Automobile Features

Production volumes in automobile companies have grown by around 2% per year over the last 20 years; however, its relative importance in terms of market value compared to other industry sectors has decreased significantly. Today the automobile industry represents less than 2% of the total European market capitalisation, while 20 years ago the sector was almost double in relative size.

Only about 1/4 of over 50 car manufacturers who were operating 40 years ago have been able to retain their economic independence. Despite this consolidation, overcapacity in the industry is a constant issue, keeping pricing and the return on invested capital under pressure when the cost of capital can often not be covered. A high fixed cost base ensures that companies follow a growth strategy. However, this does not mean more jobs in the sector, but rather that fewer employees in lower-cost countries have to produce more.

As a result of tough competition, product cycles have become shorter which creates a crowded market place with newer and fresher products. This also means that 1) the competitive advantage period of a model, or technology, decreases, and 2) research & development costs have to be covered more quickly.

Recognising market movements first, or even creating them, is a key success factor for automobile companies. For example, early detection of the rising demand for hybrids was an important marketing move for Toyota, while other companies may be launching their hybrids when competition is already quite intense.

Automobile Trends

The industry is mature, especially in the European and American markets, while some Asian markets (e.g. China and India) still offer some growth. Overall, demand growth is likely to stay below the nominal GDP (Gross Domestic Product) expansion rate.

In all consumer markets, whether they are low-priced household goods, food, apparel, or cars, a clear polarisation exists. On one side there are people who can afford to buy very expensive automobiles, while on the other, demand for low-cost vehicles is increasing. This trend can be expected to continue and car manufacturers have to ensure that they are not going to be lost in the middle.

The regulatory focus on greenhouse gas emissions, as well as the increasingly tight regulations on air pollutants, is creating pressure for automakers to reduce fuel consumption, as well as emissions from internal combustion engines. The trend is moving towards developing drivetrains based on new technologies such as hybrids and fuel cells.

Branding, technological leadership (especially in fuel efficient propulsion technologies and safety) and consequently differentiation, as well as good supplier relations will be the key success factors for the automobile company of the future.

In the context of climate protection the western industrial nations would have to lower their GHG emissions by 60% to 80% by 2050 in order to limit global temperature increases to no more than 2°C of pre-industrial levels. This translates into GHG emissions would have to be reduced by 2% to 3.5% per year. On the assumption that car traffic increases by 2% per year, efficiency would have to increase by around 4% to 5%, which is significantly higher than the commitment from the European automotive industry of 140 g CO₂/km by 2008.

The tougher ACEA objectives will be substantially more difficult and costly to meet since it might require the hybridisation of the drivetrain and more dramatic shifts in the product portfolio. To meet the target by 2008, carmakers need an annual rate of improvement of 3.3%, suggesting that they may have to accelerate the introduction of expensive new technologies to boost fuel efficiency. Carmakers recognise that this will be challenging.

To meet current imposed carbon constraints, Original Equipment Manufacturers (OEMs) can turn to a wide range of carbon efficient measures, such as incremental technologies, alternative fuels, hybrid vehicles, and, in the more distant future, fuel cell technology. With rising oil prices, bio and synthetic fuels, which produce less GHGs than petroleum fuels, are becoming a viable alternative to gasoline and diesel. Leaders in these areas will gain competitive advantage and brand differentiation in the industry in the coming years.

Hybrid drivetrains are likely to provide an interim solution, although they do not significantly reduce emissions when driving long distances. Hydrogen-related technologies may represent a revolutionary but long-term answer as they are currently still too expensive and the infrastructure is not available yet.

Due to the characteristics of combustion engines (for petrol and diesel), it is not possible to reduce all emissions through improved engine efficiency alone. While diesel engines have advantages in terms of CO₂ emissions compared to its petrol counterparts, they produce much higher emissions of PMs, HC and NOx. Thus, this can result in a trade-off between public health impacts and climate change.

Transforming a diesel engine into a cleaner powertrain requires sophisticated technology. The average cost of compliance for Euro 6 is estimated by the VDA (Verband Deutscher Automobilindustrielle) at €400 per vehicle. Volkswagen puts additional costs, required at roughly €1,000 per vehicle. This is comparable to the higher material costs experienced in 2005 in terms of magnitude. Some auto sector analysts, however, consider these costs to have been overstated by the automobile lobby, and quote much more manageable figures closer to €1,400 per vehicle.

Companies that have market-ready, new technologies enabling compliance with tougher standards should be able to improve their short-term competitiveness.

In the developed and developing worlds, strategies should aim at achieving significant reductions of road traffic injuries from current levels and curbing the growth rate in deaths and injuries. Either through regulation or by market forces, car manufacturers are already facing pressure to make cars less dangerous, not only for the drivers and occupants of the vehicle but also for those on the street (e.g. pedestrians, bicyclists).

The following measures can be taken by car manufacturers to meet the EU regulations: 1) creating more space between the front end and so-called hard points (such as the engine) to absorb the energy from a collision; 2) redesigning the car’s hood to make it a better energy absorber and fitting the car with active safety systems such as airbags; and 3) equipping the car with active safety systems such as night vision, adaptive lighting, active braking systems and run-flat tires to prevent accidents.

