

The Environment as a Supply Chain Management Issue

Richard Lamming and Jon Hampson

University of Bath, Centre for Research in Strategic Purchasing and Supply, School of Management,
Claverton Down, Bath BA2 7AY, UK

This paper investigates the issues for purchasing and supply chain managers in the context of environmentally-sound management.

The discussion begins with an analysis of relevant consumer attitudes, legislation and concepts in environmentally-sound management (life-cycle analysis, waste management, product stewardship, etc.), linking them to supply-chain management practices such as vendor assessment, total quality management, lean supply and collaborative supply strategies. In each case, parallels are drawn between established practice and new imperatives that require innovative solutions from managers.

The paper then explores the results of fresh field research with five major UK companies, identifying the different ways in which the challenges introduced above are being faced, and adding some extra perspectives to the debate already covered. The discussion concludes with a projection of common issues and ideas for areas of supply chain management that might profit from better environmentally-sound approaches.

The environment, business and the purchasing function

The environmental problems that society faces have been widely documented. While much of the blame has been laid at the door of business, there is still little guidance on how business may *effectively* and *positively* reduce some of the risk that it faces from 'environmental issues'. There is a need to develop practical solutions to meet environmental challenges. Business policy appears to be at the core of the environmental debate and central to the problems and the solutions.

Consumer pressure

In the USA, 75 per cent of consumers say their purchasing decisions are affected by a company's environmental reputation while 80 per cent would pay more for environmentally 'friendlier' goods (Drumwright, 1994). In the UK, the results of a recent Department of the Environment survey on

public attitudes show that concern about the environment has survived four years of recession and is growing in line with the economic recovery. It is now third on a list of the most important issues that the public thinks government should be addressing, second only to unemployment and health, and above crime, education and the economy in general. It also showed a dramatic shift in public opinion to favour the 'polluter pays' principle, even if this means paying higher prices for goods and services (62 per cent). Eighty-seven per cent of respondents wanted more information from companies on the environmental impact of their products, and 88 per cent wanted better labelling to enable them to make more informed decisions (ENDS 232, 1994).

A potentially effective way of managing a company's environmental policy is by linking it closely with the activities of the purchasing function. Lloyd (1994, p. 39) claims that:

'in the future, environmental pressures will increase. Social, economic, business, financial and

legal measures are going to force companies to set up environmental management systems. These will have to include as a key sub-system the appraisal and monitoring of suppliers.'

It appears that diffusing environmental management techniques backwards or forwards through the supply chain might be a very effective way of developing the general environmental performance of an industry.

Legislation

'The development of environmental legislation is singularly the most important factor influencing the behaviour of industry in the field of the environment.' (Welford and Gouldson, 1993, p. 18)

In the UK, the Duty of Care, implemented under the Environmental Protection Act (1990), has imposed a number of previously non-existent cost constraints on companies, to the extent that some products may now be as expensive for a company to dispose of as they are to buy. This applies, for example, to the lithium batteries for pay phones, bought by British Telecom (BT) – the company is currently examining new recycling schemes. A similar pressure has led BT to reconsider its policy on lubrication oils, and other fluids, for its extensive vehicles fleet. In future, BT may actually *rent* the oil from suppliers, returning it to them for cleaning and reprocessing after a specified period of use. Any individual or company that produces, holds, or is concerned with controlled waste (commercial/industrial) is responsible for its safe passage through the supply chain. However, this is only for waste *downstream* of production – it currently relates to the disposal chain rather than to the entire supply chain.

In Germany, the Waste Packaging Ordinance Law (1991) and the associated DSD scheme (a private initiative, set up in parallel with the national legislation) impose a duty all along the supply chain to accept all returned packaging from customers and to arrange for its recycling or re-use. Suppliers who prove that their packaging is recyclable are given a licence to show a green dot on sales packaging. Many supermarkets now only buy green-dot packaged products, thus avoiding direct responsibility for recycling, and resulting in pressure throughout the system to minimize the recycling process itself. There have apparently

been severe initial implementation problems with this scheme but they are declining. Discussions are underway at the European Commission for a similar scheme on an EU-wide basis.

Emphasis is now beginning to focus on complementing 'command and control' techniques with the application of market-based instruments such as carbon taxes, the voluntary Eco-label and the Eco-Management and Audit Scheme (EMAS). European Directives now relate to packaging waste, landfill control, priority waste streams, integrated pollution prevention and control, incinerators and toxic releases.

The USA differs from Europe in that environmental control is very much based on legal compliance. In 1990, the US Environmental Protection Agency undertook more than 1500 enforcement actions, collecting \$61 million in penalties – an increase of 75 per cent on the previous year. In Canada, meanwhile, if a company claims a product is 'environmentally friendly' when it can be proved otherwise, its directors face a maximum penalty of five years in prison. This principle of responsibility is extended to the entire life cycle – e.g. biodegradable products should not emit pollutants when buried, etc.

Meanwhile, EMAS and the British Standard, BS 7750, require companies to improve continuously, beyond legislation, to remedy all environmental effects of a business.

Differing approaches to setting legislation may thus be observed and while all sectors may expect to face challenges, it may be that regulations will fall unevenly, disadvantaging some firms and benefiting others. In connection with this, Colby *et al.* (1995) cite location, size, technology and age of plant as relevant factors, and quote the case of Chevron, which in 1993 put two of its refineries up for sale, rather than spend the \$275 million it would have cost to bring them into line with the 1990 US Clean Air Act amendments.

Waste

It has been calculated that the UK purchases 600 million tonnes of materials each year to produce 30 million tonnes of consumer goods and 30 million tonnes of food. The remainder is waste (Jones, 1996).

Some companies now monitor their competitors' waste-management practices and their annual costs of waste, including the purchase

cost of wasted materials. In this context, waste may be seen as a resource – 64 per cent of companies which are proactive in the field of waste management cite financial reasons for recycling, although real payback is derived from ‘beginning of pipe solutions’ (Biffa, 1994; White, 1995).

A case in point is the BMW 3 Series, which is currently 82 per cent recyclable, with a target of 90 per cent. This is claimed to lead to keener product pricing, since the company is able to re-use more materials and preserve scarce resources. All components for which there is a demand are resold through the parts dealer. BMW is collaborating with Fiat and Renault to establish reciprocal recycling schemes across France, Germany and Italy. Meanwhile, discussions are underway at the European Commission that could make such schemes compulsory for all – potentially bringing BMW and its partners significant first mover advantages.

