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Ecoefficiency in consumer products

BY D. M. MONTGOMERY†

S. C. Johnson Wax, Frimley Green, Camberley, Surrey GU16 5AJ, UK

This paper reviews the development of ‘ecoefficiency’ within S. C. Johnson Wax and suggests why this is one of the most important concepts in industry’s progress towards the goal of sustainable development.

Performance, cost, quality and safety are all elements that are built into products right from the design stage, through manufacture to supply to the end user. The emphasis on sustainability now demands the inclusion of environmental impacts factored equally with these other, more traditional, concerns. S. C. Johnson Wax’s goal is to provide top quality and performance cleaning products; in so doing it often faces difficult cost trade-offs between the competing elements, but balanced commercial decisions have to be made.

Ecoefficiency is more than a theoretical concept. It is employed throughout a product’s life-cycle from design, through sourcing, manufacture and distribution to end use to ensure the most efficient deployment of resources. At S. C. Johnson we have found that ecoefficiency is a win for the environment; it is invariably too a quantifiable win for the bottom line.

1. Introduction

In this paper I will review the development of the term ‘ecoefficiency’ and, using examples from S. C. Johnson Wax, suggest why we believe this to be one of the most important and achievable concepts for industry in taking the first steps towards sustainable development.

Sustainable development, the overarching goal to which we all aspire, has many definitions but a simple one is ‘... *to meet the needs of the present without compromising the ability of future generations to meet their own needs*’ (WCED 1987). Issues encompassed by sustainable development are diverse and include the consumption of resources, the growth in world population, biodiversity, pollution, the social dimensions of public participation, employment, transport and a myriad of other topics. The number of issues covered by sustainable development is bewildering and so, in order to move forward, industry has worked together and developed business definitions and a strategy on which it can act.

Four years ago in 1992, the largest ever gathering of world leaders took place in Rio at the ‘Earth Summit’ to discuss global environmental and economic issues and a strategy for sustainable development. In the run up to the Rio Earth Summit a coalition of 48 business leaders from around the world established the Business Council

† Present address: The Automobile Association, Norfolk House, Priestley Road, Basingstoke, Hampshire RS24 9NY, UK.

for Sustainable Development (BCSD). This group advised national leaders attending the Earth Summit about opportunities for sustainable development and through the publication of the book *Changing course* (Schmidheiny 1992) they provided a global business perspective on development and the environment, along with a commitment to sustainable development. In *Changing course* (Schmidheiny 1992) these business leaders recognized that economic gains cannot be achieved by unlimited exploitation of the Earth's natural resources as if there were no cost. Economic growth, social progress and sound management of environmental resources are inextricably linked to the future health of the planet.

'Ecoefficiency' was a term first coined by the BCSD in 'Changing course'. It was defined by them as being reached by 'the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle, to a level at least in line with the Earth's estimated carrying capacity.' (World Business Council for Sustainable Development, Workshop Definition, Antwerp (March 1995) and Washington, DC (October 1995)). Although this definition encompasses such issues as human needs, public participation and use of non-renewable resources the most straightforward way of defining ecoefficiency is 'improving the efficiency of materials used so creating more with less'. This 'use less, waste less' approach invariably equates to 'costs less' in the long term for both business and the environment—hence it is a persuasive commercial argument.

Ecoefficiency links the front-end integrated product design process with manufacturing and distribution. Importantly it also encompasses the use and disposal of products, so taking a life-cycle type approach.

2. Consumer household cleaning products

In the late 1980s the public's awakening environmental awareness and concern about problems such as the greenhouse effect, ozone depletion, acid gases and industrial pollution led to a 'green' boom in the consumer cleaning business. Consumer opinion polls showed that consumers wanted more 'environmentally friendly' products and reportedly were prepared to pay 5–10% more for them. 'Green products' sprang up to fill this apparent niche in the market and with them grew green marketing and the use of 'natural', 'bio' and 'ecofriendly' labelled products.

Now that the dust has settled ten years later very few of these 'ecological' products are still on the supermarket shelves. Those that are aim their appeal at a small niche market of very green consumers. So, why did the majority of these products fail?

