

4.2 The need for international standardisation

A workplace in a particular business operation in a specific country sets safety requirements that are unique to such business and country. When creating safety directives for such a workplace, the directives usually apply to the immediate environment within which the business operates. Such requirements or directives do not necessarily apply internationally. However, the safety risk that can result from activities in a particular business may affect the environment of adjacent countries or the international world. If the global environment could be adversely affected, then such directives need to meet certain quality standards. Such standards should meet international requirements in order to ensure that the global environment is kept intact. Such requirements need to be made acceptable prescribed standards of practice for dealing with and preventing safety and health risks that may affect the international environment adversely.

Guidelines for arc welding activities, for example, are usually determined by the specific conditions in which such an activity takes place, because it mainly affects the local environment. Not all countries worldwide engage in arc welding on a large scale.

Many countries in the world are highly industrialised. The emission of industrial smoke, for example, on a great scale will affect the quality of the environment on a global scale. In this instance there is a need to set guidelines for directing the prevention or control of smoke emission. Such guidelines should apply as standards that effectively deal with the emission of industrial smoke in all industrialised countries. The international standardisation of such guidelines will ensure that all industrialised countries meet the same standards in dealing with the emission of industrial smoke.

4.3 The position and purpose of the ISO

The International Organization for Standardization (ISO) was established in 1947.² This non-governmental organisation, which is based in Geneva, Switzerland, resulted out of an international need for standards to control processes of international trading.³ The ISO was created with the purpose of enhancing the standard of trading, communication and manufacturing on an international basis through the development of appropriate international standards.

The ISO has to respond to the needs of organisations to develop standards that relate to both specific and general trade and industry. Such standards set practical standardised directives for implementing specific programmes, with a view to enhancing quality related to specific industrial or business needs. Any country can become either a Full, a Correspondent or a Subscriber Member of the ISO. South Africa is a Full Member of the ISO represented by the South

² Goetsch & Davis (2001) 3.

³ Fuller & Vassie (2004) 212.

African Bureau of Standards.⁴ International committees, which comprise different members, are responsible for developing international standards. However, the ISO has no authority to enforce the application of standards created. The application of any international standard of the ISO is completely optional; however, customers' needs for quality assurance may pressurise organisations to implement and adhere to international standards developed by the ISO. Specific directives are built into standards to enhance adherence to particular quality imbedded in standards.

ISO 14000 is a very good example of an international standard that sets requirements with guidance for use applicable to the implementation of environmental management systems (EMS).

4.4 Origin of ISO 14000

Many organisations are concerned with the effects of their business operations on the quality of the natural and man-made environments. Such concerns relate to specific or all types of activities, products and services. These concerns flow mostly from new stringent legislation as well as from customer, stakeholder and shareholder demands related to the protection of the environment for generations to come.

A major concern about the environment is the serious threat to ecology and the world's ecological systems. The uncontrolled pollution that flows from industrialisation and urbanisation, which depicts people's disregard for the preservation of nature's ecosystems, has led to a realisation of the urgent need to develop a preventative and turnaround strategy to combat the adverse (and in some ways, irreversible) effects on the environment. Global warming and ozone layer depletion, which offer numerous possibilities of threats to humans, cause a great deal of such ecological degradation.

A serious focus on environmental standards began in 1993. The ISO established the Technical Committee 207 (TC207) with the aim of developing a uniform international EMS, as well as directives and tools for its implementation. The 50 participants of TC207 generated ISO 14000, which was published in 1996.

4.5 The basic objectives of ISO 14000

The ISO played a vital role in developing a range of standards in order to assist organisations in exercising a proactive approach to the management of environmental concerns. According to Goetsch and Davis,⁵ the basic objective of ISO 14000 focuses on assisting organisations to prevent environmental impacts that could flow from any business activities, products and services. The crucial focus of ISO 14000 is to provide support to organisations in their efforts to protect the environment, and

⁴ Goetsch & Davis (2001) 4 & 230.

