

CHAPTER 17
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Environmental management

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Introduction

The environment has become one of the major issues facing not only the hospitality industry but also humankind, with the increasing acknowledgement that human activity is causing global climate change. In the tourism industry, the importance of the environment has long been recognized. Indeed, the concept of 'sustainability' originated and developed in this sector. This is largely because much of leisure tourism is based on visitation to places with natural or manmade resources that people can enjoy. Paradoxically, the more people seek out natural resources such as Ayers Rock in Australia or beaches in Thailand, and manmade attraction such as Egypt's pyramids or Disneyworld, the less attractive they become. This is because the effect of visitation is to erode or reduce the very resource that is being visited. For example, in the Veneto region of Italy, hotels noticed a sharp downturn in business in the early 1990s. They discovered this was due to northern European visitors being dissatisfied with the region's attitude to the environment. In response, hotels and tourism operators formed a consortium to demonstrate and promote green values. As a result, Hotel Ariston in Milan implemented an environmental policy and increased its occupancy by 15% (Ball et al. 2002: 112).

Given the importance of this subject, there has been relatively little research into environmental management in the hospitality industry. The most prolific and influential source of information has been *Green Hotelier*, a magazine aimed at industry practitioners. Over an extended period, this publication has provided a very large number of articles, often based on case studies of highly applied 'research'. Stipanuk (1996) argued that in the USA, the lodging industry responded to environmental issues long before they became 'politically correct, market-opportunity driven or governmentally mandated'. He argues that this history of concern should mean that the industry will continue to care about the environment irrespective of incentives or legislative pressures. Writing at the same time, however, Brown (1996) expressed some reservations about how proactive the industry was, based on her survey of 106 hotel general managers in the UK. She based this on the failure of hotel companies to incorporate environmental measures into their management reporting and control systems. Kirk (1998) also surveyed hotel managers, in this case in Edinburgh, and found a similar lack of action. Of 85 respondents, only 19 reported an environmental policy in operation.

Environmental action

Sustainable development has been described as a new paradigm for management theory and practice. The World Commission on Environment and Development (i.e. The Brundtland Commission) defined sustainable development as development which meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987). A concrete result of the Rio meeting of the world's leaders was the development of the publication known as *Agenda 21* (UN 1992). Subsequently, this was translated by the WTTC into *Agenda 21 for the Travel and Tourism Industry*. This developed priority areas for both the public and private sectors.

In order to achieve sustainability, a wide number of stakeholders have to be involved – governments, environmental agencies, business and consumers. Governments are increasingly introducing legislation and regulation to manage our impact on the environment. In addition to international and governmental pressures for change, we are also seeing the growth of the green consumer. Hospitality businesses are subject both to the 'push' of governmental pressure, for example through the 'polluter pays' principle, and the 'pull' of the market, as increasing numbers of consumers express a preference for green products and services. They have responded to these pressures in a variety of ways.

Some business managers simply think of the environment as part of a raft of government regulations, that is, as an issue of compliance with laws and codes of practice. Others have seen environmental management as a means of differentiating themselves and have gone in for environmental or 'green' award schemes. A more sophisticated approach is to see environmental responsibility become part of the search for total quality. The parallels between aiming for total quality and cradle-to-grave environmental management can be seen through similar audit systems (ISO 9000 and ISO 14000).

Increasingly, however, companies are accepting the ethical case for developing sustainable strategies. Such businesses feel that they have a corporate responsibility to go beyond what is legally required and to operate on a sustainable basis. Some have incorporated environmental management and waste management procedures into their existing operations; some have developed new procedures, based on an environmental policy; and many companies now have environmental reports in their annual company reports.

The five main drivers for change towards sustainable development in an organization are:

- the need for compliance with legislative and fiscal requirements
- opportunities for financial savings
- consumer attitudes and pressure
- public opinion
- enlightened senior management

Companies often progress through a number of evolutionary changes in their approach to environmental management. The first stage of development is sometimes referred to as an 'end of pipe mentality', where the concern is with dangerous or toxic wastes, disposal of the waste materials and waste of scarce resources. This approach leads to an emphasis on waste minimization and waste recycling.

The second stage of development is based on an evaluation of an existing process holistically, through consideration of the input–transformation–output process.¹ This leads to a consideration of the measurement of the ratio of input to output (system efficiency) and policies designed to maximize the use of resources. These considerations lead to better controls over purchasing, storage, production and service.

The third stage of development reflects the approach of a company which has an environmental vision, reflected in a holistic design of their systems, environmental principles designed into the total organization, and consideration for all the internal and external processes in the organization. By considering all these factors as a system and how all the parts of an operation interact, it should be possible to make sensible decisions which allow it to obtain the optimum benefit to the environment while not threatening the financial viability of the hotel. Treating the operation as a whole, and considering interactions between design, purchasing specification, production planning, stock management, waste management and waste disposal, it is found that it is possible to gain both environmental and financial benefits, the latter savings being able to be used to finance environmental initiatives with no immediate short-term payback.