Research has suggested that the majority of these consumers exaggerated their willingness to change purchasing habits in light of their new found environmental awareness. Or rather they were prepared to modify their habits when the issue was high profile and in the mass media but once the 'urgency' seemed to fade and they found that the products did not meet efficacy or cost expectations demand for them dried up. Of course, a few examples can be quoted when consumer's environmental awareness does still find expression in purchasing actions aimed at changing a companies actions. The recent case of Shell and the disposal of the Brent Spar oil platform illustrates this well. However, in that case the boycott of Shell's products by consumers merely led to an increase in sales for its competitors, i.e. consumers were not asked to go without or settle for an inferior product, in addition, the action was very high profile and very short term.

The longer term failure of 'green' products could also be ascribed to a reputation for high cost, poor performance and confusion on the part of the consumer of what is the 'right' action. The feeling that 'what I do will not make any difference' could also play a significant role. Whatever the reason, the genuine desire for greener products still exists but not at the cost of performance, quality, convenience or having to pay a higher price for goods. The consumer's message to business is do not design for the environment alone but strive to achieve environmental benefits alongside competitive pricing, quality and product performance. Successful products thus become defined as ones which meet all of the traditional requirements while minimizing adverse environmental impact and maximizing conservation of resources throughout the life-cycle of the product.

Throughout this paper I will draw on examples from S. C. Johnson Wax. I will try to show how S. C. Johnson Wax is using ecoefficient principles in the design and production of products and the benefits they have achieved so far. I will also highlight some of the challenges this approach has created and strategies being used to overcome them.

3. S. C. Johnson Wax

S. C. Johnson Wax is a privately owned multinational corporation, one of the largest of its kind in the world. It was founded in 1886 in Racine, Wisconsin, USA, where its headquarters are still located. The corporation operates in over 50 countries worldwide, manufacturing and marketing a range of household and commercial cleaning products. In the UK these products are marketed under the familiar brand names of Pledge, Glade, Brillo, Goddards, Mr Muscle and Duck.

From the beginning, the corporation has been guided by consistent principles of conduct in the management and operation of its business. These principles were formally set out in 1976 in 'This We Believe', the statement of S. C. Johnson Wax's business philosophy. The environment was highlighted as a key part of this philosophy. The current chairman, Sam Johnson, is a founding member of the Business Council for Sustainable Development (BCSD), and an avid environmentalist and successful businessman. Sam says a shrewd businessman hates waste because it is something he bought but did not sell!

S. C. Johnson Wax had made a number of environmentally driven improvements to its products and processes over the years, For example: (1) in the 1950s and 60s the company pioneered water-based formulation technology in various household product categories; (2) later in 1975 Sam Johnson made the voluntary decision to remove all CFCs from S. C. Johnson Wax's aerosol products. This action was taken three years before the US legislated a CFC ban and 12 years before the historic Montreal Protocol called for the worldwide phase out of CFC use.

The company's environmental commitment has continued and is now embodied in its environment policy and quantitative public corporate environmental goals. As part of the goal setting programme in 1990 S. C. Johnson Wax identified 13 chemicals which it did not want included in formulations. By 1994 12 of these had been discontinued. Volatile organic compounds (VOCs) have been reduced as a ratio to the formula by over 14% worldwide. This sets the company well on the way to achieving the 25% reduction by the year 2000 set out in its goals. By 1994 S. C. Johnson Wax had reduced the use of virgin packaging as a ratio to formula weight by 24.4% through elimination and minimization programmes and the incorporation

of recycled materials. This surpassed the 20% 1995 goal by a full year. They were also on target to achieve the 1995 50% reduction of manufacturing emissions goal, with combined air emissions, water effluents and solid waste reduced by 45.1% as a ratio to production by the end of 1994.

These corporate goals reflect a great number of individual projects and actions being carried out by S. C. Johnson Wax's business around the world. One of the tools being used to drive these activities is the integration of ecoefficiency into the business from product concept, through commercialization to production and final consumer use.

The ecoefficiency concept is primarily aimed at S. C. Johnson Wax's products. This is because products, in the hands of the consumer, contribute significantly to the total environmental impact of the business and their design influences all other aspects of the product life-cycle. Hence it is from products that the biggest environmental savings can now be gained.