⁵ Goetsch & Davis (2001) 7.

to balance pollution levels against socio-economic needs. The service that ISO renders includes assisting organisations to continually make progress in meeting applicable regulatory and policy requirements. ISO 14000 provides all the necessary elements for implementing an EMS effectively. However, setting environmental goals or prescribing absolute requirements that apply to environmental performance are not part of such elements. Measuring organisations' compliance to ISO 14000 international standards, as well as to applicable national and local regulations, lies within regulatory agencies. The ISO's international standards merely set guidelines for the valid and internationally acceptable uniform implementation of an EMS.

4.6 Scope of ISO 14000

The ISO presents an all-inclusive portfolio of standards for selecting and testing methods to hone in on environmental management challenges. ISO 14000 substantiates such approaches and practices and culminates in the most recognised constellation for developing and implementing an EMS.

The scope of ISO 14000 specifies requirements with guidance for use pertaining to an EMS. Such scope simultaneously elicits the elements or component parts of the international standard. Continual improvement is an essential focus of ISO 14000.⁶ Continual improvement is seen as a process that recurs often in order to enhance an EMS to achieve and confirm environmental performance, according to an organisation's environmental policy.⁷ In its scope the ISO 14000 addresses a range of foci to improve an EMS, validate congruency between organisational environmental policy and EMS endeavours and activities, provide confirmation of conformance with applicable legal requirements via internal and external assessment and evaluation, and to verify recognition of interested parties in the organisation, such as stakeholders, customers and employees.

4.7 Elements of ISO 14000 as an international standard for an EMS

ISO 14000, which serves as an international standard for an organisation to develop, implement and improve an EMS, consists of different integrated and inseparable elements. The following elements apply:⁸

4.7.1 Design an EMS in accordance with standardised requirements

An EMS can be regarded as an indispensable part of the normal management systems of an organisation. An EMS establishes and applies an organisation's environmental policy and manages all related dealings with environmental aspects and environmental impacts.⁹

6 Goetsch & Davis (2001) 171.
7 SABS (2009) 1.

8 Goetsch & Davis (2001) 7–8.
9 SABS (2009) 2.

4.7.2 Formulate an environmental policy that sets the basis of the total EMS effort

An organisation's environmental policy must stipulate all its intentions, as well as its directions that relate to setting the parameters for its environmental performance as expressed by top management, in consultation with stakeholders, employees and other applicable interested parties.¹⁰ Blunden and Thirlwell¹¹ emphasise the important role of policy in the context of environmental activities and postulate that a policy statement provides the benchmark for measuring all organisational activities and endeavours.

4.7.3 Specify and elicit environmental aspects that could generate safety and health risks that could affect the environment adversely or positively

An environmental aspect refers to any element of the activities, production processes or services provision of an organisation that can interact with elements in the environment. In this case, interaction implies making contact with any one or more observable or unobservable substances in the nearby or distant environment. Such interaction with substances, which represents safety hazards, sets one or more energies free which could create any level of safety risk. Safety risk could result in any form of adverse or positive effect or effects.¹²

4.7.4 List and scope all legal and other requirements which the organisation subscribes to and that apply to its environmental aspects

ISO 14000 sets clear legal directives that apply to developing and implementing an EMS. Such requirements are not absolute. Directives in organisational policy clarify the focus of legal and other requirements with which an organisational EMS must comply. Applicable fields of focus include ground, air and water pollution, global warming, preservation of energy, and many more. International, national and local legal and regulatory requirements apply. The input of stakeholders, clients, customers, employees and other applicable interested groups or parties must also be reflected in accordance with prescriptions that apply to requirements pertaining to consultation. Interested parties are seen as any individual or group that may be affected by the development and implementation of an environmental management programme (EMP) or environmental management system (EMS).

4.7.5 Establish all objectives, targets and plans for developing and implementing an EMS

An organisation's environmental policy must establish environmental objectives to measure the achievement of clearly specified targets. Compliance with legislative and regulatory requirements and directives specified in its environmental policy

10 IoDSA (2009) 230; SABS (2009) 3.
11 Blunden & Thirlwell (2013) 228.

12 Smit & Esterhuyzen (2014) 40.

must be the basis for setting environmental objectives. All objectives must elicit particular targets that serve as a measure for determining the achievement of environmental objectives, as elicited and explained in the environmental policy. Explicit plans to achieve all objectives in par with targets must be realised as an essential part of an EMS. Periodic review of the progress towards achieving environmental objectives is an essential part of confirming progress. Such a review is a crucial part of an EMS and utilises the Deming PDCA-cycle¹³ as suggested in the ISO 14000 application.