The extent to which large international hospitality chains have reached the third stage is debatable. A study by PricewaterhouseCoopers (2001) researched the environmental

¹ See Chapter 2 for an explanation of this model.

practices of Europe's 10 largest hotel chains. Nine of these had environmental policies, but only one of these was externally accredited and verified. Four had environmental management systems (EMSs) in place and a fifth was planning to do so. Most adopted some form of communication about the environment with various stakeholders – annual reports to shareholders, notices in rooms to guests, bulletins or newsletters to staff, and to the world at large on their website. Such chains also face the challenge that their environmental policy may not fulfil the legislative and regulatory demands of the individual countries in which they operate. Moreover, the environmental issues and challenges can vary widely from one country to another. In some parts of the world, water is a critical resource, notably on islands and in the Asia Pacific region. The Mandarin Oriental in Jakarta, Indonesia, has been able to save 13% of its water consumption, through the use of practical measures, such as reduced flow shower-heads (Clements-Hunt 1995). In other parts of the world, the issue is air quality, as demonstrated by concerns with regards the Olympic Games in Beijing.

However, some companies do adopt a holistic approach. The Scandic Group of hotels opened a 194-room hotel in Oslo, Norway, in 1997. This hotel incorporates features such as natural wood and fibres in the construction (each room is 97% recyclable), individual computerized bedroom heating controls, low-energy light bulbs, sub-metering of energy and water and segregated waste bins in each bedroom (paper, organic waste, metal/plastic) (Green Hotelier 1997a). Iwanowski and Rushmore (1994) strongly argue the case for such eco-friendly hotels.

Environmental accreditation

One of the most significant influences has been the International Hotels Environment Initiative (IHEI). Based on an initiative by the CEO of Intercontinental Hotels in 1991, and subsequently sponsored by the Princes Trust, the IHEI was set up by 11 of the world's largest hotel chains. The hotels which made up IHEI were able to demonstrate considerable progress in the first five years (Green Hotelier 1998). Subsequently in 2004, the IHEI became the International Tourism Partnership (ITP). As well as continuing to publish *Green Hotelier* and the standard work on this issue – *Environmental Management for Hotels* – originally published in 1993, ITP is also publishing in 2007 *Sustainable Hotel Siting and Design Guidelines*. In addition it has developed a website that will easily enable hotels to benchmark their environmental performance against other

similar properties (www.benchmarkhotel.com). Finally it publishes a quick and easy checklist – *Going Green* – that enables hoteliers to adopt environmental polices and procedures.

However, the principal accreditation scheme in this field is the internationally recognized ISO 14001 Environmental Management Standard. This has five core elements – policy, planning, implementation, checking and corrective action, and management review. The Hong Kong Shangri-La became the first hotel in the Asia Pacific region to be awarded ISO 14001 (Green Hotelier 1997b). In 2000, 8791 certificates were issued, but only 61 of these were to hotel and restaurant firms (Chan and Wong 2006). In their study of 164 hotels in southern China and Macau, Chan and Wong (2006) investigated the motivation for adopting this standard. They found that the two most important influences were the corporate head office and legislation.

Other accreditation schemes include the Green Globe certification (United States), the Green Gum Tree classification (Australia), the Green Leaf Award (Canada) and the Green Tourism Business Award (Scotland). But one of the challenges is the extent to which these schemes, along with benchmarking, are effective in helping the industry to become more environmentally friendly. Bohdanowicz et al. (2005) compare four schemes and conclude that they differ with regard to geographic and climatic areas covered, types of facilities included, nature of environmental information required, benchmarking methods, user friendliness and implementation cost. They go on to arguing the case for an internationally agreed standard approach to benchmarking.

Chan and Wong's (2006) study also suggested that small hospitality businesses were less engaged with environmental issues than large chains. Brown's (1996) study also found this, as did Stabler and Goodall's (1997) study of the hospitality sector on the island of Guernsey. Stabler and Goodall (1997) also concluded that external influences were most likely to change attitudes and behaviours. They strongly recommended action by central and local government to achieve this, through grading schemes, building regulations, incentives, and leading by example.

Environmental management

The application of systems theory² is particularly relevant to the environment, since the natural world is made up of a

²See Chapter 2.

number of highly complex and interacting systems that have come to be called the 'ecosystem'. The purpose of an EMS is to manage the exchange of materials between the operation – that is to optimize inputs, processes and outputs. Much of environmental management is concerned with the nature of systems outputs, particularly those we consider as waste. However, it is becoming increasingly clear that in order to manage the impact on the environment, we need to consider not only the outputs, but also the inputs and processes.

There is always a danger that the focus is on the wrong sub-system or system component. What happened in the case of pollution control was an exclusive concentration on treating *undesirable* outputs through pollution control – an expensive option. However, it was later recognized that looking at inputs and processes, which themselves contain hidden pollution costs, and innovating to eliminate all undesirable pollution (pollution prevention) can be more effective. Pollution is not simply an inevitable outcome, but a symptom. The cause may be close in time and space, for example the production process; or more remote, for instance a design flaw; or both.