4. Integration of ecoefficiency into the business

The first stage in a product's life is design and although it accounts for only 5% of product development cost, decisions reached at the design stage contribute to 70–80% of the life-cycle cost of a product. Design dictates performance, product quality and safety, manufacturing and process costs. There is now a need to include environmental impact along with the other, more traditional concerns at the beginning of the design process. S. C. Johnson Wax is not attempting to 'design for the environment', as this was the problem with many of the early green products, rather it includes environmental criteria in each stage of the design process along with performance, cost parameters and regulatory requirements.

It is more than just a question of S. C. Johnson Wax being an environmentally responsible company; integrating environmental issues into the business at all levels is now fundamental to business competitiveness.

5. European business pressures driving ecoefficiency

(a) *Ecolabelling schemes*

Apart from the EU scheme, ecolabelling exists in a number of European countries. Schemes range from the Blue Angel in Germany, which is essentially a single issue scheme, to the Nordic Swan in Scandinavia which is a comprehensive assessment scheme. For multinational companies like S. C. Johnson Wax, to implement fully our pan-European brands, it is clearly essential that our products are formulated and packaged to ensure they take account of the key criteria of these schemes, particularly if they are of importance to our customers and ultimately the consumer. In theory, ecoefficient products should demonstrate the key characteristics necessary for the award of an ecolabel, which is after all aimed at products with low environmental impacts.

(b) *Packaging waste collection schemes*

For companies producing consumer goods, the challenge posed by the packaging waste collection schemes is to minimize the packaging and hence the cost to the business and indirectly to the consumer. Ecoefficiency achieves this by reviewing

current and new packaging designs to ensure they are lightweighted, made of mono-material to facilitate recycling and avoid the use of certain packaging materials. A good example of this thinking can be seen in the development of the new S. C. Johnson Wax rimbloc packaging. The removal of the plastic blister and redesign of the carton has resulted in a product that can be sent to any European market, has significantly reduced packaging fees and yet still protects the product and has a great deal of customer appeal.

(c) *Retailer demands*

Retailers across Europe feel that certain issues are of importance to them and their customer and therefore base their trading decisions accordingly. Some of the issues which retailers require companies to factor into design decisions follow.

(1) *Product types*. In Sweden a major supermarket chain has threatened to delist 'unnecessary' products such as air fresheners and those containing chlorine-based bleach. Austrian retailers, on the other hand, have been reluctant to take aerosol products due to a poor perceived environmental image. However, the launch of the new compressed air propelled aerosol for Pledge has meant that the sales force in Austria was able to increase distribution of the product by 25%.

(2) *Plastics*. Netherlands, Scandinavia, Germany and other northern European countries refuse to accept PVC packaging or tax it heavily. S. C. Johnson Wax along with many other multinationals are increasingly moving to alternatives to PVC such as PET for bottles in order to supply all markets. Indeed S. C. Johnson Wax has moved to polypropylene (PP) labels for aerosols supplied to these countries. This move will provide savings of raw materials and reduce inventories for countries where PVC is banned and where preprinted cans had previously been used. Another example of pressure on packaging type comes from the Dutch supermarket chain Albert Heijn which will not take our new polystyrene Brillo punnet packs as it sees plastic packaging as difficult to recycle. Ironically the life-cycle assessment has indicated that the new pack has a lower overall impact through use of less materials and lower energy inputs even though it does not contain recycled material nor is it so easily recycled as the old cardboard pack.

(3) *Pack size*. Isomodular packaging, which optimizes pallet stacking for mixed packs, has become important in Germany. This means that products must be designed to fit a standard isomodular footprint which ensures maximum pallet usage. S. C. Johnson Wax is finding this technique produces substantial cost savings by optimizing the number of units per pallet and so increasing transport efficiency. However, German supermarkets are also requiring display packs which can significantly increase the amount of packaging around the product. Our challenge is to take this opportunity to rethink and redesign our secondary packaging to capitalize on these requirements for isomodular display packs.

