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Chapter One

Introduction to environmental management

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Learning Outcomes

After studying this chapter, you should be able to:

- explain the field of operation of environmental management
- compare environmental and business management
- depict the role of cross-functional teams (CFTs) in environmental management
- account for the emergence of environmental management
- link corporate social responsibility to environmental management
- differentiate between the different components of environmental management
- discuss the principles and costs that apply to environmental management
- clarify the strategies that apply to environmental management
- outline the impact of human activity on the environment, which can result in degradation.

Overview of this chapter

This chapter provides an overview of the different elements in the range of activities and functions that an organisation has to perform when developing and implementing an environmental management programme. The general picture offered in this chapter depicts, in brief, all the elements of environmental management that are discussed in the following chapters in more detail.

1.1 Introduction

Many people in South Africa live in conditions that are harmful to their health and well-being – even though it is a fundamental right of all South Africans to live in an environment that is not harmful to one's health and well-being. Environmental management should be integrated into all development activities and co-operative environmental governance should be provided for by establishing decision-making principles regarding all matters concerning the environment.¹

¹ NEMA, 1998.

1.2 Defining environmental management

Environmental management can be defined as the way in which businesses deal with environmental aspects.² Environmental aspects are regarded as any element of the activities, products or services of an organisation that interacts with raw materials or resources in the environment. Strydom³ regards the natural world as an environment that comprises numerous natural sources that are available to be used by the manufacturing industry as raw materials. According to Section 1(xi) of the National Environmental Management Act 107 of 1998 (NEMA), the environment can be seen as the immediate and remote surroundings within which individuals and organisations exist. Such surroundings are constituted by the atmosphere, water and land, plus micro-organisms, fauna and flora, as well as any section, combination or interrelationships between these elements, plus the physical, chemical and cultural properties and conditions of any element(s) in this list that may affect human and/or organisational health or well-being. All these elements represent objects that are made of matter with which humans interact on a daily basis and which could affect humans either positively or adversely.⁴ See Chapter 3 of this book for more detail on the nature of the natural world.

To interact with raw materials as resources in industrial processes requires particular ways of dealing with such processes in order to achieve specific objectives. Kolk⁵ maintains that such ways of dealing with elements in the environment requires 'soft' factors within the context of management. Smit⁶ indicates that the mandate of management to humankind is that humans use natural resources in a responsible and orderly manner and as economically as possible. Orderliness within the context of the economic principle applies to human activities, such as planning, doing, developing, implementing or destroying. Humankind must be accountable in meeting its own and societal needs and targets through utilising resources in an orderly fashion. Accountability and stewardship in terms of orderliness in using resources, with due consideration of economic principles, are crucial in all human conduct.

Management represents human endeavours to understand and describe the ways that natural, human, financial and man-made resources should be used to reach specified goals, objectives and targets, while giving full recognition to and applying the economic principle. The application of the economic principle does not imply thriftiness. The economic principle refers to practising economic efficiency. Soft issues that apply to environmental management include commitment, dedication, inspiration, involvement, culture, recognition, leadership and many more. All such elements must be incorporated as integral parts of an organisational environmental management system (EMS).⁷ The best directives for implementing an EMS effectively are to be found in ISO 14000, a series of environmental management standards,

2 Kolk (2000) 3.

3 Strydom (2011) 37.

4 Smit & Esterhuyzen (2014) 139–140.

5 Kolk (2000) 213.

6 Smit (2012) 65.

7 SABS (2009) 2.

published by the International Organization for Standardization (ISO), which provide guidelines for implementing an organisational EMS. Such implementation needs to be based on an environmental management plan and must take place in full consideration of the needs and interests of interested parties (individuals and groups) that may be affected by an EMS.⁸ See Chapter 5 of this book for more detail on environmental management within the framework of the implementation of an organisational EMS.

1.3 Relationship between environmental management and business management

There is a close congruence between business management and environmental management. Business management can be regarded as the orderly and organised utilisation of resources in providing goods and services to customers with due consideration of the economic principle.⁹ The rendering of services and the provision of goods via the co-ordination of work-related activities result from the effective utilisation of human and other resources while implementing the functions of planning, organising, leading and control (POLC-cycle).

- *Planning* implies thinking about the options involved in activities that relate to the achievement of organisational business objectives.
- *Organising* is concerned with structuring people into functional groups and assigning tasks, authority and resources accordingly, in order to realise organisational objectives.
- *Leading* refers to influencing and inspiring employees to realise the success of a business organisation.
- *Control* means applying processes to organise and regulate human and all other resources involved in order to realise organisational objectives.¹⁰

Environmental management and business management differ in terms of functional focus. Environmental management focuses on ways to deal with environmental aspects in order to prevent any adverse environmental impacts. Environmental aspects refer to the involvement of any activities, products or services with any substance or group of substances in the environment. Business management focuses on the orderly utilisation of resources for the purpose of financial gain. Implementing environmental management means that an organisation plans and implements all its activities, products and services in terms of environmental management principles and strategies. In addition, environmental management implies Plan, Do, Check and Act (PDCA-cycle), which enables an organisation to realise its environmental policy objectives and targets.

8 NEMA, ss 11 & 35.

9 Strydom (2011) 24.

10 Strydom (2011) 24–25.

The PDCA-cycle, which was developed by Deming,¹¹ corresponds congruently with the POLC-cycle of business management. Planning provides for thinking through and considering all options related to activities, products and services in preparation for implementing an EMS. Based on such planning the organisation moves to the Do-stage, during which all planned activities are put into practice. The Do-stage involves frequent periods of checking and reviewing to see whether objectives and targets have been achieved. After this stage, the organisation has to act to rectify any non-conformities and to implement preventative action as and when necessary.¹² The ISO 14000 guidelines, developed by the ISO, uses the same approach in the effective implementation of an EMS. The stages outlined by ISO 14000 in implementing an EMS are planning, implementation and operation, checking and management review.¹³

It is clear that there exists great congruence between the systematic approaches of business management, the Deming cycle and the operational stages of ISO 14000.

In the implementation of environmental management, total quality management (TQM) is continuously applied to determine the level of management efficiency. The key elements of environmental management that TQM focuses on are: management approach, continual improvement in advance of legal compliance, elimination of root causes of problems, the involvement of staff and interested parties, and customer satisfaction. The focus of TQM greatly ties in with the formerly mentioned POLC, PDCA and the stages outlined in ISO 14000. The different approaches place different emphases on specific elements of an EMS, but in essence they all operate from similar bases to ensure that the implementation of an EMS greatly resembles the guidelines and requirements set by the ISO with regard to advancing the objectives and targets of environmental management. The approaches of business management, TQM and environmental management are integrated via the application of the Deming PDCA-cycle on a consistent basis, in accordance with continual improvement through expanding the focus and increasing levels of advancement. See Chapter 5 for more information on the application of the PDCA-cycle in environmental management.

1.4 Cross-functional teams

Cross-functional teams (CFTs) provide the best and only integrative approach to effectively managing safety, health and the environment (SHE) in the workplace. Robbins¹⁴ notes that the members of such teams come from almost similar hierarchical levels in an organisation. Such teams are multi-disciplinary in nature, because the members come from different professions or disciplines that convene to produce the best available solution to any SHE challenge in the workplace. Workers from lower levels may also be included, depending on the nature of the challenge. Thompson

11 Deming (1982) 54.

12 Kolk (2000) 107.

13 SABS (2009) 3, 5, 7 & 9.

14 Robbins (2001) 261.

et al¹⁵ indicate that CFTs can play an important part in innovation and change. The members of CFTs can be regarded as belonging to complementary professions on the basis that they all deal with similar challenges concerning, inter alia, SHE in the workplace; however, their approach to challenges will differ in accordance with the focus of their particular discipline. CFTs are purpose driven and do not function beyond the scope of the challenge for which they need to find a solution. Members of a CFT each have their own focus; these foci are complementary to a particular challenge and the solution to such a challenge.

Which professions or disciplines should be included in CFTs for the purpose of effectively developing, managing and sustaining SHE in the workplace? The professions or disciplines which should be included are outlined below.

1.4.1 Line manager

Line managers are responsible for the effectiveness of organisational activities, products and services. This applies in particular to the SHE management of the working and surrounding environments. Line managers have to make the final decisions on the nature of programme elements, implement the programme and evaluate its outcome. Line managers have to engage the expertise of a range of complementary disciplines to ensure that effectiveness and quality of environmental management programmes within an organisation's EMS is achieved and maintained. As previously noted, such expertise is vested in a team of experts, namely a CFT, in which each member functions as an expert within a different field of operation.

1.4.2 Environmental manager

Managing the immediate and adjacent environments in the workplace is an important element of qualitative SHE in an organisation. Environmental specialists contribute to monitoring environmental issues in and around an organisation's facilities; therefore they should be included in CFTs when appropriate and necessary.

1.4.3 Safety practitioner

Safety practitioners are responsible for guarding the quality of safety programmes. They have to facilitate the discussion and decision-making processes. The quality of the outcome of CFTs that meet to enhance SHE in the workplace rests squarely on the shoulders of the safety practitioner. Safety practitioners are also responsible for ensuring that the implementation of an outcome occurs in accordance with the CFT's decisions. Their overall guidance, in which their authority as experts and their creative use of personality (personal traits) play a major role, will determine success.