4.7.6 *Perform a training needs analysis and implement training*

A training needs analysis must focus on the competence to prevent the occurrence of any significant environmental aspects. Such an analysis must include training in realising the implementation of organisational policy within the context of an organisational EMS. Employees need to be familiar with significant environmental aspects and the potential of each with regard to environmental impacts. Emphasis must be laid on mastering and consistent improvement of personal competence pertaining to roles and responsibilities concerning the implementation of the EMS. The required staff must be knowledgeable with regard to emergency preparedness, emergency responses, as well as the implementation of appropriate emergency procedures.¹⁴ All staff must be informed of the potential effects of not complying with particular relevant and accepted procedures of operation. Continuing learning in the form of retraining and additional training must be standard practice to keep all applicable staff informed of current and new additional elements of environmental aspects, environmental impacts, as well as roles and responsibilities associated with new developments in organisational activities, products and services.¹⁵ The emphasis must be a focus on the continual improvement of personal and organisational efficiency.

4.7.7 *Create, maintain and improve internal and external communication*

All staff at all levels and functions within an organisation must at all times be kept fully informed on all environmental aspects and environmental impacts related to organisational activities, products and services. The organisation is responsible for creating, developing, utilising and improving appropriate procedures to ensure effective communication for such purposes. The first priority in this regard is the effective communication of the organisation's environmental policy. All staff must be conversant with all significant environmental aspects associated with organisational activities, products and services, as well as potential environmental impacts. The necessary internal communication to enhance and maintain an effective level of information of staff may take different forms, for example: group meetings, newsletters, bulletin boards, intranet sites, reports and personal notes.

13 Deming (1982) 54.

14 Goetsch & Davis (2001) 55.

15 SABS (2009) 14.

Feedback and reaction on all communiqués should be standard procedure to ensure that information is received and read. The emphasis is on ensuring that employees are consistently informed of the progress, success and improvement in achieving objectives and targets that are set in the organisation's environmental policy.

Besides internal communication procedures, interaction with interested parties must also be established. Interested parties can be regarded as individuals or groups that can be affected by an organisation's EMP and EMS.¹⁶ Transparency enhances involvement, teamwork and commitment of external resources in working towards achieving an organisation's environmental performance. Interested parties may include employees, non-governmental organisations, government departments, stakeholders, labour unions and customers. Information concerning emergency planning and emergency procedures should be a high priority and communicated to external interested parties. Such an approach applies especially to joint efforts in emergency procedures.

4.7.8 *Create and disseminate documentation regarding the EMS*

Documentation of all elements of an EMS plays a very important role in enhancing the successful implementation of the EMS. Documentation should explain the overall structure and functioning of an EMS, plus how all the different facets of the EMS work together. All staff must be conversant about sources where information on any elements of the EMS can be obtained. The format of documentation, and communication via such documentation, will be affected by factors such as the size of the organisation in terms of numbers and levels of staff to be informed, for example differences in cultural groups, and by geographical distribution. The purpose of establishing and using appropriate documentation is to ensure that all employees are equally well informed concerning the status quo of the progress of the EMS in relation to objectives and targets postulated in the environmental policy. The focus should be on the consequences of not meeting such ends; demonstrating compliance with legal and other requirements; stating gap analyses in order to enhance diligent and effective dedication towards goal achievement; and enhancing team involvement in all functions at all levels. Documentation should explicate measurement of success and provision of directives to improve where and when necessary.

In order to ensure qualitative record keeping of activities and their effects on the EMS, specific guidelines and standards should be developed to generate documents to provide proof of and validate implementation.