Planning and designing 'green' buildings

Some authors have expressed the view that the whole economic and business system has to be redesigned to integrate with the natural environment. They advocate the redesign or start up of a business so that it does maintain a holistic relationship between economy and ecology, and is not therefore limited to 'end-of-pipe' remedies such as reducing existing emissions. Many companies in the hospitality industry have attempted the design or redesign approach.

Apart from hospitals, hotels have the highest environmental impact of commercial buildings due to the amounts of energy, water and other resources they consume every day of the year. Indeed, the construction industry, in general, consumes half of the resources produced on the planet every year, and is directly and indirectly responsible for about 40% of emissions (Rada 1996). One of the most obvious commercial advantages of environmentally designing a new hotel or restaurant is that it will have lower operating costs than a conventionally designed structure. Rada (1996) suggests that the main principles of environmental design are:

- *minimizing the use of resources*, the advantages of which cascade down into reduced maintenance and technical equipment costs;

- *thinking of a building as a complete system* rather than as a collection of engineering disciplines; and
- *multifunctional use of parts, features and systems* which have the twin advantages of reducing costs and increasing functionality.

Stipanuk (1996) reports that even in 1954, Statler Hotels Corporation was building properties designed with a 'conscious consideration of recycling, use of daylight for lighting restaurant space, reuse of guest linens, a minimization of materials in construction, and reductions in energy usage'. Today hotels may be constructed and operated completely with the environment in mind, as with the Orchid Hotel in India (Jones 2002). Whilst renewable sources of energy are desirable, there are some constraints. Solar power is particularly suitable for new hotels in sunny climes, and other renewables are available (derived from the wind, hydroelectric, wave, tidal and geothermal power), but currently they account for only a very small proportion of the world's energy supplies.

Environmental management systems characteristics

The characteristics of an EMS are:

- A written policy statement
- A set of targets against which to measure progress
- Agreed specific actions
- Monitoring results against targets

An EMS requires to be 'fed' from a variety of sources, including internal subsystems and the external environment. Some of these may be considered as 'tools' of environmental management which provide feedback. The EMS then responds to this feedback. There is a need 'to establish structures and norms which will ensure that environmental performance is improved over time'. This may be achieved through the organization first assessing its own performance and then responding to that data by setting benchmarks (Stainer and Stainer 1997). Just as the implementation of a TQM programme requires the full support of top management, so does an EMS. Indeed, those organizations that have already implemented TQM find it easier not only to meet legal requirements but also to integrate 'total quality environmental management' into their TQM system.

An EMS may be seen as hierarchy, starting with, at the highest level of the organization, a policy statement. Below this will

be operational systems which impact on the day-to-day management of all of the areas of a hospitality business: purchasing, food production, food service, rooms division, maintenance, transport and so on. Achievements against targets will be measured against a regular audit of environmental performance.

The environmental policy and mission statements • • •

All employees have to play their part in moving the organization towards sustainable development. The production and dissemination of clear environmental policy and mission statements, endorsed by senior management, is essential. These must include specific and attainable goals and targets, including performance targets, and details of the arrangements for monitoring, control and communication. The policy statement should also clarify responsibilities. Whether issued as a new policy statement or incorporated into the company's mission statement, the environmental initiative must be linked to action and targets. Hence, in larger companies, a specific environmental manager or co-ordinator is probably needed to ensure the environmental strategy is implemented.

While no responsible company would aim at minimum targets, it is important to know what these are. Naturally, the organization has to meet local and national legal requirements and may wish to incorporate the requirements of a standard such as ISO 14001. Any existing company standards will have to be incorporated in the new policy, and the standards used by suppliers and recommended by trade bodies may also influence policy. A policy should:

- be brief, maximum two pages
- be such that it is understood by, and communicated to, all levels of the company
- be available to the public
- include a commitment to progressively reducing areas of environmental impact
- include a commitment to meet all current legislation
- aim to go beyond legal compliance
- indicate that individuals will be assigned direct responsibility
- indicate that an auditing programme will be set up to measure the implementation of the policy
- have a commitment to review the policy after a specified period
- be consistent with health and safety policies of the company

A possible model for effective environmental performance appraisal, in the form of a continuous loop, is given in Table 17.1.

The environmental audit • • •

The term 'audit' is usually associated with finance, and a financial audit involves the application of rigid rules. By contrast, environmental auditing is based on balancing of facts and values, rather than just on financial measures. The purpose of an environmental audit (EA) is to assess the performance of an organization against prescribed targets related to inputs, processes and outputs.

- *Input* measures include indicators, targets and measures of plant efficiency, materials quality and recyclability. It may be seen as much broader than simply material input and might include, for example, the effectiveness of training staff.
- *Process* measures aim at percentage improvements in reducing waste in stock holding, processing and packaging.
- *Output* measures record impact on, or damage to, the community, including waste, emissions and pollution.

Clearly, such an audit on the whole organization must be carried out at regular intervals, feeding back internal information for control of the EMS. As we shall see, audits of subsystems of the EMS, such as those of specific resources – water, energy and so on – feed back into policies relating to the specific management of these resources.