(4) *'Readily' biodegradable*. In Scandinavia and Switzerland the main S. C. Johnson Wax outlets have insisted that all products are readily biodegradable as defined by the OECD (OECD 1992) This has led to reformation of several products to meet these needs. This reformation process has led to new materials being tested which may not have been considered normally. In one recent case the new formula that was developed for Scandinavia was superior to the original pan-European formula and actually cost less to produce, hence it has become a Europe-wide formula.

(5) *Formula lists*. At the moment lists of banned raw materials only exist in the professional cleaning markets where local authorities have a major impact. However,

some of the national ecolabelling schemes, though voluntary, have similar lists which will impact formulations.

These examples would not necessarily be covered by ecoefficiency in its general use. However, in reviewing products with a view to ecoefficiency, issues are uncovered where the business can meet these, environmentally driven, demands and in doing so be more efficient on a Europe-wide basis.

When you combine these demands with more general modern market pressures—faster cycle times; market penetration; longevity of products; and more intense competition—ecoefficiency becomes a valuable business tool in stimulating creative thinking, awareness of important commercial issues and the development of competitive products.

6. What does ecoefficiency means in practice?

For S. C. Johnson Wax ecoefficiency has contributed to the development and marketing of a number of new products and ensured that modifications to current products have reduced environmental impacts. Below are summarized examples of the use of ecoefficiency in different areas of the product development and the brand maintenance process.

Innovative product concepts, such as Plug-Ins airfresheners which are based on highly concentrated perfumes in a very small pack. They release perfume in a controlled manner over a 45 day period using minimal raw materials and energy inputs and emitting very few VOCs to achieve a continuous effect.

Aerosol evolution into products such as Touch & Fresh, where a concentrated product is used in a miniature aerosol so reducing the amount of packaging per use. The aerosol is then packed in a reusable dispenser which maximizes its efficient use and customer appeal.

Ecoefficiency has also been applied to conventional aerosols where the butane propellant in Pledge furniture polish has been replaced by compressed air, hence swapping a non-renewable carbon based resource for a renewable one. In addition work on the standard aerosol can has resulted in a re-design that has meant the can has the same strength as before but, for S. C. Johnson Wax's European production, 370 tonnes of steel are saved each year.

Packaging changes have resulted from the systematic review of all of our product packs in light of the general ecoefficiency principles. Examples of pack modifications are as follows.

(1) Lightweighting of plastic bottles such as Mr Muscle trigger packs has saved 25% material by weight compared to the standard bottle. Even seemingly small modifications such as the redesign of the Toilet Duck insert saved 1.2 g per insert, This adds up to a saving of 69.6 tonnes of plastic per year or approximately £56 000 in cost savings.

(2) Redesign of the Plug-Ins pack has resulted in a 17 g saving per pack while the refill wallets have been reduced by 1 g saving a total of 24 tonnes of board a year.

(3) Incorporation of recycled materials in carton board and corrugated cases is now a fairly standard practice across the industry. However, the use of recycled plastics in Plug-Ins refills, Toilet Duck and Shake'N'Vac bottles have resulted in substantial virgin material savings, and cost saving too as high density polyethylene (HDPE) prices soared in 1995.

Formula modification has increased the use of water-based technology for our auto-care wax range sold in Germany. This has significantly reduced solvent emissions. In

addition, the reformulation of Glade airfreshener and Raid insecticides across Europe has resulted in a substantial reduction in solvent usage. In total, these formulation changes have resulted in a 33.5% reduction in VOC usage by S. C. Johnson Wax in Europe since 1990.

Design of products is clearly the key to the whole life-cycle usage of the product. Another major component of the life-cycle process over which we, the producer, have direct control is manufacturing. This is where most people see the major environmental impact focused, though in the household cleaner market it is undoubtedly the product and end of life disposal that have the most impact.

7. Manufacturing's contributions

Manufacturing has a direct and clearly recognized impact on the environment through the use of materials, energy and the generation of wastes. Innovative systems of waste and energy reduction have clearly been shown by a wide range of manufacturing companies to have major impacts on cost reduction while having other benefits such as increased prestige for the company and improved morale in the workforce. The concept of ecoefficiency can be expanded to encompass the design and engineering of manufacturing lines in order to optimize their performance and reduce resource usage.