BMW’s ‘Packaging Manual for Suppliers’ sets out specific requirements for avoiding packaging waste and excessive packaging materials which, if non-returnable, must always be recyclable. The implications of such initiatives obviously have very strong ramifications for the purchasing functions of such companies and their parts and materials suppliers.

The UK organization, Business in the Environment, concludes that:

‘Good purchasing will minimise the risk of breaks in the supply chain ... Since purchased goods and services represent the major proportion of total operating costs for many companies, and as quality, performance and design improvements become more important in maximising value in products, there is an increasingly strong link between environmental improvements and quality, and therefore long-term profitability.’ (BiE, 1992)

Environmental criteria in vendor assessment

For companies with a substantial bought-in cost component in their operations there is clearly a need to view management of environmental matters as critically important. It is not simply a question of avoiding environmental risk – in dealing with such matters they may find an opportunity to add value (Lloyd, 1994). ICL, for example, has

developed a process for cleaning printed circuit boards with water, instead of CFCs. This has allowed them to place more components on each board, and saved £1 million per year by not buying CFCs.

The broad aims of any environmental purchasing policy, as outlined by BiE (1992) are:

- purchasing goods and services to environmental specifications;
- considering alternative supplies, if appropriate;
- evaluating the commitment and performance of suppliers;
- working with suppliers to make improvements possible or more cost effective.

In Britain, Rover considers that:

‘the environment is no longer simply a compliance issue ... it is now one of the drivers for the company.’

In keeping with this, Rover has begun to buy only recycled paper – as an act of faith – although it is more expensive and requires standardization of photocopiers etc. Rover reasons that the paper will soon become much cheaper, while, in the meantime, it is sending a clear message to its suppliers. It is also debating whether gaining accreditation to an environmental management standard should be a requirement for suppliers trading with Rover in the future (ENDS 233, 1994, p. 36). Meanwhile, the UK’s DIY market leader, B & Q, claims that

‘whilst outside our direct control, we can ensure that the manufacturer is aware of the impact and takes meaningful action to reduce it. B & Q is applying its purchasing influence as a positive force for improving the environmental management of our suppliers.’ (B & Q, 1993, p. 37)

To continue trading with B & Q, suppliers have to answer detailed questionnaires about their products and processes, and demonstrate that they share the same commitment as B & Q.

The examples below demonstrate two broad methods which companies may employ when addressing environmental issues with their supply bases.

Example 1: Vendor questionnaires. Assessment of the environmental impact of a company's demand for material inputs may be effectively carried out using questionnaires for all potential suppliers (Lloyd, 1994, p. 38).

For example, B & Q's questionnaire to its supply base covers both technical and managerial issues. In addition, 75 per cent of its larger suppliers, or those with high profile environmental issues, are now visited regularly by B & Q auditors. All responses go into a database of supplier issues, enabling trends to be seen, environmental issues to be tracked across the supply base and some product sectors that produce large amounts of waste packaging to be identified (B & Q, 1993). This intelligence may be used to direct attention, furthering the company's discussions with its suppliers. Twenty-five per cent of B & Q suppliers surveyed had conducted an environmental audit, contrasting with a contemporary survey by the UK Institute of Directors which indicated that the national figure was 16 per cent. Moreover, 14 per cent of the B & Q suppliers were auditing their own suppliers (B & Q, 1993). B & Q has recently upgraded its assessment scheme to include the supplier's criticisms of the retailer's handling, storage and presentation of products, and stated publicly that it will use this practice in preference to requiring implementation of BS 7750 in its supply base (Knight, 1996).

The areas of concern included in such questionnaires typically include:

- regulatory compliance;
- environmental effects and performance measures;
- existing environmental management procedures;
- commitment to managerial and process improvement, regardless of what is supplied.

If these are to be assessed both at product levels and at material/component level, the operation may require considerable expense, not only for the customer, but also for the supplier who has to provide the detailed information. Also, the processes for dealing with and acting on data collected need to be in place in the customer's organization and in the supplier base, before the questionnaire goes out. These problems are similar to those encountered in such exercises as life cycle analysis (LCA). LCA (discussed

below) aims to assess and therefore help producers to minimize the environmental impact of a product at all stages in its life, and to highlight areas for attention (Welford and Gouldson, 1993).

Example 2: The use of environmental management systems (EMS). Environmental management systems, such as the closely-linked EMAS and BS 7750, can offer some affirmation that relatively high environmental standards are being maintained in production. BS 7750, for example, is defined by BSi (1994, p. 2) as

'a specification for an environmental management system for ensuring and demonstrating compliance with stated environmental policies and objectives.'

The standard shares its common principles with the total quality standard, BS 5750 (McCloskey and Maddock, 1994). It requires the total organization and process to be considered, claiming that, because all business activities interact with the environment, the environmental management system components will be

'inextricably woven with most, if not all, of the organisation's overall management system ... effective integration and co-ordination of the overall system components is essential to ensure consistent decision making.' (BSi, 1994, p. 11)

Indicators of a good environmental management system might include (ERM, 1995):

- a well communicated policy, built on the results of an environmental review;
- records of performance against compliance issues;
- well defined roles and responsibilities at differing management levels;
- environmental improvements in programmes linked to quantitative targets;
- regular internal auditing to legislative and policy standards.

The value of BS 7750 is that it is designed to help purchasers to

'distinguish between the environmental integrity of companies, beyond product labelling, using performance as the yardstick.' (Gilbert, 1993, p. 9)

Accreditation may entail extensive documentation and bureaucracy, especially for the suppliers, and does not guarantee meeting quality standards. It does, however, shift part of the cost burden of checking the supplier's internal processes on to the supplier, but this remains

'general and enabling, rather than industry or company-specific.' (Lloyd, 1994, p. 37)

In supply-chain management terms, this may be characterized as a 'cascade' strategy, whereas the B & Q approach, identified above, reflects an 'intervention' strategy.' (Lamming, 1996)

Assessment process

Although the assessment process may initially seem to disadvantage the suppliers, if approached in collaborative manner, it may be possible to provide benefits for them through the use of such schemes. For example, assessments may allow suppliers to:

- demonstrate management quality through good practice and compliance;
- invest in 'best available technology', improving performance and savings;
- respond quickly to specific customer requests, and embed themselves in the customer's value chain;
- attract customers in new markets where standards are already recognized;
- achieve significant cost savings, through eliminating inefficiencies.