<p>Table 17.1 The environmental performance appraisal model</p> <hr/> <ol style="list-style-type: none">1. Define the environmental context and objectives2. Identify potential measures3. Select appropriate measures4. Set targets5. Implement measures6. Monitor and communicate results7. Act on results8. Review <hr/> <p><i>Source:</i> James and Bennett (1994).</p>

Energy management

Hotels were forced to look for energy economies when the cost of oil soared in 1973–1974. The American Hotel and Motel Association conducted annual surveys of energy usage between 1977 and 1984, which showed reductions of 35% over this period (Stipanuk 1996). Hotels use more energy, in terms of dollars per square metre, than industrial buildings, naturally ventilated offices and schools. The benefits of good energy management to the environment include conservation through a reduction in the use of non-renewable energy resources, and also a diminishing of atmospheric pollution, global warming, ozone depletion and acid rain.

The principle of energy management is to minimize the amount and cost of energy used by the hotel without any perceived loss of comfort to the guests unless this is done with their consent, for instance if they agree that they do not need fresh towels every day. Deng and Burnett (2000) studied the energy performance in 16 quality hotels in Hong Kong. An average Energy Use Index (EUI) based on unit floor area was derived for these properties using energy consumption data for 1995. The breakdown of energy use showed that electricity dominated total energy consumption and that, on average, about one-third of total energy was used for air conditioning. A number of factors that affect the energy use in hotel buildings, such as year of construction, hotel class, among others, were reviewed. The difficulties in assessing hotel-building energy performance were also discussed, and methods for adequately evaluating energy performance for hotel buildings were proposed.

Energy in existing buildings may be saved by implementing the following measures (Kirk 1996; International Tourism Partnership 2007):

- A review of the mix of energy sources used;
- A review of tariffs used or other contractual arrangements with energy supply companies;
- Staff training leading to practical steps that can be taken to reduce energy consumption;
- A programme of capital investment on the building, plant and equipment in order to reduce energy consumption;
- Checking and maintaining all equipment regularly;
- Implementing low-cost measures such as energy-efficient light bulbs and motion detectors;
- Improve insulation;
- Use bicycles or other environmentally friendly vehicles around resort properties.

A study of 158 hotels in Greece (Santamouris et al. 1996) found that the annual average total energy consumption was 273 kWh/m². This was a very high level compared with other types of building. Based on simulations, it was estimated that 20% savings could be made by making changes to the building's outer envelope, heating and cooling systems, and lighting. In comparison, Chan (2005) investigated energy usage in 17 hotels located in the subtropics and found annual energy usage to be 313 kWh/m², nearly 40% more than the Greek properties. However, this was an improvement on an earlier study of 17 hotels in Hong Kong (Chan and Lam 2002) which reported consumption of 342 kWh/m².

The energy management programme • • •

For the programme to be successful, someone within the hospitality business should be given managerial responsibility for energy use. In many cases this will be the individual responsible for both building and maintenance and possibly the total environmental management programme. Staff may also be designated to collect energy data (International Tourism Partnership 2007). Alternatively, some hospitality businesses have outsourced their energy management to a contract company, to exploit their expertise and economies of scale.

The first step in any energy management programme is an energy audit. By analysing and evaluating historic records and hotel statistics, a measure of the energy performance of the entire building can be obtained. Deng and Burnett (2000) studied the energy performance of 16 hotels in Hong Kong. They found that the age of the building, star rating and occupancy had no impact on usage. However, they strongly recommended separating guest floors and non-guest floors for assessing energy performance. The energy performance of individual departments, such as restaurants, bars and kitchens, may require specific investment in sub-metering. Another complication is that comparisons can only be made if the units of energy are standardized to kWh (kilo-Watt hours). In estimating costs, account must be taken of the differing price per kilo-Watt hours of the various sources of energy used and of their relative efficiency.

The energy audit should provide:

- energy consumption and cost data for up to five years;
- frequent meter readings to show day-time, night-time and weekend energy consumption; and

- an inventory of all energy-consuming equipment showing age, power loading and maintenance record, together with data on frequency of use

As with an EA, an energy audit requires the full involvement of employees. It will show where the energy is being spent, and energy-saving opportunities. It should also quantify achievable energy targets. However, it is important to note that energy performance indicators are meaningless without having an external comparator, such as the equivalent for other hospitality businesses and industry average data. Care must be taken in comparing one hotel with another as there are many factors associated with the construction, location and operation of a hotel that can affect energy consumption, for example facilities like leisure centres and swimming pools, and air conditioning.

Materials and waste management

Cummings (1992) clearly articulated the 'urgent' need for solid waste minimization in the hospitality industry. A waste management scheme will reduce the amount of waste produced, partly through recycling, where feasible, and thus also make savings in resources such as time, materials and money. For economic reasons, such a scheme will concentrate first on achieving maximum waste minimization and only then on disposal of the residual waste. As in other environmental management programmes, problems must be viewed holistically, waste management being perceived as a process affecting all stages of an operation from design to production and aimed at maximizing the value of all resources.

Every employee must make their personal contribution to waste management, including product and services designers, those responsible for purchasing, stock control, operations and sales management, with the aim of achieving the best possible financial return.