I would like to briefly describe some examples from S. C. Johnson Wax sites which show how ecoefficiency and systematic environmental management can be applied to manufacturing operations. In all of the cases I describe, the reduction in environmental impact has also resulted in increased efficiency and reduced cost.

In the Dutch manufacturing operation, where all S. C. Johnson Wax's European aerosols are filled, the aerosol can manufacturer has a small manufacturing operation located on the site. Cans are shipped by a railway directly to the production lines. The cans are transported on pallets held together by hardboard sheets and strapping. These are removed automatically as the cans are loaded on to the line and packaging returned for multiple reuses. In the UK factory cardboard cartons and label cores have been designed in collaboration with the supplier so that they can be returned for refilling. They are capable of undergoing several return trips

Materials such as plastics and card which cannot be reused are segregated by material type for recycling. The recycling message is reinforced in both the manufacturing and marketing parts of Johnson by exhibitions and education on the value of recycling and the collection of paper, vending cups, drink cans, stamps and even Christmas cards for recycling.

Effluent reduction projects have resulted in a major reduction in both the volume and the concentration of the effluent. For production lines where the same product is manufactured with different perfumes or colours careful planning of production has allowed a number of products to be run back to back with no need for washdown in between. This system not only saves wash water, energy and material loss it also provides a major time and hence cost saving opportunity. Wash waters can also be controlled by simple devices such as metered input of tank cleaning liquids, recirculation of cleaning fluids and use of efficient cleaning devices such as spray balls. The lines are designed so that automatic flushing is minimized and cleaning controllable via metered inputs. Reuse of washings, to supplement mix water, conserves raw materials and reduces the load of effluent going to the drain.

Energy conservation measures such as the reuse of hot tank washing from soap

manufacture in the subsequent batch and use of energy efficient equipment has also contributed to reduced cost and improved environmental performance.

For transport and storage the isomodular pack size system ensures optimal pallet loading for products. The system is based on a standard footprint for packs which then fits easily onto a pallet. The isomodular system was first introduced to S. C. Johnson Wax by German retailers as it allows efficient stacking of mixed goods and reduces spoilage. The use of isomodular pack sizes has become standard at S. C. Johnson Wax for all new non-aerosol packs.

8. Implementation of ecoefficiency

(a) Goals and objectives

S. C. Johnson Wax has developed a series of corporate environmental goals that drive change in the business. The goals provide specific targets against which progress is measured. However, to make these goals meaningful at each level of the business, they must be integrated into the core business objectives. The corporate environmental goals are consequently presented to each business group (brand groups in marketing, manufacturing teams and the sale forces) in the form of three or four projects which, when complete, will significantly contribute to the overall achievement of the goals. These projects are then integrated within the business plan and will then be reflected in individual annual objectives and performance appraisals. The business groups are also challenged to develop projects of their own to contribute more towards the corporate goals and improve the ecoefficiency of their products or business areas. This method of setting objectives, based on 3–4 real projects, is a result of feedback and learning from the programmes that are being run within the company.

For new product development ecoefficiency is considered at all stages in the process. It is at the development stage, however, that the environmental impact of the product is measured.

(b) Education

The process of environmental education is continually reinforced. This is done with small groups brainstorming issues from within one area of the business, for example brand groups reviewing marketing and design issues or with multidisciplinary groups including research and development, manufacturing, marketing and sales looking at issues such as generic packaging types. It is the results from these groups that generate the projects that form the environmental part of the business plan. Environmental education also takes the form of targeted presentations by specialists on issues and techniques, environmental news bulletins and general exhibitions aimed at providing information for a wide range of people. The aim of this activity is to ensure environmental issues remain at the forefront of people's minds and they begin to feel that they have a familiarity with the subject. By demystifying and indeed removing much of the technical jargon which is often associated with environmental issues we have found that people are able to see clearly what needs to be done and are willing to contribute.