Lamming *et al.* (1995) identify good practice in vendor assessment. Using their analysis, it is possible to recognize a number of common distinct steps in the process of vendor assessment, which might include:

- clarify objectives enshrined in the purchasing policy, which is framed in context of the company's environmental policy;
- characterize supply base and set criteria for prioritizing suppliers;
- develop best methods for collecting information from priority suppliers, e.g. questionnaire versus accreditation;
- set minimum standards (e.g. all suppliers to have a policy, list of key environmental issues,

register of relevant legislation, action programmes, etc.) and communicate these clearly to all suppliers;

- agree targets for improvements with suppliers.

Lamming *et al.* (1996) propose a relationship assessment process (RAP) as an eventual replacement for vendor assessment. Whilst environmental aspects are not explicitly included in the RAP conceptual model, they could clearly be incorporated in the process of customization that its authors advocate in practice.

Life cycle analysis (LCA)

Hindle *et al.* [1993, p. 38] describe LCA as

'both a state of mind and a scientific discipline that deals with environmental quality.'

As a state of mind it requires customer firms to take responsibility for environmental issues relating to the product throughout the whole life cycle, sharing the responsibility, where appropriate, with suppliers. As a scientific discipline, it provides a useful tool to assess exactly how a company impacts on the environment. The key to this resides in the recognition that it is the *use*, or demand, for the product that makes the difference and as such it is equally applicable to manufacturers and service providers who buy manufactured goods. LCA is perhaps the key to understanding what makes a 'green' product, and ultimately to determining environmental purchasing strategies. As a tool, however, LCA is still being developed, although there is a substantial LCA community developing on both sides of the Atlantic, trying to develop future standards.¹

The controversy arises when using LCA to quantify and rank a range of environmental impacts. The EC Eco-labelling scheme, for example, has run into problems in this way. If, for example, washing machines consume both water and energy, then the one that uses less of both is evidently the least harmful. However, if one is

¹ The scientific group most closely associated with LCA development has been the Society for Environmental Toxicology and Chemistry (SETAC), which has produced guidelines for undertaking LCA.

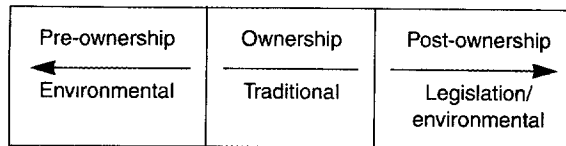


Figure 1. Concepts and responsibilities in product stewardship

more energy efficient, but uses more water and detergent, it is impossible to establish an order of importance between the priorities of global warming and water consumption/pollution (White, 1994, 1996).

This suggests that if LCA is to be used with suppliers the parameters must be set within manageable limits, by concentrating, for example on areas of production for which there is most information, or which can be easily improved (White, 1995).

Product stewardship

The concept of product stewardship is concerned with recognizing that the extent of the company's influence lies well beyond the traditional boundaries of the firm: it includes the environmental impacts of goods, upstream and downstream in the supply chain, from raw material extraction to final disposal – in essence, from 'cradle to grave'. It is summarized in Figure 1.

This concept has clear direct resonance with the product life cycle. IBM has identified two objectives and four product attributes in this respect, reported by Dechant and Altman (1994, p. 13) as follows:

Objective 1: To build into products attributes that would be deemed environmentally conscious

Objective 2: To know what will happen at the end of every product's life with respect to its impact on the environment:

Attributes:

- design for disassembly: recyclable materials are selected;
- use of hazardous materials: efforts are made to reduce or eliminate hazardous materials in the make-up of the product;
- reduction of chemical emissions: changes are made to reduce emissions;

- use of natural energy and resources: efforts are made to conserve resources, particularly in manufacture and packaging.

Smart (1992, p. 170) argues that

'the environmental impact of a product is the sum of the impact of each input that goes into its making, use and disposal. Thus it is logical for the proactive company to look not only at its own processes but up and down the chain of materials sourcing, production, distribution and use – a concept known as product stewardship.'

The UK Duty of Care and other EC initiatives are now forcing companies to assess the product stewardship concept on a broader basis. Meanwhile, in the USA, quality improvement processes applied by packaging engineers at Xerox to reduce the impact of supplier and product packaging have enabled the copier company to avoid 10 000 tons of waste, and save \$15 million per year.

Links with total quality management

Introducing a system of environmental quality into a company's processes can be seen to have very close parallels with implementing a total quality management (TQM) system. The changes that are required not only involve processes and products, but also the organizational culture. A TQM system can reduce overall costs in the company and the supply chain, and eliminate waste and wasteful practices.

Just as TQM deals with quality at every stage of the production process, both internally and externally, so environmental quality is dependent on everyone in the organization 'owning' some product or service responsibility. This will also require the suppliers to be closely involved, as all sections of the supply chain have some expertise and experience in dealing with different stages in the product development. In this way, environmental quality may be considered as a facet of quality improvement, when assessing suppliers.

BT, for example, recognizes that all companies, irrespective of the industry in which they operate, will eventually be subject to a number of

environmental pressures, and therefore treats the environment as

‘an opportunity for change, by becoming more efficient, reducing waste, developing a competitive advantage ... in essence to link environment with Total Quality Management.’ (Tuppen, 1993, p. 24)

BT recognized that it was important that any environmental policy should work towards its main business objectives rather than against them. The main drivers behind environmental purchasing policy for BT were accepting that:

- effective product stewardship requires knowledge of whole-life impacts;
- minimizing risk at the procurement stage can improve long-term benefits;
- a supplier that runs an active environmental programme is more likely to deliver a quality product;
- it is an effective way in which to reach companies further upstream in the supply chain.

As discussed above, B & Q has combined its vendor assessment quality scheme with its environmental audit – manifested in the combined role of a single senior manager (Knight, 1996). Elsewhere, Shrivastava (1995, p. 187) has proposed the use of a new term: total quality environmental management – TQEM.

