The world's three major car manufacturers (Toyota, GM and Volkswagen) are pursuing various environmental initiatives involving green operations practices. These include green buildings, eco-design, green supply chains, green manufacturing, reverse logistics and innovation. However, there might be a gap between what companies say they do in their environmental reports and what they actually do.

There is ample evidence that other, smaller, companies are pursuing more sophisticated and original environmental initiatives, but this article looks at how the three major volume manufacturers are doing.

An introduction to environmental and sustainability management

Over a decade after the introduction of the ISO 14000 series for environmental management systems (EMS), pursuing environmental leadership continues to be a daunting and complex task. Most environmental initiatives are fuzzy, and there are also many other non-environmental issues needing to be addressed. Environmental initiatives must compete for budget against other internal projects (marketing campaigns, production capacity expansion, quality improvement, etc). However, public pressure, legislation, possible cost reduction and improved company image may be sufficient motivation to improve environmental performance.

A key area for improvement in many companies is that environmental management should take a systemic (rather than systematic) approach, analysing how decisions will impact on environmental aspects and overall business and operations strategy too.

It's not always the case that environmental management initiatives will return a profit, or dovetail with corporative objectives. There will be conflicts, especially when the initiatives are taken under an opportunity cost analysis. However, the more that business considers the importance of managing these intangibles, the more environmental issues will come to the fore.

Greening operations function

Sustainability is a strategic issue, one that must take into account the nature of sectors, organizations, processes and products within a society. This implies a systemic approach to understanding the impact of an organization on the economy, society and ecological environment. Since its beginning as a concept, green operations has adopted a mainly process-based approach. We can define environmental operations management (EOM) as the integration of environmental management principles with the decision-making process for converting resources into usable products. EOM is positioned at the strategic level of operations management since it primarily concerns product and process design. In fact, defining strategic operations objectives is strongly connected to environmental issues. The operations function of a company encounters environmental protection issues directly because it's the main source of harmful emissions, so environmental management programmes and policies should be carefully developed to strengthen operations strategy.
Green operations practices

Green operations practices are those that contribute to the enhancement of environmental performance in companies' operations. Broadly speaking, they will be practices for production planning, product and process development, supply chain management, production, and after-sales operations. Innovation also plays an important role, as well as having strong implications for the environment.

Reverse logistics

Although reverse logistics is considered to be part of green supply chain management, it can be treated as a separate tool from green supply chain practices. This is because different skills and ways of thinking are needed to run a reverse logistics programme. Traditional logistics uses a “forward” thinking approach, but in reverse logistics a product recovery approach is a vital condition for the future. Although different skills are necessary for the forward and backward flows in the supply chains, it will also be vital to combine these activities in order to maximize gains and reduce costs.

The automotive industry and the environment

The automotive industry's positive contributions to the world economy are offset by its products and processes significant environmental impact. Total world production of cars reached more than 53 million units in 2007, and if commercial vehicles are incorporated this increases to 73.10 million units. There are approximately three-quarters of a billion cars worldwide and, if the industry continues to produce cars at the current rate, there will be two billion cars on the road by 2050 (unless personal transport takes to the skies by then!).

Historically, strong focus on lean production created a decrease in costs. This, in turn, led to price reduction, with attendant market saturation and predatory price competition with low profit margins. Companies couldn’t rely on the benefits of lean production alone as the rules of competition changed as the 1980s became the 1990s. In the twenty-first century, the rules are changing again and there is increasing pressure for the adoption of environmentally friendly processes and greener products. Environmental concerns must go beyond mere efficiency gains, as encouraging efficiency leads to increased consumption, which actually increases the overall use of resources that harm the environment.