16 SABS (2009) 3.

4.7.9 Establish procedures and means to maintain and control documentation

Specific procedure and means must be instigated in order to ensure that relevant and appropriate documentation is created and maintained with regard to all structural and functioning elements and facets of the EMS. Communication on all such issues of the EMS should be created and disseminated on a regular basis. The creation of documentation, such as progress and evaluative reports, must be implied in the environmental policy, planned and constituted to be produced at different stages and disseminated with dedicated precision. All documentation must be maintained in order to keep record of all activities of the EMS and the effects thereof. Procedures for keeping and maintaining documentation should be standardised.

To ensure proof of activities, the nature thereof and the effects thereof are available at all times, strict control must be kept with regard to documentation of all elements of an EMS. The application of directives on the recording of the contents of reports and other documentation will contribute to quality control of documentation. However, strict control must be implemented to control access to documentation with the purpose of keeping and producing valid proof of all elements, stages and facets of an EMS. Such documents must be kept safely and must be readily available and easy to present.

4.7.10 Develop procedures to deal effectively with significant environmental impacts

The SABS¹⁷ depicts an environmental impact as any change in the environment as a result of one or more organisational environmental aspects related to its activities, products or services, which could interact with environmental hazards in the natural world. Such change could be adverse or positive in nature. The change could be partial or whole in size. Such hazards could be in the immediate or distant environment. For example: organisational activities may disturb the bees in a nearby bee nest which could result in a team of employees getting stung. In contrast, an explosion at a nuclear plant could have a major effect on human life far away from the location of the explosion. Typical environmental impacts are air, ground and water pollution, global warming and ozone depletion.

An organisation needs to establish, develop and implement procedures for dealing effectively with any of the possible environmental impacts that could result from environmental aspects that could flow from its activities, products or services. Specific criteria and methods should be established and applied to determine significant environmental aspects and associated environmental impacts. It is needless to reiterate that the focus in dealing with environmental impacts should be on prevention, coupled with emergency preparedness and emergency procedures, should any foreseeable or unforeseeable environmental impact occur.

¹⁷ SABS (2009) 2.

4.7.11 Develop and assess effectiveness of emergency preparedness and response procedures

Emergency preparedness and emergency response procedures constitute important indispensable elements of any effective EMS. Emergency preparedness and emergency procedures should focus on:

- dealing with safety hazards and unsafe behaviour on site, because they are the culprits that lead to environmental aspects
- mitigating all unacceptable levels of safety risk on site and in the environment in order to prevent any environmental impact
- dealing with incidents and accidents with regard to preventing such occurrences and using lessons learnt as a basis for corrective and preventive action
- communicating on an internal and external basis to keep all interest groups within the organisation, as well as interest groups in the community, informed on the progress and successes of the EMS
- minimising environmental damage of any kind in order to lessen any adverse effects of significant environmental aspects and environmental impacts
- compiling and effectively using lessons learnt from any incident or accident on site or in the environment
- setting regular schedules for testing of emergency response procedures and emergency preparation in order to confirm and validate the efficiency of such plans and implementation
- confirming the effectiveness of evacuation exercises, evacuation routes and associated training via regular training, drills and practical exercises
- testing and proving, via regular practices, the effectiveness of utilising the assistance of contributory external resources (eg neighbouring organisations) in dealing with environmental impacts
- verifying, via regular virtual exercises, the appropriateness of the list of key personnel and aid agencies in the prompt and speedy implementation of emergency response procedures.

An effective EMS requires that all these important issues pertaining to emergency preparedness and emergency response procedures are in place, tested and continuously improved.

4.7.12 Determine the key qualities of operations that could significantly impact on the environment

An organisation needs to determine the key characteristics of the operations that can have a significant impact on the environment. Specific procedures have to be developed in order to monitor and measure the qualities and effectiveness of all

operations and related activities. Information obtained via such monitoring and measurement forms an important basis for developing and implementing corrective and preventive action. Key characteristics to focus on are the effectiveness in managing significant environmental aspects, the contribution in achieving environmental management objectives and targets as well as the extent to which environmental performance is improved. International and national measurement standards applicable to determining the quality of an EMS should serve as criteria for judging effectiveness. All equipment used for measuring effectiveness and quality must be valid and calibrated in accordance with prescribed legal requirements.¹⁸

4.7.13 Evaluate compliance with the view to implement corrective and preventive action

ISO 14000 has no legal authority to enforce compliance; however, the proof of the effective implementation of an EMS comes through confirmation of compliance with applicable legal and other requirements with which the organisation has chosen to comply. Such compliance includes obtaining and applying applicable licences and permits. A specific issue that needs to be clarified is the identification of any non-conformity which occurs when an organisation does not meet or fulfil a requirement. In the event of the identification of non-conformity, the necessary steps need to be put in place to prevent any future occurrences of non-compliance. In the event of the identification of a potential non-conformity, action to prevent such an occurrence needs to be put in place.