The link with quality management systems is further reflected in the nature of BS 7750 in relation to the total quality standard BS 5750. While the challenges of fully understanding the total environmental impact are distinct from the requirements of BS 5750, companies with the quality standard in place should benefit from experience of implementing this type of system. EMS are based on yearly improvements in the company’s overall environmental performance: this is a key element in the quality programmes that a number of leading firms have implemented with their strategic suppliers.

Lean and flexible production

The concept of well managed environmental quality also fits well with current trends towards smaller, leaner and more flexible production

systems. A truly ‘lean’ enterprise is one which manages to produce goods with half the inputs (materials, time, labour space) (Womack *et al.*, 1990). The same can be said for a lean supply chain (Lamming, 1993, 1995, 1996; Robertson, 1995). Implementing an environmental policy requires a company to:

‘re-examine ... the needs and expectations it has to meet. It then has to develop new ways of meeting those in a way which delivers the better value and performance which customers want, while using less material and creating less waste.’ (Hindle *et al.*, 1993, p. 36)

The concept of product stewardship clearly implies that suppliers need to be drawn into this process, as very few companies are involved in every stage of a product’s life. As purchasers move to address the challenges of lean supply, so the links with environmental soundness may be expected to become increasingly apparent.

Small and medium-sized enterprises

As noted above, the role of large companies in passing on good practices to their smaller counterparts (e.g. their suppliers) may be the key in the development of widespread environmental management:

‘The diffusion of environmental management techniques via the supply chain is ... a very important factor influencing the improvement of industrial environmental performance.’ (Lloyd, 1994, p. 40)

Encouraging environmental improvements through the supply chain will be a major issue for small and medium-sized enterprises (SMEs), who will usually have less information, resources or expertise readily available to them for dealing with the environmental requirements of large customers. Because of their potentially vulnerable positions, the extent to which SMEs respond to this issue will be dictated by the strength of the business case, in terms of commercial benefit.

The movement away from mass-production techniques to lean production and supply, involving smaller and more flexible units, has some relevance for SMEs. Gilbert (1993) argues that in

order to improve the overall picture, 'big business' concepts need to be adapted and made to work for smaller enterprises, using the systematic approach of quality. As many SMEs are increasingly being encouraged to gain accreditation to BS 5750, there are environmental aspects which they can build into everyday decisions, which may provide cost-benefits in the long run. Lamming and Oggero (1995) have shown that SMEs do indeed expect to implement and benefit from partnership sourcing and associated purchasing techniques although Mudambi and Schrunder (1995) raise doubts about limited potential.

Collaboration and relationships

The concepts of inter-firm collaboration, or 'partnership' in supply have been discussed extensively elsewhere (Macbeth *et al.*, 1994; Kanter, 1994; Lamming, 1993; Ellram, 1991; Roy *et al.*, 1992).

If a collaborative approach is employed in purchasing, suppliers may be able to help customers to understand the environmental effects and their causes in the supply chain. At the same time, customers may help suppliers to understand the related issues such as potential competitive advantage and the criteria used for evaluation and rating. Since each has a vested interest in the other's success, this joint working should create the best results, giving a more cost effective environmental solution and better market opportunities for the supplier to embed its business in the customer's value chain (BiE, 1992).

Moreover, environmental standards in purchasing provide a basis for constructive dialogue with suppliers in the context of a joint commitment to quality improvement, and should motivate suppliers to look at activities of their own suppliers. Examples abound of companies who have taken this approach with their trading partners and, in some cases, with competitors.

In 1994, in a project with several local councils, the UK automotive manufacturer, Rover, conducted a pilot scheme of helping six suppliers to improve their performance. The exercise included a whole-life philosophy, committing the firm to extend its environmental strategy to all aspects of the business. This was not simply seen as 'a good

thing to do' but very important to the future of the business:

'It's true for us and it's true for our supplier base as well.' (ENDS 233, 1994, p. 19)

Rover considers itself to be dependent on its suppliers to keep up to date with technology and quality, as inter-dependent businesses, and this includes environmental performance. Suppliers involved in the pilot scheme achieved annual cost savings of between £10 000 and £100 000. Rover recognizes that this helps to make the supplier more cost effective, a benefit which then comes through to the company as cost improvements. In conjunction with a number of organizations, including three local councils, the vehicle maker produced a document, based on the experiences of the pilot exercise, to introduce EMS to SMEs, and to give advice on implementation (Rover Group *et al.*, 1994). The aim is to assure the environmental performance of suppliers, by working in collaboration with them, and to incorporate environmental considerations into the existing 'RG2000' programme (for advancing quality management in partnerships). The purchasing teams look for continuous improvement on environmental performance alongside other criteria, with a view to having a 'shared destiny' in the future. This document is now being circulated by the local councils to other small businesses as part of an awareness campaign attempting to get the message throughout the supply base.

In the San Francisco Bay area, a group of companies has established a coalition aimed at improving the market for recycled paper. The companies, which are among the largest in the region, signed a charter which obliges them to increase their use of recycled paper, of which they are all major purchasers. By voluntarily increasing their purchases of recycled paper products and the post-consumer waste content of paper products over time, they aim to demonstrate a sufficient long-term demand for recycled products and encouraging investment in new recycling plants, de-inking plants and better printing equipment. This has been built into their purchasing programmes, giving preference to products with a higher proportion of post-consumer waste and total recovered paper content. They meet regularly with printers, paper converters/manufacturers and equipment manufacturers, to work towards increasing the

post-consumer waste content as fast as technology allows and ultimately to purchase 100 per cent environmentally-preferred paper products (Smart, 1992).

Supply chains often appear to suffer from poorly-organized information and too many barriers to communication. At present, this is the case with environmental issues. As the nature of environmental problems is uncertain in the future, and the focus of future legislation unclear, intra-value chain co-operation would appear to be a fundamental element of any environmental strategy. As a result of such a strategy, suppliers should be more confident of protecting their markets and more able to employ the expertise of their customers and their own suppliers in developing innovative products with improved environmental qualities.

An example of supply chain co-operation regarding environmental issues is provided by the case of S. C. Johnson Wax which, in 1991, convened an environmental symposium with 57 of its largest world-wide suppliers, to assess the potential barriers to making environmental improvements throughout the supply base. This identified such areas as environmental 'illiteracy', inconsistent scientific opinion and the slow down in the advancement of environmental technology. The objectives put forward included: improving the environmental value of products in formulation, packaging, application and disposal, to reduce emissions and to recycle wherever possible. The suppliers stressed expectations of progress, but not necessarily of perfection. However, it was widely seen as 'an important bridge building exercise' (Smart, 1992, p. 171).