As with other environmental management programmes, the first stage is the design of a waste audit. It is, however, inevitable that some waste will occur, unless there is appropriate, local, multi-sector co-operation to close the waste loop. Management of this waste must be carried out within the constraints of the hotel's legal duty of care in a prioritized manner as follows:

1. re-use the material if possible;
2. if not, collect and separate waste streams for possible recycling;

3. if this is not possible and the material has potential energy value, contribute it to local incineration or power generation schemes;
4. if none of the above options are possible, consign to a land-fill site.

A holistic approach to waste management must take account of waste which is not measurable as an 'output', for example the excessive use of detergents and cleaning fluids. This is often called 'invisible waste' and can be detected by means of a more comprehensive input-output analysis, combined with measures of efficiency, including comparisons with other hospitality businesses in a chain or industry standards. Particular attention should be paid to levels of food waste. Around 15.5% of edible food has been found to be wasted in hotels and restaurants (Ball et al. 2002). Paper is another commodity where waste can be minimized by reducing consumption, re-use and recycling where necessary. An analysis of present use, including purchases and waste, should yield some solutions to the problem.

The advantages to the environment of recycling are obvious. However, there are also financial advantages, including a reduction of the cost of waste disposal and the cash value of some of the products of recycling. Table 17.2 identifies some common recyclable materials and the resulting products.

Many hospitality businesses throughout the world are still using refrigeration systems which predate the new generation of CFC- and HCFC-free units, despite international initiatives and legal sanctions. Technological advances have produced alternatives to these hazardous chemicals which are cheaper and more efficient and it is now a relatively easy task for maintenance engineers to carry out the necessary conversion. As already noted, safe collection and disposal of the CFCs and HCFCs is essential so that the gases do not escape into the atmosphere. Clearly, when buying new refrigeration units or air-conditioning plant, managers should buy only CFC- and HCFC-free equipment. Energy savings of 10–50% are possible with modern equipment.

Management of the indoor environment

The indoor environment comprises air quality and levels of lighting and noise. These can impact upon the comfort, health and well-being of customers.³ Each country will have its own

³See also Chapter 3.

Table 17.2 Recyclable materials

Aluminium, for example cans and foils with high waste value, made into new aluminium products.

Steel cans: the tin coating is removed and the steel melted down for steel-based products.

Paper: separated into differing qualities; the high-grade paper is treated and made into boxboard, tissue, printing and writing paper, newsprint and liner board.

Glass: usually clear glass is separated from coloured glass. The glass is crushed and treated, then melted, the molten glass being made into new containers, fibre glass or glass beads for reflective paint.

Plastic: plastic goods require careful sorting. The plastic can then be melted and remoulded into drainpipes, insulation, rope, carpet backing and many other goods.

Frying oil: this has a commercial value and may be collected by manufacturers for a variety of uses, including the base for cosmetics.

Source: Kirk (1996: 117–118).

regulations covering health and safety. In the UK, the Health and Safety at Work Act 1974 and the Health and Safety at Work Regulations 1992 provide the main legal requirements. These are supplemented by the Control of Substances Hazardous to Health Regulations 1988. The UK regulations cover, in particular, the dangers of occupational lung diseases caused by exposure to dust, smoke and chemicals.

Comfort is a subjective experience even though attempts may be made to measure it objectively in terms of temperature, purity of air, humidity, ventilation and noise levels. When we look at comfort holistically, it will become clear that the above factors affect one another, ventilation and acceptable temperature, for instance. A comfortable temperature will also depend on people's level of activity and what they are wearing. There is no absolute optimal temperature defining comfort, but rather a range of temperatures known as the 'comfort zone', within which most people will feel comfortable under defined conditions. Other factors that interact within the bedroom environment system are bedroom temperature, ventilation and energy loss – arising out of guests opening their windows if too hot. The need for individual control of temperature and ventilation by the guest will be obvious.

Operations managers have a responsibility for reducing to a minimum the risks to guests, other visitors and employees

from a variety of hazards. There are five groups of chemical hazards:

- toxic, for example herbicides and pesticides,
- flammable (solvents and fuels),
- explosive,
- corrosive, and
- infectious.

Software may be used to create, update and monitor a database of all potentially harmful materials, chemicals and substances in the hotel. In the UK, under the Chemicals (Hazard, Information and Packaging) Regulation (CHIP) (1993), manufacturers of hazardous chemicals must provide data sheets giving the information necessary to build up such a database. The principle which should be applied to dangerous materials is that of substitution with a safer alternative or, if this is impossible, ensure that safe handling, use, storage and disposal procedures are in place.

Air quality

Poor air quality can affect both the comfort and the health of guests and staff. The parameters by which air quality may be measured are (i) the proportion of normal air gases and (ii) pollutants. Concern has been expressed over the effects of mechanical ventilation and air conditioning on indoor air quality. The competing claims of energy conservation and ventilation have resulted in poor levels of the latter. This can result in headaches, mucosal irritation of the eyes, nose, throat and respiratory problems.