15 Thompson et al (2005) 560.

1.4.4 Occupational health expert

Occupational health experts, including health practitioners and nurses, are renowned for their preventative approach to possible harmful effects of work and working conditions on workers.¹⁶ The main issues that occupational health experts address are: ensuring that people are placed in suitable work; performing biological monitoring and health surveillance, in accordance with applicable legislation; monitoring the health quality of the work environment; health counselling and health education; delivering occupational health services; and keeping health records and performing health liaison in connection with health services external to an organisation.¹⁷ Occupational health experts play an important role in monitoring the effects of the immediate and remote environments on the health and well-being of organisational workers and on the community at large. It is important to remember that certain legal functions pertaining to SHE can only be performed by occupational health personnel. Their input and knowledge that relate to pre- and post-medical examinations, medical surveillance, injury reviews, personal protective equipment (PPE), etc are indispensable when it comes to safety risk assessment, incident analyses and solutions that result from their input.

1.4.5 Ergonomics expert

An ergonomic expert is an important partner in CFTs which focus on the health and safety of the work environment. Ergonomics focuses on the human-machine interface, which includes four elements: the environment, the machine (eg equipment), the capabilities of the person and the interaction (interface) between the person and the machine. Stranks¹⁸ provides a fairly extensive picture of the responsibilities of an ergonomics expert towards the SHE of the immediate working and the adjacent environments. The design of workplaces plays an important role in this regard. Elements such as illumination, ventilation and manual handling are addressed by ergonomics experts. The focus is mainly on the people, the work environment, the human-machine interface and the total working system.

1.4.6 Engineer

Engineers play a very important role in most industries. Their knowledge and expertise is of particular interest to environmental management, because the basis of handling all substances is to be found in the physical and chemical nature (structure and functioning) of things. Engineering for safety primarily focuses on work equipment, which includes machinery and materials, the overall work environment (buildings, plants and mines) as well as the general living environment.¹⁹ Engineers are most knowledgeable about the SHE risks associated with the design of machinery and equipment, with the aim of limiting energy

16 Stranks (2012) 185.

17 Stranks (2012) 185–187.

18 Stranks (2012) 142–162.

19 Stranks (2012) 229–238.

release at the source. This can be significantly prevented via the appropriate design of equipment and handling processes.

1.4.7 Human resources manager

The human resources manager, who to a great extent relies on business psychology, has an important role to play as a member of a CFT. Factors such as selection and placement of employees, understanding human needs and human behaviour, performance appraisal and conducting surveys among workers are some of the important fields of work that human resources can address. Making decisions about human behaviour in order to enhance SHE practices in the workplace via effective environmental management is where the human resource manager can be most helpful as a member of a CFT.

1.4.8 Financial manager

Very few, if any, decisions on developing and sustaining effective SHE practices in the workplace and environment are without financial implications. The introduction of any new form of improvement or innovation requires some level of financial expenditure. No CFT can function effectively without the input of the financial manager or a representative. Any change in machinery, equipment, work procedures or, for example, the release of dangerous substance(s) goes hand-in-hand with financial requirements. Decisions of this kind must have the backing of a person from the finance department as part of the CFT.

1.4.9 Enterprise safety risk manager

Enterprise safety risk management focuses on the financial safety risk that an organisation incurs in operating its basic business activities, products and services. Like other complementary professions or disciplines in an organisation, environmental management has an important role to play in minimising the possible financial losses associated with SHE practices. Developing, implementing and sustaining an EMS effectively will ensure consistent qualitative SHE in the workplace and surroundings, with due prevention of unnecessary organisational enterprise safety risk. Enterprise safety risk management relies greatly on the quality of an organisation's EMS with the aim of minimising financial loss. As a member of the CFT, the input of enterprise safety risk managers can be of great significance when, for example, determining and monitoring the financial implications of the application of a new smoke emission system in a manufacturing plant. In this regard, the enterprise risk manager performs a corporate risk management function.²⁰

20 Valsamakis et al (1992) 80.

1.4.10 Maintenance department staff

The maintenance department of an organisation can provide important input with regard to the SHE in the workplace. Maintenance staff provide information on the probability of the performance of hardware; this is essential for making decisions on the functional integrity of machines and equipment. Maintenance records of machines and equipment provide important information for making decisions on hardware related to SHE in the workplace and surrounding environment. Stranks²¹ lists particular fields within which maintenance staff can deliver important contributions where environmental management is concerned, namely: mechanical, chemical, electrical, physical, pressure, structural and access.

1.4.11 Training department staff

Innovation or changes pertaining to SHE issues in the workplace frequently require workers to increase their level of competence. SHE training has to be innovative in accommodating requirements in this regard. Being a member of a CFT provides the opportunity to take note of requirements that flow from innovation and to validate the current quality of training when necessary. Goetsch and Davis²² emphasise the importance of regular training and re-training to ensure that workers sustain their competence in dealing with environmental risks. The CFT creates the context with regard to knowledge and competence about which workers and the community need to be kept informed.

1.4.12 Fauna, flora and marine expert

Experts in these fields assist environmental managers to take ownership and accountability of potential and actual environmental impacts on the environment. The input of these experts assists an organisation in caring for all life in, among others, the animal world, the vegetation and the marine environment.

1.4.13 Water, air and soil expert

Experts who specialise in the prevention or minimisation of damage to water, air and soil assist organisations in implementing an EMS that will prevent or minimise damage to such elements of human, plant and animal life.

1.4.14 Expert in the general psychological and social well-being of humans

It is important that all industries, as far as possible, abstain from harming human functioning in any respect, including psychological and physical harm. Adverse impacts on the environment can also negatively impact on human functioning. Specialists of all kinds in human well-being need to be part of CFTs to assist organisations to implement an EMS in such a way that it results in as little harm to humans as possible.

²¹ Stranks (2012) 276.

²² Goetsch & Davis (2001) 194–196.

1.4.15 Quality management

Cross-functional teams offer organisations opportunities to learn from many other fields of specialisation that play a role in environmental management. Quality management refers to functions of inspection, quality control and quality assurance.²³ In essence, quality management implies performing the functions and associated activities of planning and control. Within the context of participating in a CFT for the purpose of ensuring an acceptable quality of environmental management, quality management focuses on the effectiveness of dealing with significant environmental aspects and the prevention and/or control of environmental impacts.

1.4.16 Special services

Although not frequently required, environmental management may need the input of one or more special services offered by a particular company, profession or contractor. Enhancing environmental well-being may, for example, require the expert advice of, for example, the legal profession; a contractor, who is a specialist in rendering a particular service, such as implementing behaviour-based safety; a fire-fighting department; or a company that provides an information service on handling hazardous substances. A service provider that specialises in the provision of personal protective equipment is often included as a member of a CFT because the need to safeguard workers frequently produces challenges pertaining to SHE.

It must be clearly understood that an organisation does not necessarily need the input of the entire range of complementary disciplines all at once. Needs could fluctuate. There are also many more complementary disciplines that are not listed in this chapter. This list serves as a basis of complementary disciplines that could apply. The composition of a CFT depends on the need for specific expert advice; this is determined by the nature of the environmental aspects and related environmental impacts associated with a particular organisation.

1.5 Environmental management – emergence

Section 24(a) of the Constitution of the Republic of South Africa, 1996 (the Constitution) indicates that 'everyone has the right to an environment that is not harmful to their health or well-being'. There are a number of environmental conditions that are currently posing environmental safety risks to the health and well-being of humans and all other living organisms, including ecosystems. Issues such as global warming, ozone depletion, disastrous weather patterns, urbanisation, as well as water, air and soil pollution require that environmental management receives high priority in order to prevent irreversible damage to the global environment. Business organisations are increasingly taking action to prevent environmental degradation through implementation of an EMS in accordance with international, national and local environmental legislation.

²³ Krüger & Steenkamp (2008) 157 & 161.

It is important to note that environmental legislation is of vital importance in promoting environmental sustainability, both as a source of guidance and of enforcement.²⁴ The Constitution provides the overarching legislative foundation for all environmental management in South Africa, with NEMA as the primary environmental framework Act. Specific environmental management Acts (SEMAs), such as the National Environmental Management: Air Quality Act 39 of 2004 and the National Environmental Management: Waste Act 59 of 2008, are linked to NEMA. Further chapters will look at some of the SEMAs in more detail.

1.6 Environmental management and corporate social responsibility

Environmental management should be utilised to ensure sustainable development. Sustainable development, according to NEMA, refers to the integration of social, economic and environmental factors into the planning, implementation and decision making of a business in order to ensure that development that is undertaken will serve not only the present generation but also future generations. As development might have an effect on the environment, it is only fair that such impacts be deliberated with the people who might be affected.

When assessing the environmental impact of any application for environmental authorisation, all potential interested and affected parties should be given the opportunity to raise their concerns and make comments on any issues relevant to such an application. This public participation process is described in NEMA. Furthermore, interested and affected parties are described in NEMA as including:

any person, group of persons or organisation interested in or affected by such operation activity; and

any organ of state that may have jurisdiction over any aspect of the operation or activity.

All businesses need to have customers to buy their products or make use of their services – no business can function in isolation. Therefore, businesses have a responsibility to take any social impact of their business activities into consideration. As much emphasis is given to environmental issues on a global scale, businesses need to revise their policies to include environmental aspects if they want to ensure a competitive advantage and sustainable development. Policies might include engaging with the community in order to improve the environment in terms of air, water and soil; producing eco-friendly goods; and taking responsibility for products from 'cradle to grave'. Corporate social responsibility and sustainable development will be discussed in more detail in later chapters.

²⁴ Environmental Legislation and Policies (2015) 1.