Drumwright (1994) carried out a study into the use of environmental purchasing as an example of non-economic buying criteria, and found that regardless of the motivation to build environmental criteria into purchasing decisions, once companies had started with it, there were no cases in which the practice was abandoned. She found, however, that it often increased the amount of stress on the purchasing function, when they felt that in certain cases, they should move away from long-term suppliers:

'When a supplier that we've worked with for 15 or 20 years before all the environmental concerns came up didn't share our views ... it was difficult. I feel much more like an extension of the

supplier. I take it too personally when things don't go right for the supplier.' (Drumwright, 1994, p. 12)

Drumwright established a typology of companies that approached environmental purchasing in different ways. The first type used 'responsible behaviour' as an extension of the founder's values, and the social mission became the 'second bottom line' upon which performance was measured. In such companies, the purchasing department held a high status, and played a formative role in the activities of the company, such as new product development and inter-functional problem solving. Purchasing was seen as integral to meeting social goals, as standards experienced a ratchet effect, becoming increasingly rigorous (Drumwright, 1994, p. 7). In the second type of company, the environmental purchasing policy came from the:

'managerial recognition that socially responsible behaviour was inextricably linked to the company's success, and to discourage any further regulation that would alter the industry's structure.' (Drumwright, 1994, p. 8)

In the third type of firm, environmental purchasing was 'opportunistic', and motivated by a competitive advantage, rather than social responsibility. The fourth type of company found that environmentally friendly purchasing had 'non-negligible' costs. Any publicity received was regarded by their customers as neutral. They often viewed 'social responsibility' in a broad context and frequently applied it to product essentials, unlike types two and three.

A major issue which Drumwright drew from the study was that purchasing managers were generally unreceptive to the integration of environmental purchasing measures:

'A focus on pricing and other economic criteria such as performance measures for purchasing professionals could predispose them to ignore non-economic criteria ... it could also be that purchasing professionals are not privy to information about corporate strategy to the same degree as operating managers, or that they filter out aspects of strategy information that are not compatible with the economic measures by which they are rewarded.' (Drumwright, 1994, p. 13)

On a more positive note, one UK purchasing manager said:

'We see a strong correlation between environmental issues and quality ... neither quality nor environmental issues are optional extras, and neither should be regarded as [an] "Add on".' (Wynne-Davies, 1994)

Company interview results: putting principles to practice

To test the concepts which are reported in the literature, we conducted personal interviews with managers in five major UK companies, all of which have stated their commitment to improving their environmental performance. Some of these companies have been very active in trying to extend this commitment to their supply bases – each had taken a slightly different approach to the way in which they did this.

The subjects discussed centred around nine major areas:

- environmental purchasing policy and the links with purchasing strategy;
- the key environmental and supply-chain issues and pressures;
- effects on supply-chain performance of introducing environmental assessment;
- effects on relationships with suppliers of introducing environmental assessment;
- collaborative opportunities with trading partners, based on environmental policy;
- attitudes to environmental management systems, and the links with total quality;
- investments, costs and benefits;
- environmental criteria as a factor in supply base rationalization;
- visions and priorities for the future.

All the companies were large or very large, influential, successful, UK-based (but not necessarily UK-owned) firms with international operations. They remain anonymous in the discussion below, coded as follows:

A = a specialist high street retailer;
B = a motor vehicle manufacturer;

C = a telecommunications systems and services provider;

D = an automotive components manufacturer and distributor (OE and after-market);

E = an information systems and computing equipment manufacturer/provider.

The retailer (A) saw environmental issues as a subset of a whole range of ethical issues in which business should play a larger role and considered its purchasing power to be its key strength in achieving 'sustainable' business practices. Three others (B, C and D), while acknowledging an important responsibility to their stakeholders, approached environmental purchasing strictly as a business matter. Purchasing was considered to be a very important company function and environmental soundness was treated as an element of quality. In the words of one manager (B):

'our mission [requires us] to be a good corporate citizen. To be a good corporate citizen one of the issues is to ensure that we have responsible attitude to move towards an environmentally sustainable business.'

Company E had only relatively recently begun to embrace environmental issues enthusiastically. It was still in the initial stages of implementing an environmental purchasing policy but recognized that this would be a key driver in achieving its environmental legitimacy and crucial in reaching its business goals.

Product stewardship

The extent to which the companies recognized and addressed this concept varied. The retailer (A) was requesting detailed information from suppliers on all potentially harmful substances involved in any stage of production, for all purchases over £100 000. The telecomms firm (C) requested general information about such activities for all suppliers with contacts worth more than £750 000, to supplement a more detailed questionnaire regarding their environmental management systems. The vehicle manufacturer (B) linked environmental quality with its standard quality document which determined the business strategy. This cascaded into individual functional strategies, each with specific targets and milestones. The purchasing strategy accordingly

had a number of environmental targets within its own quality strategy, and environmental issues were seen to be part of the overall business specification. The components supplier (D) was keen to encourage suppliers who used materials with which the company was specifically concerned (such as packaging) to address the problems as part of the continuing discussions on quality with the company. The information systems firm (E) had concentrated more on its own in-house environmental effects but planned to extend this analysis further upstream in the near future, based on agreement of the areas of concern for the company (e.g. waste streams).

Product stewardship, therefore, had been recognized by all as an issue, but each had approached it in a slightly different way. The manner in which it should be embraced appears to be a key factor in determining the direction that an environmental purchasing strategy will take. One concept related to this, which was frequently raised in discussions over environmental impacts, is LCA.

Supplier assessment systems

As suggested by the literature, two generally distinct methods were used in supplier assessment. The first was the use of a detailed questionnaire concerning all the impact that suppliers had on the environment. The retailer (A) used a series of questionnaires, increasing progressively the level of detail required. These were designed as follows.

The first related to the supplier's:

- attitude to the environment;
- willingness to co-operate with the customer's concerns;
- willingness to attend supplier seminars organized by the customer;
- willingness and ability to implement an environmental policy.

The second necessitated the complete audit of the supplier's inventories of raw materials, wastes and emissions, together with percentage compliance against regulated pollution levels.