4.7.14 Compile and maintain procedures related to listing and keeping EMS records

Keeping records that prove the effectiveness of an EMS forms an essential part of an EMS. Goetsch and Davis¹⁹ stipulate the four levels of documentation and records applied to an EMS. The first level refers to all issues related to an organisation's environmental policy. The second level covers all the procedures that apply to working on and implementing the EMS. Level three focuses on all the practices and work instructions as per relevant levels and functions of employees. Finally, level four provides proof of achievements and associated corrective and preventive actions.

The best way to demonstrate effectiveness is by producing observable proof that underscores the achievement of an organisation's environmental objectives and targets set out in its environmental policy. Observable proof can be presented via written documentation and many forms of technological assistance. SABS²⁰ lists records and documents that state results obtained or that produce evidence of activities that were performed in meeting set objectives and achieving set targets.

18 SABS (2009) 17.
19 Goetsch & Davis (2001) 122.

20 SABS (2009) 4.

An organisation must put in place procedures for identifying, storing, preserving, retrieving, and disposing of EMS records. Procedures to ensure the legibility, identification and traceability of records must be established and maintained.

4.7.15 Design and apply a programme for auditing EMS compliance by qualified auditors

Implementing ISO 14000 goes hand-in-hand with auditing quality. An organisation is required to introduce and operate a system of periodic auditing. The purpose of an audit is to confirm and ensure compliance with applicable legal requirements contained in ISO 14000. Audit reports must inform management about the efficiency of implementing the EMS and serve as a basis for working on continual improvement of the EMS. Audit procedures must be established and applied. Such audit procedures must detail the scope of each audit, the frequency of audits, the methodology of the auditing process, and the requirements and responsibilities for performing the audits and producing the auditing results.²¹ The audit report must state to what extent the EMS achieves its objectives and targets as set out in an organisation's environmental policy, with due consideration to the requirements of the international standards depicted in ISO 14000. An audit report must also verify to what extent such standards have been effectively implemented and maintained. Such results must define the context of a management review of the complete utilisation of ISO 14000 in implementing an EMS.

4.7.16 Establish a review process to ensure EMS efficiency and effectiveness

Management must periodically review an organisation's EMS. The review will focus on the suitability, adequacy and effectiveness in creating opportunities for continuous improvement via valid changes. The focus will be on scrutinising the environmental policy, EMS objectives and targets. Management must review a range of documentation and records in order to evaluate the audit results, the efficiency of its communication, its overall environmental performance, the achievement of objectives and targets, the status and effectiveness of corrective and preventive action, the outcome of previous management reviews, the effectiveness of emergency preparedness and any circumstantial changes that may affect the EMS, and must provide recommendations to improve its EMS.²²

The process of review by management needs to happen frequently throughout the overall implementation of an EMS. Such a review should happen as part of the Plan-Do-Check-Act cycle. This PDCA-cycle, which was developed by Deming,²³ is extensively explained by Kolk.²⁴ This cycle of actions should be implemented with regard to all activities, products, services and procedures. The management review fits into the Check-stage. However, a management review must be applied

21 Goetsch & Davis (2001) 86.
22 SABS (2009) 9.

23 Deming (1982) 54.
24 Kolk (2000) 105-107.

during every element and its sectors. For example, the outcome of management review with regard to organisational resources sets the basis for planning during the development of an organisation's environmental policy. See Chapter 5 for a more detailed explanation of the structure, functioning and application of the PDCA-cycle. This cycle should be applied on a micro and macro level, depending on the focus and associated range of activities. Application of the cycle takes the form of a rising spiral as the focus grows in terms of the range of contents and the level of difficulty.

