The figures contrast with around 25% union membership in the UK workforce as a whole.

Knowledge Resources

A region's knowledge resources are, primarily, dependent on its human resources. In 2001, according to the UK Office of National Statistics, West Midlands had 13.000 people (full time equivalents) working in R&D. This corresponds to 8% of the UK total. Some 4000 of these were in transport equipment research – approximately 27% of the UK total. These figures illustrate the relatively low overall percentage and the concentration of automotive research – a large proportion in the research centres of Jaguar, Land Rover and TRW.

The EU average, in 2006, for public expenditure on R&D, as a percentage of Gross Domestic Product (GDP), was 0,65% and for business expenditure a further 1,2%[8]. The UK was below the average for public sector R&D expenditure, at 0,57% of GDP, and slightly below average for the proportion spent on business sector R&D, at 1,15%. In comparison in the West Midlands business expenditure on R&D is below average at 1% of GVA[9] against the national

[7] http://news.bbc.co.uk/1/hi/england/west_midlands/3480001.stm
[8] In 2006 the USA and Japan spent totals of 0,69% and 1,87% and 0,74% and 2,39% of GDP respectively.
[9] The available regional data is for GVA rather than GDP. However, the percentages and proportions will not be very different.

and public expenditure is also below average at 0,4%. This is despite the region hosting three major automotive R&D centres – of Jaguar, Land Rover and TRW.

On the European Innovation Scoreboard (INNO Metrics, 2006) the region is in the top 50 European regions with a score of 0,57 on the Regional Summary Innovation Index of the combined innovation indicators. Earlier detailed analysis identified it as a region with "above average GDP per capita, strong educational performance but below average R&D and patent performance".

National Innovation Policy

National and regional initiatives both play a role in supporting the industry. Nationally, the British Government sees its role, primarily, as providing a sound macro economic environment for business through fiscal and monetary policies. The Department of Trade and Industry is responsible for industrial development as well as for science and technology policy. It hosts an Automotive Unit, whose job is to help the industry in the UK to succeed. It seeks to do this by encouraging the spread of best practice in design and manufacture, supporting inward investment and influencing the design of regulations and tax policy so that they reflect the interests of the sector. (See www.autoindustry.co.uk).

At national level the main policy support is, therefore, via the regulative environment. However, one specific initiative is the Foresight Vehicle Programme, which has been running since 1997 and brings collaboration amongst industry, academia and Government, that seeks to identify and demonstrate technologies for sustainable road transport. The philosophy is that future products and technologies must meet social, economic and environmental goals and satisfy the market requirements for mobility, safety, performance, cost and desirability. It does not attempt to guess winning technologies but seeks instead to address forecasts of desirable vehicle capabilities. No comparable programme exists elsewhere in Europe.

Another national initiative was the creation of the 'Automotive Innovation and Growth Team' in March 2001. This was a group of senior figures in the industry commissioned by the Government to take evidence and produce a report on future priorities and recommend policy action. The Team's reports were published in May 2002, (DTI, 2002), with a series of recommendations. These included actions to:

- Create an Automotive Academy to build on existing 'shop floor improvement' initiatives, such as Accelerate, (see below) and to develop programmes to train the multi-skilled engineers of the future.
- Refocus the Foresight Vehicle Programme on commercial exploitation (Following this its leadership moved from DTI to the Society of Motor Manufacturers and Traders.)
- Establish two UK Centres of Excellence in Low Carbon and Fuel Cell Technologies and on Transport Telematics and Technologies for Sustainable Mobility

The Automotive Academy was set up with a Government commitment of £15 million with the intention to deliver programmes in most regions to promote supervisory, management and engineering training for Britain's future automotive businesses. Its administrative HQ was in the West Midlands hosted by SMMT. However, the policy framework changed and the DTI (now BERR) took the view that much of the support offered to specific sectors was generic for manufacturing. Hence the Academy plan was superceded by the formation of the Sector Skills Council for Science Engineering and Manufacturing Technologies (SEMTA see http://www.semta.org.uk/). Business support is also organized with the same philosophy. Thus the Government has created the 'Manufacturing Advisory Service' (MAS) which is a national network with regional 'hubs'. This offers subsidized support and consultancy to SMEs on any aspect of their business – including management, product development, marketing and process improvement.