1.7 Components of the environment

The environment comprises three main components, namely the natural environment, the built environment and the social environment. The natural world consists of all physical and chemical substances, all forms of life, as well as all ecological processes and interactions between any one or more of the preceding elements. The built environment, which is man-made, is made up of physical structures and infrastructures, while the social environment consists of socio-cultural structures and processes, as well as the community and product safety and health. Although the three components exist within clearly differentiated structures, they function on a continuous integrated basis.



Figure 1.1: Components of the environment

NEMA depicts the environment as the total surroundings within which the human race exists. Such surroundings are made up of all physical structures and infrastructure, all forms of life and processes of ecological existence, plus the total sphere of human social expressions.

1.7.1 The natural environment

People live in a vast and intriguing environment that is constantly changing and comprises thousands of things. All things, also called objects, can be classified as either observable or non-observable. Observable things can be seen or experienced by humans. Non-observable things cannot be seen or experienced by humans.

All things have substance, whether they are observable or non-observable. Substances (things or objects) that are made of matter can make contact with one another; such substances have contact ability. Only things that are made of matter can interact with one another. A thing, substance or object that can make contact and interact with other objects has the potential to harm people and damage property and the physical environment. Anything that has the potential to harm or damage is a safety hazard. A safety hazard can be defined as any substance that has the potential to pose harm or damage to something or someone else.

Safety hazards create safety risks during the mutual interaction between one or more safety hazards in the environment. Such safety risks can cause harm to people

or damage to property or the environment. It is during the interaction of and dealing with objects (as safety hazards) that organisations create environmental aspects. Such environmental aspects can result in environmental impacts, which are observable in adverse or positive effects on the environment. It can be concluded that all substances are potential environmental safety hazards because of their ability to be instrumental in creating environmental aspects and environmental impacts. See Chapter 3 of this book for a detailed discussion of the natural world.

1.7.2 *The built environment*

The environment of an organisation comprises two distinguishable groups of things, namely things that are made by people and things that are not made by people. Although things that are not made by people have a natural origin, such things are also substances, made of matter, and are inclined to make contact and interact with other natural and man-made substances in the environment. Such interaction also generates safety risks. The built environment includes all structures, processes and practices humans create to advance their quality of life. In many instances such creations endanger the many elements and systems in the natural world. Examples include the pollution of air, water and soil, deforestation, the destruction of ecological systems, the production of excessive waste and the extinction of species of fauna and flora.

Organisations need to consider all elements within the natural world when implementing an environmental management programme. The main focus must always be on environmental conservation, with as little damage as possible to the natural world. Preventing damage and, if any damage occurs, sustaining the status quo with the purpose of rectification, if possible, must be the essential endeavour in the total process. Organisations need to understand that all elements of the components of the environment are always in some way in consistent reciprocal interaction; organisations should therefore apply an integrated approach when they implement environmental management policies.

1.7.3 *The social environment*

Humans form an important part of an organisation's external and internal environment. All the needs of human parties who may have interests or could be affected by any part of an environmental programme must be considered. The total well-being of the surrounding human environment in both immediate and remote contexts has to be considered with reference to safety, security, physical and mental health, as well as social and cultural issues, and more. All the components of the external environment of an organisation are consistently in interaction with and have a mutual effect on each other. An integrative approach to considering the needs and interests of the natural world, the man-made world and the social environment is essential in implementing an environmental management programme.

1.8 Principles of environmental management and environmental costs

Any economy needs resources in order to be sustainable. Such resources are assets that are used to produce goods and render services to meet the needs and wants of humans. As these resources are scarce (limited amounts are available) they need to be properly managed in order to fulfil the wants and needs of society, but also in such a way as to ensure that future generations will also be able to use them.

Common goods comprise all resources that are found in nature such as land, water, plants, animals and air. In many instances humans do not pay for these resources; therefore, nature can be used and misused for economic and/or social reasons without remuneration. Humans are causing irreparable damage to natural resources by irresponsibly using too many resources and polluting resources. Population growth, pressure on water supplies and an ever-increasing demand for energy all lead to global environmental issues.

1.8.1 *Principles of environmental management*

Specific principles guide and direct the development and implementation of an environmental management programme.²⁵ The principles cover a wide range of elements. The following list provides a summary of the most significant principles.

- Everybody has the right to an environment that is in all respects safe with regard to one's health and general well-being.
- Environmental conservation is the primary focus with an emphasis on the prevention of pollution and, where damage has already occurred, limiting or reversing the damage, if possible.
- Any organisation that implements an environmental management programme is held responsible for all the effects of the programme for as long as the programme runs. Such 'cradle to grave' responsibility goes hand-in-hand with the rule that the 'polluter pays' for all adverse effects that may flow from the programme of such a polluter (these two concepts will be described in more detail in Chapter 6).
- The responsibilities for conservation and for the prevention of pollution differ between developed and developing countries. Developed countries contribute more to global environmental degradation as a result of industrialisation.
- The main focus of all environmental management is to serve all humans, as well as their values and needs, equitably.
- The outcomes and developments of environmental management must be socially, environmentally and economically sustainable, with due reference to the conservation of ecosystems, prevention of pollution, waste management, prevention of disturbance to landscapes, the use and exploitation of non-renewable resources and protection of the environmental rights of humans.

²⁵ NEMA, Chapter 1.

- Environmental education, sharing knowledge and experience, as well as raising environmental awareness and other appropriate means must be used to advance community well-being.
- All decisions concerning environmental management must be open and transparent. All parties who have an interest in or who may be affected by an environmental programme must be duly consulted.
- Environmental managers must fully recognise and implement an integrative approach, acknowledging that all the elements of the environment are reciprocally linked and integrated.
- Environmental policies, legislation and action with regard to environmental management must be harmonised and co-ordinated via intergovernmental co-operation, in accordance with local, national and international requirements and standards.

1.8.2 Environmental costs

Environmental costs comprise a wide range of environmental management activities. Such costs range from cleaning up land that has been contaminated to installing solar power to supply energy to a business. Kolk²⁶ identifies four environmental costs:

- *Costs that are not directly or legally the responsibility of the business.* Such costs include environmental impacts due to, for example, carbon dioxide emissions from burning coal in a steam engine when delivering goods to industry.
- *Costs due to compliance with environmental legislative requirements.* These include costs for waste disposal, costs associated with pollution prevention and fines for non-compliance.
- *Costs related to the implementation of environmental measures.* Costs related to innovation to produce and market green products are included in the costs related to environmental measures.
- *All costs that are related to environmental management in a business.* These include costs for water, energy, fuel and raw materials. By reducing these costs owing to a reduction in usage, businesses often also reduce their impact on the environment.

1.9 Environmental management strategies

Implementing environmental management occurs with full recognition of three specific strategies, outlined by Kolk:²⁷

26 Kolk (2000) 156–157.

27 Kolk (2000) 78–82.

1.9.1 Outside-in strategy

Factors external to an organisation affect the implementation of an environmental plan. This requires that an organisation clearly formulates a strategy to accommodate such factors and the effects they could have on the internal operations of the organisation. Specific issues need to be considered in the outside-in strategy:

- The nature and quality of the competition offered by external competitors need to be identified and analysed in the context of an organisation's own strategies and activities aimed at achieving its environmental objectives and targets.
- A thorough survey needs to be conducted in order to identify the total number of competitors and the nature of the opposition that they offer; this gives an idea of numbers, size, markets and market positions. All of these issues need to be fully considered when drawing up an environmental management strategy.
- An analysis of the nature and characteristics of products and types of markets must be carried out in order for an organisation to develop a competitive strategy for its own products and to achieve a competitive edge in the market place. Issues that are of importance in this regard are mass, fragmented or segmented markets, or local, regional, national or global markets, etc.

Performing an outside-in strategy will enable an organisation to counteract outside-in effects on the development and implementation of its own environmental management plan.

1.9.2 Inside-in strategy

Developing a competitive strategy requires that an organisation determines the availability of staff, skills, resources and appropriate organisational arrangements. An audit on financial, tangible and intangible assets needs to be conducted. Issues to be clarified are staff expertise and know-how, patents, buildings, equipment and more, with a view to ascertain and define firm-specific advantages. The need for and nature of co-ordination on an internal basis, as well as with complementary external resources, has to be established in order to design effective vertical integration in operation processes. An inside-in strategy also applies to an organisation which has branches at different locations.

Clarity on an inside-in strategy leads to efficiency in tackling environmental management issues at various levels and locations, if applicable, within an organisation.

1.9.3 Inside-out strategy

This strategy depicts the structure and functioning of the external networks within which an organisation operates. The inside-out strategy clarifies the position the organisation occupies and the influences it exercises within networks. Interaction within a network focuses on the allocation of values and on exchanging goods, technology and capital. The strength of an inside-out strategy sets the need for and emphasises external dependency and bargaining relations in order to enhance competition in general. The potential of control over product chains, which influence the expansion of environmental practices, flows from dependency relations. The effectiveness of an inside-out strategy, in which the strength of internal characteristics is mobilised, plays an important role in achieving core positions to influence the effectiveness of integrated environmental management.

It is therefore clear that an organisation has to develop these three environmental strategies to ensure that it focuses on the fundamental issues that determine the success of its environmental management plan.

1.10 End result – the impact of human activity

Humans cannot be separated from the environment; they live in the environment, utilise natural resources and cause most of the environmental issues. Owing to the inconsistency of humans, they have a tendency to misuse limited natural resources. Human impacts on natural resources (the environment) include two key factors:

- the number of people using the natural resources
- the rate at which the natural resources are used.