(c) Communication

I have spoken at length about how S. C. Johnson Wax is implementing ecoefficiency and given examples of how the use of ecoefficient tools have reduced costs and

improved market penetrations. The other area in which we are finally beginning to make progress is to encourage people to talk about what they see happening. This is being used particularly to develop common ground with key suppliers and trade customers. To aid this communication process and really bring home the value of ecoefficient design, marketing and manufacturing we have produced both corporate reports and a region specific report. These reports are not aimed at the environmental specialists but instead provide information for sales to use to open a dialogue with their contact. The information in our report is on innovative designs, manufacturing changes and how we see key environmental issues. The report also serves as a tool for us to report against the corporate goals.

The dialogue with customers will create added impetus for marketing to more fully integrate ecoefficiency into all of their brand profiles and acknowledge the benefits it brings.

9. Barriers to ecoefficiency

(1) Lack of consistent legislative constraints across Europe make it hard to visualize their impact in the future on the business as a whole.

(2) General business inertia, the desire to do things the way they have 'always been done'.

(3) The belief that environmental perspectives mean added costs, reduced performance or less customer appeal.

(4) Incomplete accounting for lifetime cost of products particularly at the concept/design stage mean that the true cost to the business is not understood.

These barriers can only be overcome by ensuring the information on legislative impact is available and understandable in business terms. There is a need for education on ecoefficiency to be carried out regularly and for its effectiveness to be tested. Incentives in the form of personal objectives encourage the adoption of efficient designs. However, most importantly successful examples of ecoefficient design and the benefits it has generated need to be shared with the key people.

10. Looking to the future

Issues that S. C. Johnson Wax, and other fast moving consumer goods businesses, will be dealing with in the medium to long term will probably include:

(1) suspicion of 'chemicals' and their effects on public health and the environment—the controversy around chlorine is a current example;

(2) increased costs for the use of packaging materials and the disposal of waste;

(3) increased regulatory pressure on chemical ingredients;

(4) increasingly well informed consumers who demand more information on the products they buy.

For S. C. Johnson Wax ecoefficiency is the tool we are using to drive the business to meet these expected demands. It will help us to maximize product and process efficiency while reducing environmental impact.

The challenge we are facing internally is to provide simple user-friendly tools that will allow product designers, marketing and manufacturing to clearly assess a product or process impact and to identify ways to reduce that impact. For products we are working on a concept we are calling resource utilization. This is very simply based on an assessment of the amount of product (formula and packaging) needed

to perform a standard function, for example, the amount of polish required to clean one square metre of table. The results of this work will be used by product designers and in the new product process to compare product concepts in order to determine which has the best environmental profile. The next step in this process will be to incorporate this fairly crude tool into a database that takes account of regulatory requirements and key life-cycle considerations in order to ensure that we more often design products right the first time for the whole European or indeed worldwide market.

The long-term vision for many consumer goods in general must be to move towards the delivering of a service to consumers rather than concentrating on selling individual products. For cleaning products this may mean developing highly specific products that act as powerful cleaners and then condition surfaces to resist dirt for a long period of time hence ultimately reducing the amount of cleaning that is needed.

11. Conclusion

Ecoefficiency is not just an issue for fast moving consumer goods companies; 'design for "X"' (DFX), where 'X' is cost, quality, environment, etc., has become standard in the aerospace industry, in car manufacture, computers, white goods, etc. It is not easy balancing competing product requirements, however, it is a basic challenge of product design. The premise of total quality and environment management (TQEM), that environment and quality problems must be identified and eliminated before they occur is a very powerful concept.

Ecoefficiency seems, to S. C. Johnson Wax, to be a sensible way of focussing the business to encompass legislative requirements, trade pressures and future consumer demand. Ecoefficiency genuinely can reduce environmental impact, improve efficiency in the business and reduce costs; it is in essence the first step towards sustainable design.

To implement this approach S. C. Johnson Wax has addressed or is addressing several key stages including: commitment from management; education; goals and setting specific business and individual objectives; implementation and tracking plans, new product developments and reporting results; communication of 'wins' internally; re-evaluation of process effectiveness and continual reinforcement.

At S. C. Johnson Wax we are beginning to see the real benefits of using ecoefficiency, not only to improve the environmental performance of the business, but to lead to efficiency improvements, cost saving and generate innovative ideas. We are still in the process of weaving the principles firmly into the business and results so far demonstrate the potential value of achieving this.

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