The two centres have now also been set up. CENEX, based in the neighbouring East Midlands, is the Centre of Excellence for low carbon and fuel cell technologies. It is an industry-led public-private partnership that aims to assist UK industry to build competitive advantage from the global shift to a low carbon economy. It is really a virtual centre that supports innovation through networking on low carbon and fuel cell technologies and through brokering programmes of technology demonstration, market adoption and supply chain development. The centre targets lower carbon emissions from vehicles of all types including trains and non-road mobile machinery.

The second centre devoted to intelligent transport systems is Innovits based in Oxford. It has a similar structure and *modus operandii* to Cenex but in the area of ITS. Its interests cover traffic management, logistics, vehicle to vehicle and vehicle to infrastructure communications, road pricing and anti-collision systems.

Local Policy

At regional level, Advantage West Midlands (AWM) is the West Midlands Regional Development Agency. AWM has adopted a cluster approach to economic development following the work of Michael Porter, (1998). In its latest Regional Economic Strategy, the Agency has identified eleven strategic clusters in the region as priority channels for funding and other support. These range from established industries to embryonic clusters where there are few companies but there is a growth in activity and potential.

For each one AWM has set up 'Cluster Groups' that are private sector led but involve all the elements of the cluster and are chaired by full time cluster managers. The purpose of the Groups is to look at the issues facing businesses in the clusters and set out strategies for how these can be addressed. The Automotive Group operates at two levels, where one comprises senior managers from companies and the other providers, such as universities and other agencies, and public officials.

The Development Agency has drawn up a strategy for the automotive cluster which is intended to address the issues outlined above, whilst recognising the importance to work in the national framework. The strategy tries to address the region's position in having vehicle builders in the premium and niche sector allied to a supply system largely geared to the former volume sector. It also reflects a need to move from only offering support to manufacturing to also supporting technological development.

The total funding that is expected to be provided exceeds €21 millions, more or less evenly divided between capital and revenue allocations. Most is intended to come from the RDA's allocation from the national government but more than €2 millions will come from the European Regional Development Fund. In the application of these funds a similar sum is expected to be levered from other public and private sources. Three main priorities are identified:

Priority 1 – Technology

Here much of the proposed strategy is aligned with the national strategy to support low carbon and intelligent traffic systems as discussed above.

a. *Low Emission Vehicles.* This priority aligns with the CENEX initiative to support research and applications in Power trains – including conventional, hybrid and alternative: Light Weight Vehicles – materials and design; Material Properties – formability and joining; Electrical Systems – including architectures and compatibilities; Aerodynamics, Manufacturing Technology and Vehicle use – optimum requirements for different cycles.

b. *Intelligent Transportation Systems (ITS).* Since international standards have yet to be set for ITS the proposal is to have new test and evaluation facilities which will also be used for technology development and application. A wider objective is to work with the RDA's Transport Policy team, the West Midlands Local Authorities and the Dept. for Transport nationally to apply ITS technology in order to help ease the region's significant problems of traffic congestion and thereby benefit business, and the public, more generally.

c. *Niche Vehicle Cluster Growth.* The RDA has explicitly targeted support for the sub-sector with the intention of creating themed networks and collaborative partnerships of knowledge transfer to develop and exploit R&D and innovation. Since the Niche Vehicle manufacturers' are small their innovative ideas often stall through lack of funds and the high risks attached to investment. The Niche Vehicle Network has recognised that collaborative R&D spreads costs and risk and offers a more sustainable way to develop competitive edge and provide the necessary technology and certification to access international markets.

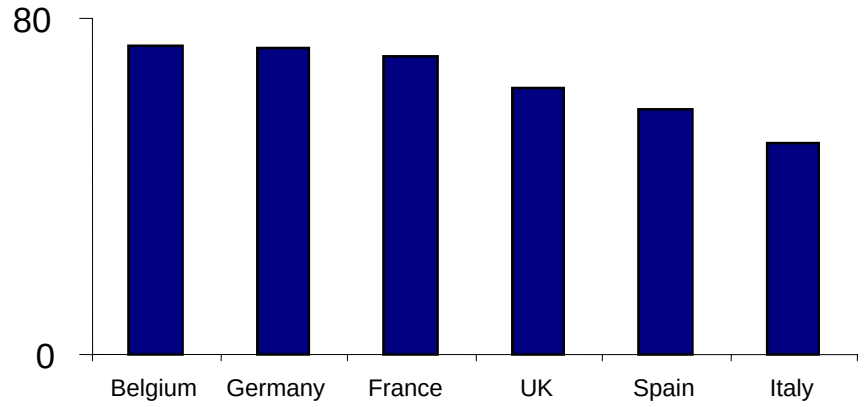
Priority 2 - Support for the Supply Chain