Human activities impacting on the environment include:

- *Urbanisation*: Large areas of nature are utilised for urban areas – think of big cities such as Johannesburg, Pretoria and Cape Town. Such urban areas use vast amounts of natural resources and in the process generate vast amounts of waste. People usually have a limited knowledge of environmental issues and their impact.
- *Economic activities*: All economic sectors have an impact on the environment – unfortunately mostly negative. Such sectors include mining, retail, manufacturing, communication and tourism.
- *Public sector*: The government, both national and local, contributes to pollution. Population data should form a critical part when planning for development as population growth leads to an increase in environmental impact. Furthermore, people should be involved (through public participation, etc) and empowered in environmental management. Legislation with regard to environmental issues should be encompassing and should be enforced. Environmental management should be a priority with government: nationally as well as locally.

1.11 Conclusion

This chapter indicates that environmental management has a wide field of operation. It includes a spectrum of planning and activities that focuses on protecting the human environment from adverse effects that could flow from natural happenings and in particular from human endeavours and activities. It is quite clear that environmental management has a significant role to play in promoting environmental conservation, thereby preventing irreparable damage to the environment.

Review questions

1. What would you include in your definition of environmental management? List the main elements.
2. In what ways are environmental management and business management alike?
3. List the possible members of a cross-functional team for environmental management.
4. Explain how environmental management emerged.
5. Describe the components of an environmental management programme.
6. Describe the strategies of an environmental management programme.
7. List 10 principles of environmental management; explain only five.
8. List the various environmental costs which may be incurred.
9. Briefly explain the impact of human activity on the environment.
10. How does corporate social responsibility tie in with environmental management?

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Chapter Two

Sustainability and triple bottom line

JH Wynand Louw

Learning Outcomes

After studying this chapter, you should be able to:

- understand and explain the importance of the King reports
- differentiate between the issues covered in the King II and King III reports
- explain the important concepts of the triple bottom line and the triple context
- discuss the Global Reporting Initiative guidelines
- be conversant in the principles of sustainability
- clarify ethics in South Africa.

Overview of this chapter

Chapter 2 focuses on sustainability and the triple bottom line. The King I, II and III reports are discussed and the key differences between the King II and III reports are highlighted. Ethics in South African businesses is briefly discussed, alongside sustainability and the Global Reporting Initiative (GRI).

2.1 Introduction

Environmental problems require flexible and transparent decision making that incorporates diversity of knowledge and values.

In the macro business environment, stakeholder participation in environmental decision making has been increasingly embedded in national and international policy. In order to incorporate the ideals of the King III recommendations, a more participatory process is required with all the relevant role players. This may seem risky, but there is evidence that if management designs this well, these risks may be well worth taking.

For many years, corporate management abdicated its responsibilities towards environmental issues raised by activists and scientists. Businesses focused only on making profits, irrespective of the cost to the environment and the safety of people. As a result, environmental resources were overexploited for many years.

The management of the environment was seen as non-critical and did not have a high priority in the strategic plans of companies. Environmental issues were viewed as a necessary evil that ate into company profits.

In the past, the sustainability of a business was only measured in terms of its financial results. Managers and shareholders wanted greater profits and higher dividends. If these were not delivered, shareholders moved their investments elsewhere.

During the Industrial Revolution, the need for environmental protection was not taken into account. All that mattered was the economic interests of companies whose aim was economic progress and economic development at any cost and the elaborate use of resources. Companies and governments transformed the environment into an economic competition between the industrialised nations.

In the 1990s environmental issues began to play an increasingly important role in organisational activities. In South Africa this became evident with the introduction of the King I, II, and III reports, especially with regard to public companies. Other businesses had to follow suit in order to be competitive and to be seen as ethically responsible entities.

A number of tools were created by companies to monitor and improve their environmental performance. Examples of tools of analysis and control are the environmental management systems (EMS) and environmental audits used by many governments and companies across the world.

2.2 The King reports

2.2.1 King I report

The first King report on corporate governance (King I) was published in 1994. This report was the first corporate governance code for South Africa. King I established recommended standards of conduct for boards and directors of listed companies, banks and certain state-owned enterprises. It included not only financial and regulatory aspects but also advocated an integrated approach that involved all stakeholders.

2.2.2 King II report

King II included new sections on sustainability, the role of corporate boards and risk management. This revised code of governance became applicable from March 2002.

In addition to the types of organisations listed in King I, the code of governance became applicable to state departments and national, provincial or local government administration falling under the Local Government: Municipal Finance Management Act (MFMA). The code was also applicable to public institutions or functionaries exercising a power or performing a function in terms of the Constitution, or exercising a public power or performing a public function in terms of any legislation, but excluded courts or judicial officers. King II encouraged all companies to adopt the applicable principles from the revised code.

2.2.3 King III report

This report, released in September 2009, recommended that organisations produce an integrated report in place of an annual financial report and a separate sustainability report, and that companies create sustainability reports according to the Global Reporting Initiative's (GRI) Sustainability Reporting Guidelines.

Companies in South Africa now have a framework for reporting to help them achieve good governance in the context of the King I, II and III reports. It is premised on the philosophy that governance in any context must reflect the value system of the society in which it is based and operates.

The creators of the King I, II and III reports were mindful of the need to create a uniquely South African business culture, different from that embraced by American or European businesses. The reports incorporate the African value system that emphasises:

- collective over individual good
- principles of mutual interdependence and co-existence
- a spirit of humanity, in which individuals are entitled to respect
- a hierarchical political ideology, based on an inclusive system of consultation at various levels
- a preference for consensus over dissension
- a mentality of inherent trust and belief in the fairness of human beings.

The reports require a shift in organisational emphasis from a decision-making hierarchy to more consultative and consensus-based techniques. By recognising the existence of an Afrocentric view on corporate governance, the King reports aim to bring on board those people who previously felt excluded or alienated by the Eurocentric character of corporate governance in South Africa, regarding it as an attempt to impose European value systems on Africa.

The King II and III reports advocate that corporate governance is essentially about effective leadership. The philosophy of the King III report revolves around leadership, sustainability and corporate citizenship.

The King III philosophy of leadership, sustainability and corporate citizenship is outlined below:¹

- *Good governance is essentially about effective leadership.* Leaders should rise to the challenges of modern governance. Such leadership is characterised by the ethical values of responsibility, accountability, fairness and transparency and is based on moral duties that find expression in the concept of ubuntu. Responsible leaders direct company strategies and operations with a view to achieving sustainable economic, social and environmental performance.

¹ IoDSA (2009b).

- *Sustainability is the primary moral and economic imperative of the 21st century.* It is a source of both opportunities and risks for businesses. Nature, society and business are interconnected in complex ways that should be understood by decision makers. Most importantly, current incremental changes in sustainability are not sufficient – a fundamental shift in the way companies and directors act and organise themselves is needed.
- *The concept of corporate citizenship* flows from the fact that the company is a person and should operate in a sustainable manner. Sustainability considerations are rooted in the South African Constitution, which is the basic social contract that South Africans have entered into. The Constitution imposes responsibilities upon individuals and juristic persons for the realisation of the most fundamental rights.

'It is leadership for efficiency in order for companies to compete effectively in the global economy for probity, because investors require confidence, that management of a company will behave honestly and with integrity towards the owners of the company's capital, and leadership with responsibility as companies are increasingly called upon to address legitimate social welfare concerns relating to their activities.'²

2.2.4 Key differences between King II and King III reports

Table 2.1: Key differences between King II and King III reports³

Area	King II	King III
Alternative dispute resolution (ADR)	This is not dealt with in King II.	In recognition of the fact that litigation is not always in the best interests of the company (it is often costly, may take years to finalise and does not always lead to the best outcome), the practice of ADR has been introduced as part of the board's overall duty to act in the best interests of the company. Its intended purpose is to ensure the effective, efficient and expeditious resolution of disputes through mediation.

² IoDSA (2009b).

³ Hendrikse & Hefer-Hendrikse (2012).

Area	King II	King III
Application of the code	Applies to 'affected companies' (those listed on the JSE, banks, financial and insurance entities and state-owned enterprises). It is an aspirational code for other companies	Applies to all companies, regardless of their size or structure. Like its predecessor, King III sets aspirational best practice corporate governance standards for these companies.
Audit committee	The board should appoint an audit committee.	In terms of the 2008 Companies Act, shareholders of the company in the general meeting must appoint an audit committee. King III largely mirrors the provisions of the Act concerning the criteria for audit committee members, as well as the significantly increased scope of the audit committee's duties. Under the Act, the audit committee has a statutory role, as well as a number of additional responsibilities which King III recommends be vested with this committee (eg the review of a company's integrated reporting).

In South Africa, the King III report encouraged an era of accountability and responsibility for all role players in the various industries by expecting companies to report not only on their financial well-being but also on that of all the stakeholders and the environment. Companies listed on the JSE had to become more environmentally responsible in order to continue attracting investors. As investors have become increasingly aware of environmental issues, they want to invest in companies which are perceived as ethical.

King III follows an inclusive approach towards stakeholders, in which the legitimate interests of stakeholders (employees, suppliers, customers, regulators, environment, community, etc) are recognised over and above the interests of the shareholders, in a manner that benefits the long-term sustainability of an entity.

Implications: the board should identify important stakeholder groupings and management will have to engage with them to ascertain their legitimate expectations.

Judge Mervin King introduced the principle of the triple bottom line into the South African corporate environment, thereby changing the responsibility landscape not only of South Africa but also of other parts of the world. Multinational companies that do business in South Africa also have to comply with these new requirements.