The third questionnaire involved suppliers in carrying out an LCA, based on the customer's concerns.

Upon completion of the successive questionnaires, suppliers were awarded 'star ratings' which indicated a level of 'preference' for them in a supplier database. Buyers had a series of checklists for purchases, based on environmental and other social criteria and had to ensure that a certain percentage of their spend would be with 'star-rated suppliers'. The company found, however, that the most difficult aspect of the exercise was measurement, and setting the limits for what was 'acceptable' in the LCA. It stressed that all parties involved in the process must be certain of what was intended, and should agree on standards and definitions, in order to avoid differences in interpretations and values. The company had not reached a stage where it considered the costs and benefits which accrued to a supplier but rather viewed them as a pre-condition of doing business.

Three of the companies had realized that environmental purchasing was a significant factor in gaining competitive advantage. The components supplier (D) said that its policy was not based on any desire to 'save the world', but for business advantage – staying ahead of legislation and competitors, rather than simply reacting in an *ad hoc* way to specific stimuli. It also expected to use it as an element in its marketing strategy, approaching the subject by tackling those areas on which it had a direct involvement, rather than imposing on suppliers 'for the sake of it'. There was still some concern over how far to take the impact assessment of suppliers. The telecomms company (C) claimed that when the environment had become a legitimate issue on the political agenda in the 1980s, it realized that at some stage all companies would eventually have to reach minimum standards, and as such wanted to achieve the credit and positioning for being a first mover. This company had initially built an environmental module into its supplier assessment, based on an LCA of products. Each response was assessed against a template and assigned a numerical score, enabling a comparison to be made on the potential whole-life impact of similar products from different suppliers. However, this has been superseded by a new method, for two reasons. One was the fact that suppliers were dissatisfied with this approach, as it was too resource intensive. The other was that such a system only enabled comparisons between similar goods, rather than between all goods. The emphasis is now on

integrating environmental concerns into the overall management system, allowing the buyer to use the established tools. The philosophy behind this was that the company did not want to tell buyers how to do their job, nor the suppliers how to run their companies – it was also recognized that the suppliers would be far more familiar with how their own companies worked, and would be more effective in adjusting their processes in their own ways, a view to which the vehicle maker (B) also subscribed.

Environmental management and total quality

Suppliers to the telecomms company (C), which had replaced its LCA system of assessment, were happier with the new quality management system, as it was supply based rather than product based. This appears to be the crux of the approach – that the environment may be viewed as a facet of quality. The interviewee said

‘Ten years ago, total quality was seen as an extra criterion, built into goods as an optional extra. It only really took off when it became management-systems-based rather than product-based. The environment is now at the stage that TQM was at ten years ago.’

The company takes the view that price and quality are now entry criteria (in competition) and that they need a differentiator. This is provided by ‘the environment’ so an environmental module has been built into the existing-supplier quality-assessment model. The manager in company B explained that

‘all the conventional things like value for money, quality, style, efficiency, and performance – they’re all starters if you like – you have to have those to get into the market in the first place ... it’s only a matter of time – a relatively short period – before the environment will fall into the same category.’

The reasoning behind this is that quality is concerned with limiting the cost (and risk) of failure, and the environment is a part of this. The weightings that environmental factors receive in supplier assessments therefore vary according to the nature of the goods purchased, e.g. between buying deep-sea pipelines and pencils. With the

telecomms company’s (C) strategic suppliers, concerns had been built into regular discussions over strategy and TQM. (Significantly, when they were first raised, US-based companies were more comfortable with the ideas than their European counterparts, for whom ‘we almost had to spell it out, word for word’.) For the rest of the supply base, once it had been established on the agenda at corporate level, the buyers were required to communicate the ideas to their relevant suppliers. It had to be explained that there was no separate ‘pot of money’ for the environment – costs and benefits were not attributable to the environment specifically, but to the overall performance of a contract. The issues contributed to the overall vendor-rating scores, and therefore to final selection. However, it was recognized that building-in environmental concerns had produced significant business benefits, not only in terms of facilities management, for example, but also in terms of competitive positioning for contracts with large corporate customers, who are beginning to ask ‘environmental questions’ of their suppliers.

The procurement function in this firm sees itself as a catalyst, placing the issues on their suppliers’ agendas, and giving them tools with which they may achieve the standards. It is very much based on working with suppliers rather than for them, helping them to appreciate the business benefits, what to do, and where to go for assistance. Specific benefits accruing to environmental projects are not shared with suppliers: benefits from overall supplier improvements are shared, however, and environmental factors are an element of this.

An interesting point to emerge from this discussion was the view of the telecomms company (C) towards BS 7750. While it was aiming to gain accreditation itself, the manager felt that it should not push the standard on its suppliers. This was because although the assessment technique used aligned broadly with BS 7750 and the EMAS, it would be inappropriate to push the standards on suppliers as individual issues. The interviewee felt that industry was becoming far too ‘systems based’, with too many standards ‘floating around’. There was, he felt, a danger of standards becoming an end in themselves rather than a means to an end. It would be far better, he argued, to have a single standard which incorporates all quality,

environment and health and safety issues under one standard for quality management:

‘They are not separate issues, but parts of each other.’

Similarly, the vehicle maker (B), which considered environmental issues to be part of the overall business specification, looked at the total performance of a supplier, including environmental issues. They agreed that it would be prohibitive to audit each supplier on all its impacts:

‘we’re not into checking parts, we’re not into the old concept of quality. We’re actually into helping and encouraging improvement in business, and improvement in business means high levels of performance in all areas.’

This organization’s objective, however, was to get all its strategic suppliers accredited to BS 7750 or EMAS in the long run. However, it was also wary of relating BS 7750 with BS 5750.

‘It is not necessarily the next natural step for people who have achieved 5750. If people who have got 5750 have done it because they genuinely wanted it, and have found benefits to themselves as a result, *then* 7750 might be the next step. It is not an automatic progression, however.’

The interviewee would not guess when it would be possible to get suppliers accredited, though, given the recent delays in appointing accreditation bodies – it remained a priority in the future.