The principal potential sources of air pollutants (Kirk 1996: 89–90) are:

- Combustion products, including gases such as carbon dioxide, nitrogen oxides, sulphur dioxide or hydrocarbons; and suspended particulates from boilers, cooking stoves, vehicle engines, among others.
- Chemical vapours from cleaning solvents, pesticides, paints and varnishes, and photocopier emissions.
- Building materials which may include toxic substances, for example formaldehyde in foam insulation, textile finishes, pressed wood, fibre glass or mineral fibres, plasticizers, among others.
- Tobacco-smoking products. A number of places around the world – New York, Ireland, and most recently England – have now introduced bans on smoking in public places.

- Radon gas and radon products which can be released by the soil beneath the building or by stone (especially granite), cement or brick building materials.
- Methane gas from decomposition of any nearby landfill facility or from leaks in the gas distribution system.
- Water vapour which may result in high humidity and mildew, discoloration, odours and damage to materials.
- Odours, both chemical and naturally arising odours from human activity.
- Asbestos, in older buildings, capable of producing asbestosis and cancers.
- Dust and particulate matter, causing allergic reactions, damaging equipment and decor and increasing cleaning costs.
- Airborne micro-organisms, such as *Legionella pneumophila*, normally associated with moisture in air-conditioning and ventilation systems.

Air quality can be analysed by diagnostic screening to identify problems which can then be eliminated. Comments from staff and guests and objective measurements should be used over a time frame, as single measures can be misleading. The three ways to improve air quality are to eliminate or reduce the pollutant source, filter or purify the air, and ventilate or dilute pollutants. Thereafter, monitoring and evaluation are essential for maintaining high air quality.

Noise

The most common sources of irritating noise are traffic, including aircraft, construction, industry and production, and other human activities such as entertainment and sport. Noise can have many effects on the health of guests and employees, from migraines to sleeplessness. Noise can also impair employees' creative and productive performance. New hospitality businesses should be designed to physically separate noise-producing activities from noise-sensitive ones. Existing hospitality businesses should carry out a noise audit, based partly on an analysis of complaints, and take steps to change procedures and, where necessary, invest in noise control measures.

Light

The properties and quality of light available within different areas of a hotel or restaurant have important effects on the overall experience of guests/customers and the efficiency

of staff. The intensity of light for detailed work should be between 500 and 1000 lux (or lumen per square metre), a measure of 'illuminance'. Only 200–300 lux is necessary for non-detailed work. Corridors and public areas require an illuminance of between 100 and 250 lux. Within bedrooms, the overall illuminance will vary according to the number of lighting units, and the most important factor is the degree of control that the guest has over lighting.

Artificial light can cause distortions, for example in the colour of foods, and therefore lighting effects must be tested. Types of fluorescent lighting, in particular, must be tested with furnishings, crockery and food to check for any undesirable colour distortion.

Non-ionizing radiation

The most common sources of radiation in hotel operations are microwave radiation from microwave ovens, visible radiation associated with lasers in printers and ultraviolet radiation used in sun beds. Radioactivity (ionizing radiation) is rarely found in hospitality businesses, other than emissions of the radioactive element radon from certain types of building materials. Microwave radiation in the form of heat can affect the eyes, giving symptoms similar to a cataract. Regular checks on microwave ovens for leakage should be carried out to ensure that any exposure is below the recommended maximum exposure level of $100\text{W}/\text{m}^2$. Laser printers which use lasers have built-in protection against this form of radiation which can damage the retina of the eye and burn the skin. Staff should be trained to limit their maintenance activities to that recommended in the handbook and leave repairs to the manufacturer.

Water management

Fresh water is becoming increasingly scarce, and conservation must be a high priority for all managers. There are several reasons why hospitality operations managers focus on the management of water consumption and water quality. These include:

- waste water reduces the supply of what is often a scarce resource and adds to the hotel's costs;
- a waste of hot water is also a waste of energy;
- poor quality water supplies may pose a health risk to customers and employees;

- poor quality water often adds to the running and maintenance costs of equipment and reduces its life;
- contaminated waste water is a hazard to the health of other stakeholders in the community and increases the load on effluent plants.

Water quality

Evaporated water is pure, but it then becomes contaminated with impurities as it passes through the 'water cycle', for instance the nitrate-based chemicals from fertilizers which may only emerge from deep underground supplies up to a decade later. Other contaminants include phosphates and the acid rain that results from absorption of the sulphur dioxide in the atmosphere. Rivers are also used for waste disposal which may accidentally rise to danger levels, despite stringent precautions, regulations and 'lateral thinking' solutions such as making companies draw their water from downstream. For all these reasons, water is usually treated before being used for drinking and cooking. In addition to rivers and lakes (natural and artificial), water supplies come from wells which tap natural groundwater that has accumulated through seepage in underground structures called aquifers. In many areas, demand is exceeding natural supply and aquifer water levels are falling.

Utility companies provide most hospitality businesses with their water supply, though wells bored into aquifers may be the source in remote areas. Within the UK, cold water supplies for drinking and cooking are taken direct from the main supply. For all other purposes, the source will be an intermediate storage tank within the property, containing either cold or hot water. Note that the removal of waste water is controlled by local regulations. Roof and site drainage water is usually separated from sanitary waste, and kitchen waste is often passed through grease filters before entering the waste system.