2.3 Triple bottom line (TBL) versus triple context

The term triple bottom line (TBL or 3BL) was coined by John Elkington in 1994 and discussed in 2009 in an article in the *Economist*.⁴ Since then many authors have used this term in relation to companies and their social and environmental responsibilities.

After King II, people started to refer to the triple bottom line in company-reporting requirements. However, King III no longer refers to the triple bottom line but rather to the triple context.⁵

There is now an understanding that financial factors impact on non-financial factors and vice versa, although it is perhaps not appropriate to use the term non-financial as all factors eventually have an effect on the long-term financial performance of a company.

After the release of the King II report in 2002, investors evaluated potential investment options by looking at whether a company was making a profit and what the prospects were of it continuing to do so. Over the last two decades, investors have realised that making money and being a sustainable business require more than just focusing solely on the financial bottom line. This led to the development of the notion of a triple bottom-line, made popular in the King II report.

The triple context referred to in King III recognises that a 'bottom line' should not solely reflect the economic return on investment of a business. Other aspects dealing with issues of environmental sustainability and social capital, ranging from product responsibility and labour practices to community upliftment, should also be included. The triple context is underpinned by three objectives:

- economic prosperity
- environmental sustainability
- social responsibility.

⁴ Elkington (1997).

⁵ IoDSA (2012).

The ability of a business to continue in a sustainable manner will result from a positive and balanced return on the triple context of capital: economic, environmental and social.

The process of identifying, assessing and reporting on a company's business activities in terms of its economic prosperity, environmental sustainability and impact on society can be defined as the triple context.

This will impact on the core values of a company and all its activities. Reporting in terms of the triple context focuses not only on the financial returns to shareholders but also on the non-financial returns. The triple context can be viewed in two ways:

- a reporting device in annual reports
- a tool in decision making and reporting to explain the implications of decisions of management.

Annual reports no longer focus only on the financial aspects of reporting. Companies are now measured by the triple context disclosure of information. When using the triple context effectively in the annual report of the company, it can serve as an effective tool to:

- promote a company
- market its goods and services
- attract high-calibre employees
- explain the reasons for the existence of a company.

Corporate success is now measured against a company's performance in terms of the triple context, which created new rules for businesses.

The new generation of business leaders need to incorporate triple context reporting into their vision and mission statements, as well as into the daily activities of the company. This also needs to filter through to the empowerment of its staff.

The performance indicators of the Global Reporting Initiative (GRI) Guidelines, both qualitative and quantitative, need to be at the core of a sustainability report. The sustainability report covers three categories, namely the economic, environmental and social dimensions of the sustainability of a company's actions.

Each of these triple context categories have certain core indicators and additional indicators that management should identify:

- *Economic prosperity:* The main focus of this section is concerned with an organisation's impact on the economic resources of its stakeholders and with economic systems at local, national and global levels. Economic prosperity refers to the profit-making business of a company, which is after all the main reason for a company's existence.

- *Environmental sustainability*: This covers an organisation's impact on living and non-living natural systems, including land, air and water, and eco-systems. It also covers the environmental impact of a company's:
 - products and services
 - use of materials
 - water usage
 - energy usage
 - greenhouse gases and other emissions
 - effluents and waste generation
 - recycling policy
 - waste reduction methods
 - possible impact on biodiversity
 - use of hazardous materials
 - other environmental programmes
 - environmental expenditures.

Environmental responsibility also includes health and safety issues.

- *Social responsibility*: This can be grouped into three main clusters:
 - labour practices, ie diversity, employee health and safety
 - human rights, ie child labour and compliance issues
 - broader social issues, ie bribery, corruption and community relations.

Social responsibility relates to the different expectations of a diverse group of internal and external stakeholders – shareholders, employees, customers, suppliers and community and other interest groups that comprise civil society.

Triple context reporting enhances accountability, sustainability and governance of organisations in South Africa. Reporting in terms of the triple context 'forces' management to rethink their responsibilities and interactions with the following:⁶

- *Governance*: A company board (or board of directors) responsible for corporate governance needs to shift its thinking in order to become more inclusive. This can be accomplished by developing dialogues with a diverse range of stakeholders.
- *Values*: There is a need to shift from focusing on the 'hard' value of profitability to the 'soft' values of integrity, community trust, respect for employees and sustainability. Many of these factors cannot be measured against direct financial returns. There should be a steady growth in these factors that can be ascribed to the values of an organisation and its employees.
- *Markets*: Organisations need to follow more sustainable business practices, and in such a way gain a competitive advantage. Operating in an environmentally

⁶ IoDSA (2009b).

responsible manner will also have an impact on an organisation's markets. If its market is business to business, it will have to ensure that its customers also comply with triple context reporting requirements.

- *Life cycle*: Organisations need to shift their focus from product to function and the inclusion of the impact and behaviour of suppliers. This places a big responsibility on supply chain managers to ensure that their own company is not negatively affected by their suppliers, for example by the use of child labour.
- *Transparency*: Organisations have to shift towards a transparent reporting structure in their reporting to the public and the authorities. Greater transparency is required due to shareholder and public pressure for the 'right to know'. Organisations also have increased reporting requirements owing to compliance legislation implemented by the government. A lack of transparency in reporting runs the risk of involuntary disclosure by a globalised media.
- *Partnerships*: Organisations need to move to new symbiotic partnerships to help detect change, foresee problems and achieve results. Through engagement with a range of non-governmental organisations and environmental groups, organisations are more able to discern changing public concerns. Many organisations have formed partnerships with groups that will complement the organisation's philosophy and values.
- *Time*: Increasing demands are made and more events happen in one minute than ever before. Sustainable development therefore requires a mind shift about time. Organisations need to remember that time is longer than it appears as environmental change occurs over a geological time scale.

2.4 Sustainability principles

The Brundtland Commission's report of 1987, commissioned by the United Nations in 1983 to investigate the concept of sustainable development, developed the following definition, still widely used today: 'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'⁷

There is increased emphasis on sustainability and its inseparable interface with strategy and control. King III calls for integrated reporting (reporting of financial information, together with sustainability issues of the social, economic and environmental impacts of a company) and recommends that a company's audit committee engage an external assurance provider to provide assurance over the material aspects of the sustainability reporting in the integrated report.

⁷ United Nations (1987) 41.

Implications: The skills set of an audit committee will have to include member(s) proficient in sustainability issues.

Furthermore, integrated reporting may require registered auditors and assurance providers who can provide assurance on both the financial components and the sustainability issues covered in a report. This is likely to have an impact in terms of the engagement of an external auditor, the associated costs and director liability in the event of misrepresentation.

A board has the following responsibilities:

- institute controls to ensure the integrity of the integrated report (the report should be prepared annually, cover financial and sustainability performance in sufficient detail, focus on substance over form, and describe how the company made its profits)
- comment on the company's financial results
- disclose if the company is a going concern
- convey the positive and negative impact of operations and how these will be improved in the following year
- delegate the oversight, reporting and evaluation of a company's sustainability performance to the audit committee (who should ensure that sustainability reporting and disclosure are independently assured).

The 'bottom line' for any business is making profit – this is essential – but sustainable development must start from within. The financial well-being of a business is portrayed in its financial statements and annual reports; these reports are often presented as a reference when seeking new contracts.

However, the world at large is now seeking more environmental commitment from business by demanding sound reporting, which not only discloses a company's financial status, but also its commitment to the environment.

2.5 Ethics and companies in South Africa

The King III report, published in 2009, stipulates that organisations have to consult with all stakeholders and interest groups with regard to policies, activities, products and services, with specific reference to the environment and the communities in which they operate.

Organisations are legally required to report to shareholders on a regular basis about their activities.⁸ Additionally, management is also responsible for consulting with its health and safety committee on preparing and reviewing policies, plans and documents that relate to all organisational activities.⁹

8 Mine Health and Safety Act, s 2.

9 Mine Health and Safety Act, ss 8 & 11.

The extensive nature of the natural environment demands that organisations must engage all other interested parties in developing and implementing an environmental management system to effectively deal with environmental challenges. An explicit objective and directive of the National Environmental Management Act (NEMA) is to 'ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment'.¹⁰ Directives such as these lay the basis for organisational transparency with regard to developing and implementing an environmental management programme.

The International Standard ISO 14001:2004¹¹ requires every organisation involved in activities that relate to production and service delivery to establish and implement an environmental policy within the framework of an environmental management system (EMS).¹² See Chapter 5 for details on the development and implementation of an extensive EMS, which deals with different types of environmental hazards and environmental aspects.

In addition to the International Standard ISO 14001, companies in South Africa must comply with environmental management directives specified in NEMA. This will be discussed in more detail in Chapter 9.

2.6 Conclusion

In this chapter the importance of sustainability was discussed and the concepts of the triple bottom line and the triple context were introduced. Both the King II and King III reports highlight these concepts and what they mean for South African businesses. Sustainability is a term used throughout this book; this chapter defined the principles of sustainability in terms of both environmental and business practices.

Review questions

1. Which is the definitive guide to corporate governance?
 - a. The Retirement Reform
 - b. The Constitution
 - c. The King III report
 - d. GAPP
 - e. NHI
2. In your estimation, why would you say that it is important to have a sustainability report in place in your organisation or business? Will this make a difference in attracting investors to do business with you? If yes, why do you say so?