The region has had long established programmes of support for process improvement. (See below on 'Accelerate'.) However reports from BERR[10] have identified that on a Quality, Cost and Delivery basis the UK automotive supply chain still lags its EU and world competitors as shown in Figure 9 below.
The strategy recognises that continuous process improvement is not the only requirement for success. Design, Development and Research are seen as significant gaps requiring additional themed networks. Overall the view is that cluster needs the skills to innovate, access market opportunities provided by technology and the whole cluster needs to share best practice. Needs are stated as:

- Utilising existing offerings from Business Link and WM-MAS plus enhancements around these that are specific to Automotive
- Skills provision (both strategic and workforce)
- Communication of best practice
- Themed networking

Networking and dissemination events are seen as crucial since many companies are unaware of the levels of intervention that they can receive, what opportunities are present and who they could partner with to access new markets.

Figure 9 Productivity (€000 GVA/head)



[10] AIGT refresh and the Business Environment for Japanese Automotive Supply Chain in the UK

Source: Eurostat

In addition, skills are seen as a continuing issue for both present and potential future investors in the region. Science, Technology, Engineering and Mathematics (STEM) standards are still behind the major competitors, apprenticeship uptake slow and retention of numerate graduates of concern. Steps proposed include actions to analyse future demand, creating better 'signposting to existing provision and looking at how graduate employment can be improved since, along with most of engineering and manufacturing, automotive is seen as both dull and a dying industry. In the RDA's view "the vibrancy of the technologies, immediacy of product, diverse career paths and the potential of rewards needs to be brought to the fore to aid recruitment and retention of a modern workforce through positive publicity".

Priority 3 – The Overseas Proposition

The strategy outlines the need to expand into new overseas markets. It is thought that companies progressive enough to export are already doing so, but that others require assistance to access overseas markets. The knowledge of how to export is available through business support mechanisms and UK Trade Investment (UKTI) but assisting companies who wish to access new markets requires a marshalling of resources across all the clusters. The intention is that the West Midlands should have a clear and well defined automotive offer that fits into the wider UKTI proposition but provides differentiation from the other regions to create a memorable offer and attract inward investment.

Local Networks

The following networks pre-date the RDA's strategy but are now included to a greater or lesser extent within it.

a. Accelerate Programme. The major support scheme for the industry has been the Accelerate Programme. This is currently managed by a team in Birmingham Chamber of Industry and Commerce, but it covers the whole region. It is an industry led public-private partnership with a 'Management/Advisory Board of industry and public sector personnel, including universities and colleges. The original objective was to address shop floor improvement (QCD) within component manufacturers by promoting the tools of waste reduction and lean manufacturing. This is still the main focus but the Programme now also helps to address wider issues of firms' awareness, management structure, culture, planning and innovative capacity. Since it started more than 10 years ago it has dispersed more than €130m of public money on

- Business Development Grants – 1:1 subsidised consultancy support.
- Capital Grants – relatively small sums to support equipment purchase
- Supply Chain Networks – groups of companies that form 'supply chains' seeking to improve trading interactions.
- Networks for Change – groups of companies that take on a collective improvement programme.
- Seminars from Specialist Centres – for example technology centres in automotive companies, consultancies and universities and covering new processes, technologies, trends etc.

The programme is very much in the image of the region. It concentrates exclusively on process and is about making parts cheaper, quicker, better rather than on the development of new technology. However, this was much in line with the expressed needs of the large companies who perhaps saw the short term need to reduce costs as more pressing than longer term technology strategies.

The future of the region's major automotive initiative and the largest business support project is now uncertain. With the Governments view that manufacturing support programmes should be generic rather than industry or sector specific most future business support for the industry will be organized through the regional centre of the Manufacturing Advisory Centre. It is not clear whether Accelerate will continue or in what form. It is also clear that the RDA is concerned to promote technology. Hence the support for the PARD programme at Warwick Manufacturing Group as described above. This major project had two objectives – to support technological development and to help 'embed' Ford in the region. However, balanced against Ford's €8,6bn losses in 2006, the €40 grant was insufficient to persuade the company not to sell Jaguar and land Rover.

b. *Niche vehicle Network* As discussed above the region hosts a significant number of niche vehicle producers including a number of sports and 'kit' car manufacturers. These include better known names such as Aston Martin, Morgan and Westfield but also others such as Gibbs Aquada, GTM and Zolfe and Stryker. Further specialists are the electric vehicle specialists Zytec, Microcab and Modec plus the large range of construction and public service vehicle builders such as JCB, Dennis Eagle (refuse vehicles), LTI (taxis), LDV (light vans) and Whale (tankers and public service vehicles).