Most water supplies have been treated by the utility company before reaching the hotel, though those using wells will need on-site treatment. Quality levels are related to intended use. Thus lower-quality water may be used in WCs and for gardening purposes, but non-potable and potable supplies must be physically isolated to prevent contamination. There are three classes of pollutants: chemical, such as lead, aluminium, nitrates and pesticide residues and chemicals causing 'hardness'; bacteriological, as indicated by the presence of coliform bacteria and removed by chlorine-based disinfectants; and organoleptic factors (affecting taste, smell or colour).

An action plan on water quality should include setting appropriate standards, for both the operation and its location; maintenance and monitoring of the property's water plant; and assessment of the performance of the plant, especially with regard to potential sources of stagnant water. Issues that might need to be addressed could include contamination by airborne particles, infestation by insects and rodents and the selection of additional in-house water treatment measures. Common defects and their treatment include the filtration of suspended solids, desalination, water softening, chlorination to remove bacterial contamination, and filtration through an active carbon filter to remove odours and improve taste. Particular care is needed to ensure *Legionella pneumophila* cannot survive.

Control of water consumption

Water costs account for typically 15–20% of a property's outgoings of a hotel's overall utilities bill. Hot water wastage is more costly due to associated energy loss. Reducing water loss must not be at the expense of the comfort of guests, unless they specifically agree to certain measures. It has been estimated that the average hotel can reduce its water bill by 40%. The main savings come from managing flushing systems which account for 33% of total water usage, compared to only 3% for drinking or preparing food. The used water may be treated and reused in non-contact areas such as toilet cisterns and gardening (International Tourism Partnership 2007). This is called a grey water recycling system and is quite invisible to the customer. Other savings may be made through rainwater harvesting and self-closing taps, and through adapted shower-heads which reduce water usage while maintaining customer satisfaction.

Control of water consumption is accomplished by assessing current performance through conducting a water use audit which relates the measure of water consumption to the time of year and the hotel's level of business and gives a detailed evaluation of efficiency. The performance is then compared with previous figures for the hotel or those of other hospitality businesses. Comparisons with other hospitality businesses' water consumption, obtained in cubic metres per customer per year by dividing the annual consumption of water by the average number of guests per day for the year, can provide a basis for benchmarking. However, in such comparisons, specific factors affecting consumption, such as indoor laundries and swimming pools must be taken into account. This was found to be the case in a study of water usage in 17 hotels in

Hong Kong (Deng and Burnett 2002). They measured consumption by cubic metres per floor area (m^3/m^2) and found that this varied widely from $2.1\text{m}^3/\text{m}^2$ up to $7.7\text{m}^3/\text{m}^2$. This was largely due to whether or not the hotel had an in-house laundry, the average for the 10 hotels that did so being much higher than those without this facility. They also found that average water usage was highest in five star hotels and lowest in three star properties. Specific action that can be taken includes (International Tourism Partnership 2007):

- Change routines, for example reduce wash/rinse cycle in laundry
- Check regularly for leaks from cisterns, taps, pipes and basins
- Fit water-saving devices or sensors in kitchens, bedrooms and public washrooms

Green marketing

Marketing has been blamed for contributing to environmental damage simply because it produces increased consumption, particularly of raw materials. There has therefore been an increasing emphasis on the social dimension of marketing, often in response to consumer concerns. There is a sense in which customer needs must be viewed holistically over time. Marketing decisions in future will have to take account of ecological factors if sustainable development is to become a reality. Welford (1994: 26) asserts that it is in this functional area (of marketing) that a company's commitment to sustainability will be judged, particularly by the consumer and wider public. Some companies, such as Scandic Hotels, The Body Shop and Tesco, have been proactive, rather than reactive, and this is likely to become a trend.

Gustin and Weaver's (1996) study is one of the few to investigate consumers' perspectives. They found that 73% of respondents considered themselves environmentally minded and 71% were positive about staying in ecofriendly properties. Hence marketing may have to be part of a company's holistic approach to environmental management. Despite consumer pressure relating to the environment, firms will also have to recognize that consumers' wants do not always coincide with the long-term interests of the environment. This challenge can be met, at least in part, by marketing strategies that educate and inform on environmental issues and benefits.

Although some experts stress exclusively the rights and expectations of shareholders (Reinhardt 1999), businesses will

increasingly have to meet the demands of other stakeholders, such as customers, employees and the local community. For this reason, it is necessary to make public part at least of the results of the EA. However, consumers may not always be supportive of green initiatives. Manaktola and Jauhari (2007) studied consumers using hotel services in India and how conscious they were of environmentally friendly practices. They found consumers would prefer to use lodging that follows these practices but were not willing to pay extra for these services. Despite this, there is likely to be an upsurge in green branding. This may be by chains, such as the subtle highlighting of 'eco' in the Grecotel chain's logo (Konopka 1998). Alternatively this may be through awards given by professional bodies (such as the Green Globe scheme) or by local tourism organizations (such as the Scottish Tourist Boards Green Tourism Business Award).