10 NEMA, s 23.

11 ISO (2009).

12 SABS (2005).

3. Ubuntu is an African value system that focuses on:
 - a. the spirit of humanism
 - b. respect for people and the country
 - c. service delivery
 - d. a & b
 - e. a, b & c
4. The creators of the King reports were mindful of the need to create a uniquely South African business culture, different from that embraced by American or European businesses. The reports incorporate the African value system that emphasises certain aspects. Which is not correct?
 - a. Principle of mutual interdependence and co-existence
 - b. Spirit of humanity where an individual is entitled to respect
 - c. A hierarchical political ideology, based on an inclusive system of consultation at various levels
 - d. Preference for dissension over consensus
 - e. A mentality of inherent trust and belief in the fairness of human beings
5. Find a company's annual report and answer the following questions:
 - a. Which company's annual report have you selected?
 - b. Why did you choose this specific company's annual report?
 - c. Did the company report in terms of the triple bottom line (TBL) or the triple context?
 - d. Was an equal amount of attention allocated to each of the three aspects of the TBL or the triple context?
 - e. In terms of economic prosperity measures, what was the company's annual profit?
 - f. On the social responsibility measurement, who was the company's social responsibility partner?
 - g. What was the company's arrangement with this partner?
 - h. What did the company disclose in terms of its environmental sustainability indicators?
 - i. What was the company's impact on the living and non-living natural systems?
 - j. What did the company do to reduce its energy needs?
 - k. How is the company managing its waste generation?

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Chapter Three

The natural environment

Sarel J Smit

Learning Outcomes

After studying this chapter, you should be able to:

- understand the nature of the natural environment in which humans live
- explain the impact of human activities on the natural environment
- discuss the natural driving forces that influence change in corporate behaviour
- discuss business endeavours to protect the environment.

Overview of this chapter

Chapter 3 reflects on four interrelated components that are of specific concern for safety, health and environmental management, namely:

- the natural environment
- the impact of human activity on the natural environment
- natural driving forces influencing change in corporate behaviour
- business endeavours to protect the natural environment.

The discussion focuses on the nature and characteristics of the natural environment, human interaction with the environment and the impact of this interaction on the environment, changes in corporate behaviour resulting from natural driving forces in the environment and corporate efforts to prevent any adverse effects of corporate endeavours on the environment. While people are dependent on the environment to sustain an acceptable quality of business operations, the environment also needs protection from human activities. Let's get to grips with the nature of the environment, with specific emphasis on the natural environment.

3.1 Introduction

It is not possible to engage in environmental management without a basic understanding of the nature and characteristics of the environment. Comprehending the features of the natural environment provides a basis for purposeful involvement in protecting the environment against any adverse impact resulting from human endeavour or from natural forces.

3.2 The nature of the general and natural environment

The human environment comprises two distinct but interwoven parts. These parts are the natural and the man-made elements. This section will describe the nature of the natural environment.

The natural environment consists of numerous substances. All things (substances) in the universe are made of matter. Matter is the universal material.¹ Kurtus² notes that the material basis of all things makes all things tangible and contactable. Matter is the common, universal and essential characteristic that forms the basis of each and every different tangible thing. If a thing or object has no substance, it is not tangible, because it is not made of matter. Matter defines substance solidity. Matter is the property that holds things together and retains the shape of objects. Matter is composed of atoms; atoms comprise a core and rotating protons, neutrons and electrons.³ This implies that all substances of the natural world basically possess inherent kinetic energy.

Substances exist in three different formats, namely single or pure substances, compound elements and multiple elements. Single or pure elements are listed on the periodic table. The well-known periodic table arranges the basic natural elements in nature, of which things are made, in order of increasing atomic number.⁴ Many things (substances) consist of mixtures of substances. Such mixtures are compound. Compound substances are made of or are formed by two or more single natural elements.⁵ Compound substances appear in the form of a single entity because of the integrated combination of the different substances. A good example is the nature of water that comprises two distinct elements, namely oxygen and hydrogen that are integrated into a single compound substance. A multiple substance distinguishes itself from a single or compound substance on the basis of the multiple substance bases of which it is composed and the multiple threats that it poses to all other substances. Multiple substances are formed when different single and/or compound substances form a separate unity. A bunch of keys and a fork with separate tines are examples of multiple substances.

All substances that are made of matter are contactable via one or more of the human senses. If a substance is contactable it has the potential to cause harm to humans and damage to other substances (property) and to the environment. For example, air that is contactable can cause any level of loss, from minute to disastrous. If a substance is contactable and has the potential to create loss it is a safety hazard. Anything that has no substance and is not contactable is not a safety hazard. Smit and Esterhuyzen⁶ outline a list of so-called safety hazards that do not meet the requirements of being safety hazards. All members of the animal kingdom, fauna and flora meet the requirement of being made of matter and being contactable. In terms of the natural environment, this implies that everything which

1 Zumdahl & Zumdahl (2007) 25.

2 Kurtus (2013) 1.

3 Zumdahl & Zumdahl (2007) 25.

4 Zumdahl & Zumdahl (2007) 55.

5 Tech Topics (2013) 1.

6 Smit & Esterhuyzen (2014) 32.

is made of matter and which is contactable is a safety hazard; it does not apply to things such as a dream, a thought, a story, etc. As material things present themselves in different formats, all such things in any format are safety hazards. Therefore, all elements of the natural environment such as water, oxygen, rocks, trees, flowers, smoke, bees, lions, the sun, the moon, planets, meteors, etc are safety hazards.

3.3 Characteristics of safety hazards

All safety hazards have certain common characteristics that contribute to safety and environmental risk. Such characteristics relate to the structure and functioning of each particular safety hazard.

3.3.1 Structural characteristics of substances

Substances possess the following characteristics:⁷

- *Tangibility* relates to a substance's material basis that makes it contactable. Remember, if a substance has no contactability there is no safety or environmental risk.
- *Density* implies the amount of matter, which sets the framework for solids, liquids and gases. Each of these formats present different types of environmental risk.
- *Size* relates to the volume of substances, which contributes to environmental risk in different contexts.
- *Weight* relates to the amount of material substance of things and can contribute to environmental risk in different ways.
- *Shape* relates to the impact of the point of contact between substances and can contribute to environmental risk in different situations.
- *Texture* or surface relates to the effect in terms of environmental risk of the contact between different substances.

3.3.2 Functioning characteristics of substances

The different functioning characteristics of substances that contribute to environmental risk are the following:⁸

- *Energy* relates to the kinetic energy that is an indispensable part of the constellation of the atoms of each substance. Energy is seen as the capacity to do work. The two very basic energies that all substances have are kinetic and potential energy.⁹ McDonald and McDonald¹⁰ outline a list of basic manifestations and configurations of energies that are involved in doing work in the environment.

7 Smit & Esterhuyzen (2014) 45–58.

8 Smit & Esterhuyzen (2014) 58.

9 Crowell (2006) 68.

10 McDonald & McDonald (1994) 12.

- *Consistency* (also called symmetry) relates to substances, whether single, compound or multiple, functioning in accordance with natural laws under given circumstances. For example: water heated sufficiently will always boil and vapourise; a piece of iron heated sufficiently will take a liquid format; lightning can start a fire, etc.
- *Interaction* relates to the ability to make contact with other substances and to exchange energies with one another; this always coincides with the exchange of energies between such substances. For example, dragging a heavy tree trunk on gravel will result in generating heat on the trunk and ploughing some furrows in the gravel.
- The ecosystems that function in the natural environment set examples of the *interaction* of different types of systems in different situations in the natural environment.
- It is important to remember that the contribution of the different characteristics of substances to safety and environmental risk is always *situationally determined*. For example: petrol vapour is more dangerous than petrol fluid in given situations because it can ignite. Likewise, one can drown in petrol fluid, but not in petrol vapour.
- Humans form an integrated part of the natural environment. Humans have one additional characteristic that contributes to safety and environmental risk, namely *inconsistency*. Although the human body's structural and functioning organ systems are bound by natural laws, the human mind operates on the basis of norms. Humans have the freedom and ability to decide upon their conduct in every situation in life. Such freedom of choice often results in behaviour that is inconsistent to the requirements of environmental safety.¹¹

3.4 The appearance of the natural environment

The natural environment comprises millions of substances. Because such substances are tangible and contactable, they can pose a threat to the safety of other substances. In this context, all tangible substances are safety hazards. Safety hazards exist as pure hazards, compound hazards or multiple hazards. Safety hazards (substances) come in different formats, namely solids, fluids and gases. All hazards each have a set of eight common characteristics that contribute to safety and environmental risk. However, humans have an additional unique characteristic that distinguishes them from all other substances. More about this will follow later. Substances appear in the natural environment in a countless range of types of safety hazards.

¹¹ Smit & Esterhuyzen (2014) 91.

3.5 The origin of safety risk and environmental risk

When substances come into contact they interact, during which energy or energies are set free. Such energy or energies present the risk that could impact on the environment. For example: lightning strikes a tree on a game farm. Thermal energy is set free. The tree and grass catches fire. The wind spreads the fire very rapidly. A group of antelope is burnt to death. See Smit and Esterhuyzen¹² for an example of energies that appear in the natural environment.

Thus, safety risk originates when hazards interact and energy or energies are set free.