The components supplier (D), which was basing its environmental purchasing strategy on quality management issues, was not as far down the road although it recognized the relevance of the quality approach. The environmental policy was seen to be about the elimination of wasteful processes, which was entirely compatible with its quality management system with its strategic suppliers. The programme is based on continuous improvement of the partnership as a whole, rather than the supplier alone, and the rating system indicates this on a sliding scale, recording their joint progress. As such, the company’s attitude towards environmental issues was that while it recognized minimum standards, it was unlikely that a supplier would simply be de-listed on the basis of its environmental performance. If this

came into question, then the customer would try to help the supplier to find suitable solutions.

The company had achieved significant cost benefits in terms of packaging and process benefits, although specific figures could not be disclosed. It also recognized that there were several ‘soft costs’ involved in such a strategy, in terms of time in meetings etc., but it was not very concerned with these. The firm’s attitude was that the environmental programme must pay for itself:

‘As long as it does not cost money in the medium to long term, then it will remain. As such, it is natural to include it as a quality factor with suppliers.’

Although it was aiming to gain BS 7750 accreditation, the company expressed concerns over the potential danger of excessive documentation. The interviewee conceded that it might be easier to achieve as the company was already BS 5750 accredited, but the greater breadth of the new standard was a concern. For example, during its pilot assessment, it had prepared the relevant material on all its office supplies but was unable to say where the contractors who cared for the office plants sourced their sprays. This was also mentioned by another manager who explained that the process of examining total impacts of a business, evaluating them correctly, setting real targets and measuring progress against them, would require an unacceptable increase in the amount of data to collect, and personnel with a high level of industrial expertise and knowledge to be able to carry this out.

The information systems company (E) was still in the initial stages of implementing its environmental purchasing policy and had amended its vendor-assessment questionnaire to include basic questions on levels of management awareness and environmental policies in suppliers. It was keen to get as many strategic suppliers as possible accredited to BS 7750 in the long run, to prove that it could perform better than the legislative standards. Referring to companies abroad that had already achieved accreditation, the interviewee was optimistic about the overall costs, ‘After all, it’s best business practice, isn’t it?’

Collaborative opportunities/relationships

The research did uncover a couple of specific collaborative ventures with suppliers on

environmental issues. One company was working with its distribution company on ways to reduce the impact of its vehicles, while another was closely involved with two business institutions on developing guidelines for industry best practice. It was apparent, however, that the environmental issues were often incorporated into the overall quality standards with strategic suppliers, with whom the firm regularly worked closely: the environment was simply one factor out of many.

The effect on relationships of environmental criteria in purchasing decisions was widely considered important. One manager was very concerned about being accused of being a 'corporate seagull' by the mainstream purchasing function – too far removed from the everyday workings of 'real life' in purchasing. There was also concern about whether suppliers would be able to bear yet another condition of supply, on top of the regular 'beating-up' they received from the company. This is particularly relevant to the question of demands on the suppliers' resources, as mentioned above. It was recognized that they needed to be informed of the logic behind the strategy and that personal contact was of the essence. Networking, both among the suppliers and, where appropriate, with competitors, was seen to be vital. One manufacturer felt it would be unfair to set standards for suppliers without informing them of expectations, and without giving them any feed back and direction, and was assessing ways in which to set up processes by which the information gathered could be used to do this.²

In general, the response of suppliers to initial customer proposals to make improvements in environmental soundness was reported to be cool. There were only a few cases where suppliers had actually been proactive themselves, in proposing new or better ways of doing things. Those suppliers whose products had a high environmental profile, were usually aware of what needed to be done, while others did very little on their own initiative. In one case, the supplier was described as 'evasive and uncooperative'. This company's future business was being discussed,

not only because of its poor environmental record but because its attitude was not felt to be good for business. Broadly, suppliers responded to problems only in so far as the customer companies required them to, indicating again that the area is very much market driven. The automotive components manufacturer/distributor (D) was itself a large supplier to a number of major manufacturing companies and considered itself to be far ahead of the various stages of environmental improvement that these customers had themselves achieved. The telecomms firm (C) had recently gained recognition of the effectiveness of its policy, as a major international supplier in Sweden had announced that its environmental and quality standards were totally based on this UK company's purchasing policy.

The three companies that had strategically incorporated environmental criteria into quality decisions all pointed to the fact that they were gradually rationalizing their supply bases away from smaller companies, in favour of the strategic suppliers, with whom the partnership and TQM programmes were in effect and that environmental criteria were only a subset of many factors in rationalization. The retailer (A), which recognized a broad social responsibility as well as business factors, was more interested in working with small businesses, as part of its corporate philosophy, and therefore environmental factors were more important. As the company multi-sourced most goods, ethical factors played a major role in supplier selection, and the company often committed resources to help these suppliers achieve their goals, in many small projects. However, the company admitted that it was unsure of how to verify the information that it received from suppliers – to audit them all would be impossible and probably counter-productive. This was not an issue for the companies which used quality-based approaches, because the buyers were in regular contact with the long-term suppliers and would know if they were stretching the truth. Therefore, only the returns for new suppliers required verification, which represented a far more manageable quantity. The idea is that these companies should be able to look at potential suppliers that had an acceptable approach to the environment and record of quality, and accept offers and proposals from any of them.

² This may seem an obvious point, but recent research has indicated that many firms do not share such data with their suppliers, following assessment (Lamming, Cousins and Notman, 1995).

Investments, costs and benefits

The overall attitudes to investments, costs and benefits have largely been covered in the discussion above. Generally, where environmental factors had been made an issue with suppliers the benefits had been significant, mainly in terms of cost reductions but occasionally in terms of adding value to a product or process. Any costs were seen to be investments, which would be justified eventually by improved supplier and product performance. The only reservation regarded the level of resources required to implement policies. Each company appeared keen to press ahead with its plans for the future and none revealed any misgivings about having become involved in this area of purchasing. One said:

'If you bring it down to the realms of corporate purchasing, let's not beat about the bush; being a good environmentalist can also help a lot with profit margins, and therefore it is good, sound business sense to follow this.'

Each company recognized that its environmental policy would benefit product and company marketing, except for one which was using LCA with suppliers. This company recognized that the LCA was partly based on subjective values and therefore could not be used to state whether its products were superior to others. All the companies felt that if a supplier had an environmental management system then it would be more likely to deliver a quality product as it focused senior management attention in areas which had previously not been considered.