Environmental management issues and trends

Such is the complexity and regional diversity of the global hospitality industry that it is very difficult to identify clear trends (Jones 1999). Indeed the very word 'trends' implies a degree of stability which is rapidly being supplanted by 'complexity' or 'chaos'. Nevertheless, the International Tourism Partnership (2007) is clearly shifting 'environmentalism' into sustainability. It therefore proposes that operators should work with their suppliers to green the supply chain. Part of this is to work much more closely with local suppliers to reduce transport emissions (and costs). Linked to this are links with local people and communities, so that they too benefit from the hotel development. Finally, operators should 'maintain a "sense of place" that supports the geographic character of a place – its environment, culture, heritage, aesthetics, and the well-being of its citizens' (International Tourism Partnership 2007).

Although some people in the hospitality industry take their environmental responsibilities very seriously, others are only willing to act if there is some compulsion. Legislation is being, and will continue to be, used to change the behaviour of businesses. For example, in the UK we have seen legislation on waste disposal, on energy use and on reduction in the use of packaging materials. These have all affected the hospitality industry. Wan Yim King Penny's (2007) study of hotels in Macau revealed that low customer demand, poor environmental knowledge and the lack of governmental regulations enforcing environmental practices are the reasons hindering hoteliers in Macau from practicing green polices. But the major

barrier was that hotel managers do not recognize the importance of environmental management to hotel effectiveness and competitiveness. Consequently, hotels were only interested in improving areas where there are direct financial gains and where there is a fiscal/legislative requirement. A fragmented approach to managing their environmental performance has resulted.

This approach is reactive rather than proactive and does not address the added value of environmental management. Too often, managers adopt a 'cost effective' consideration of compliance, rather than a 'cost-benefit' or 'value added' approach. There is no encouragement either to go beyond strict compliance, or to attempt to influence future legislation. The guidelines suggested by Piasecki et al. (1999) are therefore neither holistic nor entrepreneurial. The language of compliance used by Piasecki is that of the manager seeking only to minimize the costs of this inconvenience without extinguishing a creative approach to other aspects of the business. These weaknesses arise from an unimaginative response to regulation which is perceived purely in terms of cost. By contrast, the entrepreneur, or enlightened senior manager, actively seeks competitive advantages from the creative use of imposed legislation and regulation, and attempts to influence other stakeholders and competitors and to influence future legislation in alignment with the company's environmental investment programme.

Hospitality businesses can only optimize their contribution to global sustainability through local and regional co-operation. Welford (1994: 28–29) advocates the development of environmental networks, including multi-sector networks, amongst small businesses, voluntary organizations and the public sector. As other companies, through promotion, become aware of best practice in this kind of initiative, expanding numbers of such networks will enable controlled and sustainable growth to occur. Rivera's (2004) study in Costa Rica aimed to identify how institutional forces, such as regulatory and stakeholder pressures, are related to proactive environmental behaviour by hotel facilities participating in the Certification for Sustainable Tourism, a voluntary environmental programme established by the Costa Rican government. This programme was among the first third-party performance-based environmental certification initiatives implemented in the developing world. The study suggested that voluntary environmental programmes that include performance-based standards and third-party monitoring may be effective in promoting beyond-compliance environmental behaviour when they are 'complemented by isomorphic

institutional pressures exerted by government environmental monitoring and trade association membership' (Rivera 2004).

The International Tourism Partnership is another example of co-operation within one industry, based on sharing of environmental information and examples of best practice. The World Commission on Environment and Development is an example of an initiative to introduce inter-sectoral and international co-operation. However, to meet the global environmental challenge, there will need to be a meeting of minds, a consensus worldview on the integration of economics and the environment. A fundamentally new paradigm relating to economics and development is difficult for many economists and business experts to accept. However, the 2007 Stern Report clearly demonstrated the economic and business impacts of global warming and the need for positive action, and it may well lead to a fundamental paradigm shift.

Summary and conclusions

Environmental management is concerned with all aspects of the operation, starting with the inputs to the business, the design and management of all processes and the output or waste from the system. Environmental management should start, first with a policy statement and then an audit, to establish current performance. This usually leads to a number of planned and measurable changes, designed to improve performance with regard to energy management, materials and waste, water management and indoor environment.

Although hospitality businesses were fairly slow to get into environmental management, a number of high-profile initiatives have promoted environmental awareness. A number of countries and/or regions have also developed environmental awards or grading schemes as a means of promoting their initiatives. In the future, it is likely that we will see more of these developments, pressured by inter-governmental agreements. However, many companies are at an early stage of development. Initially it is often possible to link environmental management with financial savings. Plans that result in lower consumption of energy or water or reduced costs of waste disposal are relatively easy to sell to the boards of companies. Beyond those changes, others may cost money to implement, with less tangible returns, often based on hard-to-quantify marketing or public relations benefits. This differentiates those companies that only respond to a business case from those that take an ethical stance on environmentalism and sustainability.

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