3.6 Environmental hazards and environmental aspects

Aucamp¹³ sees an environmental hazard as 'any situation or state of events that poses a threat to the surrounding environment'. In a real sense, a hazard stays a hazard because of its contactability and its potential to exchange and release energy upon interaction with any one or more other safety hazards. A condition or state of events cannot be hazards because they do not meet such criteria for the definition of a safety or environmental hazard.¹⁴ The basic requirements that apply are that 'any tangible object that has the potential to complement or interfere with the performance of a task' and that possesses 'closing and collision potential, is a safety hazard'.¹⁵

Using the term environmental aspect establishes an acceptable recognition of the origin of damage to the environment. An aspect can be regarded as a particular part or feature of a situation. As such, the risk threat for the surrounding environment still originates via the interaction of hazards and the resultant release of one or more energies. An aspect represents the event that flows from the interaction and energy release. For example: air is a hazard. Safety risk originates when the interaction of air, sun, earth and moisture results in a hurricane. Such interaction and resultant risk is an integral part or aspect of the natural environment. Thus, an aspect of the natural environment offers a threat to the surrounding environment as a result of the risk that comes from the interaction and energy exchange of safety hazards.

Environmental aspects refer to any organisational activities, products and services that are involved in dealing with any environmental hazards and their associated energy exchange. Environmental impacts refer to any change that may occur in the environment, whether good or adverse, that may result from dealing with environmental hazards and their energy exchange.¹⁶

¹² Smit & Esterhuyzen (2014) 61.

¹³ Aucamp (2014) 60.

¹⁴ Smit & Esterhuyzen (2014) 33.

¹⁵ Van Fleet (2000) 112.

¹⁶ SABS (2005).

3.7 The impact of human activity on the natural environment

Aucamp¹⁷ states that the environment comprises water, land and the atmosphere surrounding the earth, micro organisms with flora and fauna, the combination of and interrelationships between such elements, as well as the chemical and physical properties and conditions that can affect human health and general well-being. Safety hazard interaction could result in different incidents that are normal incidents or part of the natural environment and each could result in different levels of magnitude or severity of adversity.¹⁸

Human activity is one of the major elements that impacts on the natural environment. Such impact can be positive, but is currently more negative.¹⁹

Human activity that impacts on the natural environment relates to a range of human involvement for different reasons or purposes. Humans are almost in all respects of life dependent on the natural environment. Human involvement and activities pertaining to life arise from specific issues, namely the need to sustain human life, the purpose of enhancing the quality of life and the quest to establish and prove supremacy.

3.7.1 Depletion of sources in sustaining life

Humans use many elements of the natural environment to maintain life. Farming in different contexts, as well as fishing and hunting to provide food, are major activities. The use of pesticides to deliver more and better crops has detrimental impacts on the natural environment. Deforestation to create space for dwellings and more intensive farming diminishes the generation of oxygen, with negative effects on the atmosphere surrounding the earth.²⁰ Slaughtering and eliminating large animals, birds and fish badly impacts on the quality of natural life and its benefits for humans in sustaining life. Efforts to maintain and sustain life in conjunction with other activities adversely impact on the natural environment. The over-population of the earth in order to ensure human existence threatens the quality of the natural life inadvertently. Sernau²¹ postulates that human activity has encouraged the spread of deserts, the depletion of soils, and the destruction of forests.

3.7.2 Enhancement of the quality of life

Human activities to enhance the quality of life and to provide ever increasing needs result in major negative impacts on the natural environment. Establishing industries of different kinds, factories and mines, skyscraper buildings, sewerage plants, farming on a massive scale, squatter camps, transport systems of different kinds, and many more threatens the trouble-free development of the natural environment. Factory emissions, electrical and nuclear power plants, electricity distribution installations,

17 Aucamp (2014) 2.

18 Aucamp (2014) 69 & 82.

19 Aucamp (2014) 68.

20 Sernau (2014) 348.

21 Sernau (2014) 356.

vehicle and airplane emissions (eg carbon monoxide), pesticides, ground falls, overpopulation of certain areas, water and ground contamination and pollution, and many more human activities aimed at improving the quality of life impact the natural environment negatively. The creation of electrical power via the utilisation of fossil fuel and nuclear energy is another example of human activity that impacts on the natural environment severely.²² Carbon leakage as the main element of greenhouse gas has detrimental impacts on the natural environment.²³ Such effects are directly related to global climate change as a result of the steady increase in the mean temperature of the world's climate.²⁴ Acid deposition from agricultural and industrial activities impacts negatively on water and soil quality, which affects the ecosystems in the natural environment adversely.²⁵ Emissions from industries, as well as from petrol- and diesel-using vehicles, create major air pollution that at times almost suffocates people in major cities. Oil spills endanger the continuation of plant and animal ecosystems in the seas with adverse effects on beach pollution and reduction of sea food sources for people and animals.²⁶

Human traits such as inconsistency and irresponsibility are in many ways instrumental to forms of pollution, for example water and soil pollution, with the resultant damage to the natural environment's capacity to maintain effective growth. Sewage sludge that spills from sewerage cleansing plants serves as an example in this regard.²⁷ Human endeavour to sustain and enhance the quality of human life has therefore affected the natural environment in numerous ways. The majority of such effects, however, are inclined to be negative.

3.7.3 Establishing supremacy via conflicts and wars

People have the tendency (quest) to prove themselves better, stronger, and superior compared to others, for example the competition to conquer outer space or conflict in the form of waging war. Many of these human activities affect the natural environment adversely. Sernau²⁸ indicates that warfare always has a negative effect on the natural environment, for example the use of weapons of mass destruction to gain the upper hand on the enemy. Regional and factional fighting is renowned for its destruction of many parts of the natural environment with regard to fauna, flora and ecosystems. The negative impacts of warfare are evident in the natural disastrous effects of chemical, biological and nuclear weapons on humans, on civilisation and on parts of the natural environment, for example land mines make former farmland worthless.²⁹ Another example is the extremely negative effects of the atom bombs dropped on Hiroshima and Nagasaki during World War II. The quest to conquer outer space has added to the adverse effects of nuclear power on different aspects of the natural environment. The waste that accompanies successful, futile and failing efforts to conquer space results in sea pollution, rocket debris, and more.

22 Cresser et al (2013) 416.

23 Cresser et al (2013) 199.

24 Sernau (2014) 325.

25 Cresser et al (2013) 363–364.

26 Sernau (2014) 313.

27 Cresser et al (2013) 468.

28 Sernau (2014) 241.

29 Sernau (2014) 254–257.

3.8 Natural driving forces that influence change in corporate behaviour

Natural forces which are based on the consistency of natural laws as well as on forces that have their natural off-spring in the nature of human civilisation affect changes in corporate behaviour in order to accommodate requirements and needs that flow from such natural laws and human needs and interests.

Examples of natural forces that have an impact on corporate behaviour in one way or another include tsunamis, global climate change, urbanisation, population growth, excessive rain, drought, hurricanes, earth quakes, snow falls, heat waves, eruption of volcanoes, destruction of fauna, flora and ecosystems, water, soil and air pollution, human needs for security and general well-being, the quality of community life, and humans' need for self-development, to list only some of the most evident issues.³⁰ These natural forces usually relate to conditions of excessive energies, a lack of specific needed energies, the presence of unwanted energies, and societal pressure to accommodate people's needs.

3.8.1 Excessive energies

In most cases the presence of unwanted excessive energies has adverse effects on the natural environment. The occurrence of tsunamis, volcanic outbursts, emissions of carbon, sulphur and other chemicals via industries and vehicles, acidic water from mine works, sewage sludge from urbanisation, rain storms, galeforce winds and hurricanes, heat waves, various kinds of fires, smoke, smog, pesticides and other chemicals from industrial and farming activities, explosions via mining, earth works or wars, and more all affect the environment badly.

Human urbanisation has introduced special energy needs as a result of vast numbers of people and their corresponding needs for water, electricity, gas, transport, buildings, health, recreation, shelter and forms of labour involving different kinds of activities to sustain life in meaningful ways. Society produces ever-growing rubbish dumps and landfill sites, leading to major concerns about the challenges of dealing with the resultant increase in different types of energy and the potential impact of such waste on the environment. These excessive energy effects impact on the normal functioning of businesses; such impacts require and affect changes in corporate behaviour to maintain survival and a competitive edge.

3.8.2 Lack of specific energies

A lack of specific energies can also change corporate behaviour. During winter and snow storms, for example, there is a lack of wanted thermal energy (heat). Thermal energy is also necessary to prepare most foods. Water energy is necessary for moisturising (eg human sustenance), cleansing, growing crops, sustaining fauna and flora, and more. Natural wind, natural sun light and natural thermal

³⁰ Cresser et al (2013) 414.

energy (heat) are necessary to perform a great variety of corporate functions and responsibilities. For example, no wind turbine to generate energy can turn if no wind blows. Growing specific crops or manufacturing specific products cannot occur when certain specific chemical or physical energies are not present or available. The unavailability or lack of specific wanted energies can therefore have adverse effects on corporate performance and on the achievement of objectives. In such instances, companies may need to change their behaviour in order to stay in business. The decline of certain types of energies that goes with the decline of certain substances, like water, oxygen in the atmosphere, soil erosion and more, requires management to develop different strategies to sustain the livelihood of business.

3.8.3 The presence of unwanted energies

Corporate behaviour is to a large extent determined and changed by the presence of unwanted energies. In order to be successful, businesses cannot tolerate unwanted energies. The presence of unwanted energies associated with carbon dioxide, heat of the sun, rain, lightning, volcano lava and ashes, earthquakes, smoke, radioactivity, chemical acids, tsunamis, noise, viruses (Ebola, malaria, yellow fever, etc), animals (eg birds at airports), and more as a result of the presence or absence of a range of substances (environmental hazards) forces management to adjust their strategies, approaches and activities in order to ensure continuation of business within a stress-generating environment.