The automobile industry has one of the highest numbers of temporary workers as a percentage of the total workforce of any sector (often 10% of the workforce in a given year but representing up to 30% during peak production periods). Temporary work might in some cases be less stable and as such, this category of employee cannot afford to tolerate automobile manufacturers and their subcontractors, which are often the sole local employers. The abusive use of temporary employment is now taken more into account by industrial tribunals, which do not hesitate to rule against companies that overstep the mark and impose fines.

The high number of temporary workers at automaker companies may also affect the quality and production of cars due to increased turnover of employees and lack of skills transfer.

Make sure you carefully choose your temporary employees and maintain a high level of motivation, automobile manufacturers should offer a positive and safe working environment including: efficient work structures with flexible working hours, measures to promote young employees, part-time employment and child care.

The evaluation of the suppliers should not only be based on technical skills, quality of work and pricing, but also on environmental and social standards.

Suppliers have to be managed in the same way as subsidiaries in order to make work sequences and the interface between the supplier and the assembler as efficient as possible. In this respect, it is essential for the car company to set incentives for suppliers to guarantee not only a high level of quality but also access to innovation and state of the art technology. The car manufacturer has to make sure that the suppliers manage their people and talents in an appropriate way.

2 Mobility 2020 Meeting the challenges to sustainability (World Business Council for Sustainable Development – WBCSD).
3 Source: WRI & SAM.
7 Source: Supplement to Automotive News Europe, October 31, 2005.
8 European industrial relations observatory on-line. www.eiro.eurofound.eu.int.
PSA Peugeot Citroën’s diesel engine

In its approach to eco-design, the PSA Peugeot Citroën Group aims to take environmental requirements into account at each phase in the vehicle life cycle, from design to use and finally to end of life. PSA Peugeot Citroën’s 1.4-litre diesel common rail engine complies with Euro 4 standards by managing fuel consumption more efficiently, in particular with second-generation common rail systems, vertically positioned valves and valve drive with roller-type rockers, and by integrating emissions control technology.

CO₂ emissions of cars equipped with these engines range from 90 to 120 grams per kilometre, depending on the model, compared with average CO₂ emissions of 160 grams per kilometre in 2004 in Europe. Wider use of this type of small diesel engine is therefore an effective means of reducing automobile greenhouse gas emissions. This will help achieve the ambitious targets European carmakers have set for reducing CO₂ emissions.

Sources: www.psa-peugeot-citroen.com and www.developpement-durable.psa.fr/en

Toyota’s hybrids

Toyota is leading the way in lowering emissions and improving fuel economy in gasoline powered vehicles. They have created the world’s first mass-produced gas/electric hybrid car, and are also at the forefront of developing tomorrow’s fuel cell vehicles.

Toyota’s Hybrid Synergy Drive® vehicle is nearly 80% cleaner in terms of smog-forming emissions than Ultra Low Emission Vehicles (ULEV).

Even though the gasoline engine employed with Hybrid Synergy Drive® is a very efficient clean-burning engine, the less it is operated, the fewer emissions it will produce. Hybrid Synergy Drive® shuts the gasoline engine off and relies on the electric motor alone quite frequently: at a stop, in reverse, during initial acceleration, low-speed driving, coasting and normal braking. The gasoline engine is only used when necessary, thus saving fuel and substantially reducing emission output. In addition, thanks to the special attention Toyota has paid to the design of the system, Hybrid Synergy Drive® vehicles emit zero evaporative emissions. According to Toyota, driving a Prius from Glasgow, Scotland to Athens, Greece and back again produces fewer smog-forming emissions than using one can of insect repellent.

Source: www.toyota.com

DaimlerChrysler’s fuel cells

The DaimlerChrysler Group is making mobility sustainable through a number of initiatives based on alternative drive systems and renewable fuels.

In the past six years, the fuel cell drive system has been shrunk to such an extent that it presently requires no more space than a conventional drive system. The fuel cell uses the energy in the fuel almost twice as efficiently as a gasoline engine. The hydrogen carrier methanol – a liquid that can be sold in a manner similar to gasoline through the existing filling station network – is the first fuel in the 115-year history of the automobile in Europe that isn’t derived from a fossil source and can be produced from renewable sources.

In November 2005 three hydrogen-powered Mercedes-Benz Citaro fuel cell buses were delivered by DaimlerChrysler to the City of Beijing at the opening of the 4th International Clean Vehicle Technology Conference and Exhibition. These buses are part of a fleet of 36 buses DaimlerChrysler now has in operation in Europe, Australia and Asia in order to gain real world experience in day-to-day operation in its pursuit of viable emission-free mobility solutions.

Fuel cells release energy from the reaction of hydrogen with oxygen. The hydrogen-powered fuel cells emit only pure water vapour. Fuel cells are currently the only technology that can achieve zero emissions in vehicles.

Source: www.daimlerchrysler.com

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