One major area was raised as a subject for future concern – the concept of whole-life costing (WLC) or total cost of ownership (TCO) (Ellram, 1993, 1995). The principle of WLC/TCO is that rather than purchasing goods purely on the basis of their immediate price, the actual cost of owning and disposing of the item should be assessed too. Factors to examine, for example, might include the costs of necessary training associated with a purchase, compatibility with existing systems, particular software required, the cost of maintenance, and crucially, the cost of disposal. Clearly, WLC/TCO cannot be completed satisfactorily without examining potential environmental costs and assessing the environmental performance of suppliers. The telecomms company (C), for whom this was of particular interest, gave the example of

a product which they had been using for a long time. The product was wholly suitable for its intended task but the implementation of the duty of care had increased the cost of disposal to such an extent that it cost as much to dispose of as it did to buy. An efficient recycling scheme was set up, negating this cost. Without the benefit of such considerations, the basis of sourcing decisions may be fundamentally flawed. Purchasing thus needs a system to be available whereby the accumulated actual costs and revenues attributable to each product can be assessed.

Future actions

The unanimous resolve of the companies interviewed was to press ahead with current initiatives and to review performance regularly, setting new targets appropriately. They all expected environmental legislation to tighten up generally over the next few years and planned to stay ahead of it. The common view was that at some stage every company would be required to be active in this field and that their policies gave them a significant advantage over companies that were not yet active. Regardless of the difference in attitudes towards BS 7750, all admitted that standards would have an increasingly important role to play in environmental purchasing in the future, and that adherence to a standard should, on balance, lead to improvements in product and performance quality. Whether they would require standards to be adopted by suppliers, as a precondition for trading with them in the medium to long term, however, was uncertain.

Another characteristic of some of the companies was that their actions were very much based on market demand. For example, the components supplier (D) had already piloted a product recovery scheme for one area, but would not implement it until it became cost effective, i.e. when more pressure was put on its customers to be more environmentally conscious. It was also carrying out regular market testing and had invested in a few initiatives concerning product disposal, package recycling and reclaiming used materials, but only when the market demanded them. Similarly in areas where the raw materials of the goods were environmentally 'emotive', but not actually damaging in use, the company said that it would move away from these suppliers only when alternative sources became viable and

the market allowed them to do so. Another manager commented that:

'The biggest single driver will be the customers. We are quoting for contracts now, and those bodies are wanting detailed knowledge of our environmental policies, procedures, awareness, and looking at the processes we have in place ... at the end of the day it is a business need and we need to fulfil it.'

The companies tended to have broad rather than specific goals for the future. They were regularly examining new ways of approaching problems, carrying out benchmarking, and concentrating on making their existing policies work to their full extent.

Common issues

A number of issues emerged during the interviews, in which the companies expressed a need for further information and understanding, in order to improve their practices.

Product stewardship. How may the parameters for direct involvement be determined, and in what ways can joint initiatives be set up? What directions should managers take in order to make best progress? What should be required of suppliers? How can customers effectively 'roll out' the case for better environmental performance to suppliers? One manager expressed a desire for some form of 'business weighting' for assessing which companies to approach for this. How may suppliers understand the issue and respond to customer expectations?

Waste streams. The full implications of the legislation and priority waste streams have yet to be understood. How may waste be minimized at source in a cost effective way, including packaging waste and collection?

Packaging. What are the practical effects that reducing packaging may have on product marketing, and the logistics of collection and recycling? To what extent is it possible simply to substitute increased quantities of recycled material for virgin material? Issues of centralized and decentralized purchasing arise – how should

purchasers try to convince suppliers to source packaging sustainably?

Logistics. How is it best to 'close the loop' effectively – one manager claimed: 'I'm sure that if you can get it out, you can get it back' but was unsure of how to do this. Even where distributors agreed to become involved, they would devote less than a fifth of their space to returning packaging and other end-of-life products. Further analysis is also required on the future of distributors, given the heightened awareness of environmental damage caused by vehicles. It has been argued, for example, that Just-in-Time (JIT) systems drastically increase total vehicle mileage, thereby exacerbating a whole host of environmental problems. On the other hand, it is argued that the system epitomizes process efficiency and waste elimination, which can be realized in environmental terms.

Role of standards. What is the future role and development direction of environmental management standards, and what should be expected of suppliers in this respect? Should standards be seen as a challenge to suppliers, or a required condition of trading? How should the parameters of responsibility be drawn. Might future environmental legislation be based on those in existence now?

Whole-life costing/total cost of ownership. There is a need for some form of tool or methodology which can be used to incorporate environmental factors fully into WLC/TCO and therefore to understand the full costs of ownership.

Conclusion

It appears unlikely that many companies have given full consideration, in a strategic manner, to the supply-chain environmental factors which affect their business, or that those that have are entirely comfortable with the manner in which they are doing it.

Environmental pressures may be expected to increase in the future and an effective means of dealing with them must be implemented through the purchasing function. While uncertainty reigns over how fast these pressures will increase, business does control the majority of the world's

economic activity and resources, and as such will be expected to provide more environmental solutions. This field is growing in its significance and recognition, and even the most advanced companies are still struggling with direction and policy making. Several issues and concepts still require further research, analysis and understanding.

The costs and benefits of environmental management are difficult to quantify and it is inevitable that they will be unevenly balanced between companies. However, it is part of the supply-chain management philosophy that costs and benefits are shared between partners who are becoming increasingly dependent on each other for their mutual survival. What is clear is that the issue must be dealt with through a well integrated and communicated strategy, not only within the organization but also with the members of the extended organization (supply chain or network). The environment must be recognized as a legitimate element of TQM and, with the prospect of environmental soundness becoming a recognized feature of a supplier's overall performance, companies need to assess the implications for their own cost structures and competitive positioning.

It is clear that senior management must be closely involved. As new business concepts develop, the purchasing function is beginning to play a more important role in the future strategy of businesses and will need to have policies in place that can cope with a range of issues, many of which closely affect the environment. It is disturbing that a recent survey in the UK showed that 74 per cent of all environmental managers cite lack of management commitment as the key obstacle in their work (ENDS 241, 1995). Social responsibility may be expected to become an important issue in future years for all enterprises – the immediate challenge for managers, however, is to recognize environmental supply-chain issues as key factors in business success and to adapt current ways of working and attitudes to meet them successfully.

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