3.8.4 Societal emphasis to consider human life and human needs

Urbanisation of people has a wide range of effects on the natural environment.³¹ Megacities with their industrial giants, railroads, tarred roads, congested vehicle traffic and more, aimed at accommodating the needs of humans in trying to sustain and enhance their quality of life, depict the destruction of the natural environment. However, at the same time, these activities are unable to prevent the development of ghettos, slums and squatter camps that illustrate people's inability to really care for and sustain the quality of the natural environment. Deforestation and drying of wetland areas that result in desertification, the creation of industries to provide for a wide range of human needs and the emphasis on prosperity inevitably represent and generate different types of natural energies and collective human energies that management has to cope with to survive and grow their businesses.

3.9 Business endeavours to protect the environment

Corporate responses to protect the environment have gradually changed from fairly ignorant to responsible goal-directed business management. Prominent corporate behavioural changes that have been instituted include the following:

³¹ Sernau (2014) 277.

3.9.1 *Establishing and implementing a multi-faceted corporate policy*

Civilisation requires that corporate policy provides maximum protection of the natural environment. Such protection applies to water, soil, air, as well as all fauna, flora and all forms of ecosystems in which businesses operate. Such protection must also include full engagement in combating global climate change in terms of the development of the greenhouse effect with its unwanted temperature warming and disastrous adverse results. Most of these requirements are framed in proper applicable legislation, which sets clear directives that need to be followed and implemented in order to protect the natural environment. The International Standard ISO 14001:2004 sets requirements for every organisation involved in activities that relate to production and service delivery to establish and implement an environmental policy within the framework of an environmental management system.³² See Chapter 5 for details on the development and implementation of an extensive environmental management system (EMS), which deals with different types of environmental hazards and environmental aspects.

3.9.2 *Compliance with environmental management legal requirements*

In addition to the International Standard ISO 14001, companies in South Africa must comply with environmental management directives that are specified in the National Environmental Management Act 107 of 1998 (NEMA).

The basic elements of this Act, which focuses on providing an environment that enhances the health and well-being of every member of society, contains all the legal prescriptions and regulations required to sustain continuity and profitable endeavours. Prescribed legal and self-determined directives direct organisations to utilise a variety of resources to develop and implement an EMS that fully and effectively complies with such requirements. Such compliance places a heavy burden on the financial capacity of organisations.

Sections 33 to 35 of NEMA set out clear legal requirements, with which organisations must comply, with regard to establishing, developing and implementing an environment management programme (EMS). Section 24N of NEMA specifies the content of an EMS. The purpose of NEMA is to ensure integrated environmental management and to promote the integration of the principles of environmental management.³³ In order to comply, an organisation needs to utilise different resources; this has specific financial implications. All environmental management programmes are to be accepted, registered, certified and amended in accordance with legal requirements. No company is allowed to develop and implement an EMS without the deliberate approval of the applicable competent authority. The Minister of Minerals and Energy is the legally accepted competent authority, while the Department of Minerals and Energy administers NEMA.³⁴

32 SABS (2005).

33 NEMA, s 23.

34 NEMA, s 24(2A).

3.9.3 *Utilisation of cross-functional teams*

Cross-functional teams (CFTs) provide the best and only integrative approach to effectively managing the development and implementation of an EMS. Businesses realise that the nature of the natural environment and interaction with environmental hazards via business activities, products and services results in different types of environmental aspects, with potential levels of environmental impacts. Dealing effectively with such challenges requires a broad spectrum approach and strategy, which is derived from deliberation and consultation with CFTs that comprise a range of expertise. Robbins³⁵ stipulates that the members of such teams come from almost similar hierarchical levels internal and external to an organisation. Such teams are multi-disciplinary in nature, because the members come from different professions or disciplines that convene to produce the best available solution to any environmental aspects and actual or potential environmental impacts. Workers from lower levels may also be included, depending on the nature of the challenge. Thompson et al³⁶ indicate that CFTs can play an important part in innovation and change. The members of CFTs can be regarded as complementary professionals on the basis that they are all concerned with challenges relating to environmental protection, but that their approaches to the challenges will differ in accordance with the focus of their particular discipline. CFTs are purpose driven and do not function beyond the scope of the challenge for which they need to find solutions. Members of a CFT each have their own focus, but these foci are all complementary to the challenge and the solution to challenges. This applies to addressing all issues concerning all types of environmental aspects and environmental impacts related to the EMS of a specific organisation. Utilising different experts from various fields of study in the application of the EMS implies specific financial resources additional to the main course of activities, products and services.

3.9.4 *Corporate consultation with interest groups*

The nature of the natural environment and the interaction with various environmental hazards require that businesses have to consult with various groups and stakeholders, within and external to the organisation, that have a vested interest in an organisation's impact on the environment. The King report³⁷ stipulates that organisations have to consult with all stakeholders and interest groups with regard to their policies, activities, products and services, with specific reference to the environment and the community in which they operate. Organisations are legally required to report to shareholders on a regular basis about activities.³⁸ Additionally, management also has the responsibility to consult with its health and safety committee on preparing and reviewing of policies, plans and documents that relate to all organisational activities.³⁹ The extensive nature of the natural environment

35 Robbins (2001) 261.

36 Thompson et al (2005) 560.

37 IoDSA (2009).

38 Mine Health and Safety Act, s 2.

39 Mine Health and Safety Act, ss 8 & 11.

demands that organisations must engage all other interested parties in developing and implementing an environmental management system to effectively deal with environmental challenges. An explicit objective and directive of NEMA is to 'ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment'.⁴⁰ Such directives set the scene and requirements for organisational transparency with regard to developing and implementing an environmental management programme.

3.9.5 Corporate culture and corporate climate focus

Geller⁴¹ postulates that people are more inclined to achieve goals and objectives that they set individually or within a group context. The impact of consultation with employees and other interest groups sets the basis for achievement orientation. Such orientation forms the foundation of employee endeavours and behaviour to focus on engaging with the environment safely at all times. Developing a corporate culture and corporate focus on the importance of and enhancement of an environmental safety policy, which informs an organisation's products and services in dealing with the natural and man-made environments, has become a major focus in establishing and sustaining a competitive edge in business longevity.⁴² The ultimate point of departure in developing an organisational culture and climate is to create and utilise employees' passion for driving the importance of environmental protection and emphasising the importance of dedicated efforts to realise company objectives in this regard.

Organisations must consider all potential environmental impacts which could result from their activities, products and services during their involvement with environmental hazards and their energies that could result in environmental aspects. Negligence in this regard could have major adverse implications for the environment and for organisations.

3.10 Conclusion

It is quite clear that organisations must effectively focus on dealing with environmental conservation in the execution of their business activities, products and service delivery. Efforts in this regard must consider the actual physical and chemical elements of the natural environment. It has to be remembered that all substances possess energy or energies and that involvement in business endeavours implies interaction with environmental hazards and their energies. Organisations need to identify all environmental aspects that could be present via their interaction with environmental hazards. Furthermore, all organisations need to assess the actual or potential environmental impacts that could flow from environmental aspects.

40 NEMA, s 23.

41 Geller (1996) 26–27.

42 Goetsch (2010) xvii–xviii.

Organisations need to understand the effects of their activities, products and services, as well as societal activities, on the natural environment. Such understanding needs to be reflected in the development and implementation of an environmental management programme (EMP) and environmental management system (EMS). Businesses also have to develop and apply their EMPs and EMSs in accordance with the specific legal requirements of local, national and international origin. Organisations have to clearly indicate their actual involvement in the pursuit to protect the natural environment against any adverse effects of environmental aspects and environmental impacts.

Review questions

1. Explain the basic physical and chemical structures and functional characteristics of the natural environment.
2. Explain the difference between environmental hazards, environmental aspects and environmental impacts.
3. Briefly sketch the impact of human activities on the natural environment.
4. Stipulate and discuss the natural driving forces that influence change in corporate behaviour.
5. Outline corporate efforts to protect the environment.

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Chapter Four

ISO 14000

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Learning Outcomes

After studying this chapter, you should be able to:

- position the International Organization for Standardization (ISO) within a world context
- explain the objectives of the ISO
- elicit and define appropriate terms uniquely relevant to ISO 14000
- discuss the structure and functioning of the elements of ISO 14000
- clarify the scope of the directives that ISO 14000 sets for the implementation of an environmental management system (EMS)
- motivate the rationale for registration with ISO 14000
- state the applicability of ISO 14000
- briefly explain the structure and functioning of the PDCA-cycle.

Overview of this chapter

The focus of Chapter 4 is on the international role of the ISO in setting acceptable standards for safety and health on an international basis. The endeavour is to provide an explanation of the nature and functioning of ISO 14000,¹ combined with the valid basis for setting directives for developing an organisational environmental management programme (EMP) and an environmental management system (EMS). The explanation will add value to the clear understanding and context applicability of ISO 14000 terminology.

4.1 Introduction

It is essential to gain a perspective on the origin and objectives of ISO 14000. Such an understanding creates a framework for understanding its structure and functioning. In order to enhance an understanding of the nature of ISO 14000, specific terms that uniquely relate to the nature of ISO 14000 will be introduced and clarified. Understanding the context of ISO 14000 enhances the underscoring of the applicability of standards that provide directives for safety and health on an international basis. The initial departure of the explanation focuses on the need for international standardisation, plus the position and objectives of the ISO in this regard.

¹ ISO (2009).