Most of these are small and although in technological fields cannot always fund R&D – especially at the 'high end'. The network was set up in order to explore and address needs that could be met collectively such as R&D and marketing.

Summary

This case study has examined the main features of the industry in the West Midlands and the changes impacting upon it. It concludes by looking at the competitive position of the region's industry and its preparedness for these changes using a SWOT analysis.

SWOT analysis	
Strengths	**Weaknesses**
• UK 'centre of gravity' with significant share of vehicle output • Strong presence of volume premium brands and niche vehicle makers • 1500 automotive suppliers, including 17 Tier1, well developed 2nd/3rd Tiers • Jaguar Land Rover is a leader for adoption of new technology • A strong tradition and culture of manufacturing and, therefore, much tacit as well as formal knowledge/skill • A high quality engineering services sector well integrated with the major global players • Good development facilities at Jaguar, Land Rover, MIRA, RAPRA, TRW and others • Expertise in body manufacture, including use of lightweight materials • Emerging capability in new higher-value-added technologies • Flexibility of labour markets compared to other EU Member States • A strongly supportive public sector	• Lack of indigenous OEMS and major Tier 1s (with notable exceptions) and lack of local design or purchasing authority in most major companies • Concentration on low value components, where firms struggle to compete on costs, and less involvement in high value areas. • Lack of UK electronics or communications industry to support developments in high value vehicle technologies • Move to low cost sourcing due to high resource costs • Productivity and competitiveness below global standards in many plants • Skills base below national standards and significantly below the international standards in Japan and Germany • Inadequate investment in new product development and the necessary plant & equipment • Low adoption rates of international quality standards ISO/TS 16949 • Suffering a negative image through high profile closures and sell offs

	• Continued concerns about quality and costs – relatively high costs of labour
Opportunities	**Threats**
• New markets for the premium and niche vehicles manufactured in the region – e.g., China and India • Development of the engineering services sector, given by the outsourcing of key design and development activities by OEMs and the major suppliers • Potential for a lead role in specific technology growth areas (e.g. low carbon) • Exploiting the business opportunities created by legislative pressure (e.g. End of Life Directive, Targets for Low Emissions, ITS) • Exploiting regional technology expertise to attract inward investors • Working with the emerging economies vehicle industries to show the benefits of the West Midlands for access to markets • Partnerships with public bodies to focus on the skills needs of the engineering industry • Diversification of the supply chain to other sectors, therefore gaining new business practices, perspectives and innovation	• Uncertainty over the future with Ford's decision to sell Jaguar-Land Rover • Shrinkage of the supply chain as global competitors increase their capabilities • The movement of the production of vehicles and components to low (wage) cost countries. This applies to labour intensive processes but also to high technology manufacture. • Increasing gap in productivity/GVA and high UK labour costs • High investment costs associated with new technologies (e.g. low carbon technologies) combined with financial difficulties through over supply of product and high operating overheads • Cost down pressures leading to suppliers exiting the market • Failure to address the skills gap at all levels • The growth of European and global supply matrices with no boundaries. • Adverse exchange rates and UK non participation in the Euro

The motor industry, as discussed above, remains of strategic importance to the West Midlands regional economy. However, the closure of OEMs' manufacturing plants and the global pursuit of productivity gains have both had a drastic effect upon regional employment in the sector. In addition, the impact of supply-chain re-organisation is creating harsh conditions for component suppliers and especially the smaller single process firms in sectors such as basic metals, rubber and plastics.

The future of the industry in the region rests on the continued presence of the vehicle manufacturers and upon achieving competitive levels of productivity. It also relies on investment by the major players in new and high value technologies. The region continues to have an over reliance on mechanical aspects of the vehicle at a time when value is shifting towards electronics and communications. Future success will rest on exploiting engineering skills, especially in high value areas and' to a very large extent, on public sector investment geared to the global drivers of cost, environment and consumer demand. It will also rest on the success of the industry, the region and the UK as a whole in attracting and training the next generation of its workforce.

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