For the automotive industry, the major global environmental impacts result after production from vehicle use (fuel consumption, emissions, etc.), but there are also serious environmental concerns about car production and final vehicle disposal. The main environmental impact from car production is down to solid waste generation, emission of volatile organic compounds (VOCs), and high energy and water consumption. Inadequate or irresponsible management of landfill sites and wrecker's yards may also contaminate the soil and aquifers as end-of-life cars are dumped or scrapped. Add in the environmental impact of day-to-day car usage and a dark, sooty, gloomy environmental picture looms through the murk.

Making environmental decisions

The interaction between design, production, use and disposal of cars also brings greater complexity and difficulties in making environmental decisions. For example, reducing the weight of cars is one of the techniques to reduce fuel consumption during use. This is usually done by substituting plastics, aluminium and composites for steel in cars. However, this makes disassembly more difficult, negatively affecting the recyclability of end-of-life vehicles (ELVs). Similarly, the use of “just-in-time” practices may improve environmental performance in the manufacturing process, but
it can increase the energy consumed in logistics as shipments and delivery of the finished vehicles are more frequent.

Because carmakers are locked into three technological paradigms (all-steel car bodies, internal combustion engines and multi-purpose vehicles) these companies tend to favour incremental improvements rather than revolutionary environmental business thinking. Add in the existing economic and political interdependency between the car industry and other sectors (such as the oil industry) and radical change towards higher levels of environmental performance seems doomed to die an instant death at the hands of vested interest. Alongside their tentative efforts to improve environmental performance and reduce impact, car manufacturers must confront a hard reality - namely, that customers seem willing to drive greener cars, but green features play a minimal role in most people’s purchasing decisions.

Findings from the automotive companies

Despite the unwillingness to adopt radical change, the world’s largest car manufacturers are adopting environmental practices from the construction of their manufacturing plants to the end-of-life of their products.

Green building certification is being used for both production sites and non-manufacturing facilities. Both Toyota and GM have taken the opportunity of using “green power” to reduce oil dependency in their plants through the use of landfill gas, wind and solar energy. CO2 emissions were also tackled by substitution of cleaner fossil fuels for coal.

The design of the cars is considered a key activity for addressing environmental concerns through its ability to affect the whole life of the product. Initiatives in design vary, from the use of lightweight materials, fuel efficiency and diversification, to elimination or reduction of VOCs and the “four substances of concern”, and intelligent systems to reduce traffic congestion. Design for recycling and dismantling are the main approaches to deal with landfill shortages and new stricter ELV legislation.

All three companies (Toyota, GM and Volkswagen) have addressed the main environmental impact of manufacturing through technology-based solutions. Paint shops were converted to use waterborne paint sprayers, and water-based solvents were also introduced into processes. Energy and water conservation, reduction of greenhouse gas emissions, waste management (including recyclable and non-recyclable waste), and recycling are the main initiatives to achieve greener production.

The increasing use of batteries (in hybrid vehicles), new electronic components and safety devices may produce forthcoming concerns for reverse logistics. Stricter ELV legislation (e.g. in Europe and Japan) is regarded as a learning opportunity by the companies, and gives them the chance to influence future legislation. It provides them with valuable experience and allows them to help governments and environmental agencies design new types of legislation, mainly in developing countries.

Generally, because Toyota, GM and Volkswagen are all global players, they can take advantage of being under stricter regulation to be the first mover or environmental leader and keep ahead of the regulation in other markets.

By analysing environmental initiatives in the automotive industry we see a pattern which can be a lesson for other sectors. At first, environmental initiatives were confined to the manufacturing processes, then they were expanded to product performance, supply chains, non-manufacturing facilities and recently to more responsible final disposal. Closer analysis shows that the car manufacturers are trying
to move away from being reactive to proactive, and, in the end, companies that want to be at the forefront of environmental leadership will need to take care of their whole operation rather than just isolated individual activities.

September 2010.

This is a shortened version of “Green operations initiatives in the automotive industry - an environmental reports analysis and benchmarking study”, which originally appeared in Benchmarking: An International Journal, Volume 17, Number 3, 2010.

The authors are Breno Nunes and David Bennett.