4.8 Applicability of ISO 14000

ISO 14000 has applicable value for any organisation whose activities, products or services could have an impact on the environment. Such applicability has value for organisations of different sizes and kinds, whether private or public, or informal or formal. ISO 14000 provides guidelines and directives for implementing, maintaining and improving an EMS; ensuring compliance with international standards and elements formulated in the environmental policy; validating and demonstrating compliance to all interested parties, seeking and acquiring registration and certification of an EMS by an external world-renowned institution; and for confirming conformance that an EMS meets the requirements of ISO 14000 as a recognised international standard.

The implementation of the ISO 14000 family of standards has a wide range of applicability and provides a basis for building organisational image and stature on a local, national and international basis.

4.9 Rationale for ISO 14000 registration

Implementing ISO 14000 is optional for all organisations; no organisation can be forced to do so. An organisation has to decide independently whether to dedicate specific resources and finances to undertake such an effort. Once an organisation has decided to implement ISO 14000, it can register and obtain a certification of registration from the ISO. Obtaining certification for implementing ISO 14000 has specific advantages or benefits. Goetsch and Davis²⁵ list the following important benefits for registration and certification:

- The common and general application of the accepted international standard will enhance trade and increase profits.
- Compliance with ISO 14000 requirements increases acceptance of products and services, thereby contributing to a competitive edge and to building an organisation's image and stature.

25 Goetsch & Davis (2001) 9.

- Certification improves credibility pertaining to organisational seriousness about environmental conservation.
- Implementing ISO 14000 contributes to the elimination of challenges and problems with regard to implementing an EMS.
- Following the guidelines and directives contained in ISO 14000 in implementing an EMS reduces liability and risk, as well as associated financial implications.
- The level of acceptable efficiency that goes with implementing ISO 14000 in an EMS will add to profitability and reduce pressure from stakeholders, customers and other environmental interest groups.
- Expenses pertaining to insurance will be less because an organisation can present proof of effectiveness in reducing enterprise risk associated with significant environmental aspects and significant environmental impacts.

4.10 Relationship of ISO 14000 and regulatory requirements

ISO 14000 has no interest in dictating any prescriptions or strategising any objectives for environmental performance to any organisation. This international standard sets guidelines and directives for the effective development, implementation and continual improvement of an organisation's EMS. Regulatory bodies worldwide are inclined to establish environmental regulations that apply to the different countries within which they operate. ISO 14000 was created to assist organisations in managing their EMS in response to, and in accordance with, all applicable regulatory requirements. In order to ensure qualitative uniformity, all registered organisations must comply with ISO 14000, as well as with local government regulations that apply to implementing an EMS. It is the responsibility of each organisation to ascertain, list, explain, communicate and apply all statutory and regulatory requirements that pertain to implementing an EMS in the organisation's country and vicinity of operation. Such legal elements set the scene and context within which the organisation has to develop, implement, maintain and continually improve its EMS. Internal and external auditing of an organisation's EMS must declare and report to what extent an organisation complies with statutory and regulatory requirements that apply to such a particular entity in a specific societal environment.

4.11 Conclusion

From the preceding explanation it is clear that the nature, structure and functioning of ISO 14000 stipulates the international standard for developing, implementing, evaluating and improving an organisation's EMS. Organisations can benefit immensely by tapping into the wide spectrum of expertise and guidance that ISO 14000 offers to help them to implement an EMS effectively.

Review questions

Try your hand at the following in order to help you review the chapter's content:

1. Explain the differences between environmental aspects and environmental impacts.
2. What advantages does registration of an environmental management system with the International Organization for Standardization have for an organisation? Set out a rationale in this regard.
3. List all the elements of ISO 14000 that set guidelines and directives for the effective development and implementation of an environmental management system.
4. Can you set out all the elements of ISO 14000 that need to be addressed when implementing an environmental management system? Explain very briefly in not more than two to three pages.
5. Briefly sketch the origin and objectives of ISO 14000.
6. What does the scope of ISO 14000 entail? Explain.
7. What is the relationship between ISO 14000 and its regulatory requirements? Briefly outline the relationship.

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Chapter Five

The environmental management system

Sarel J Smit

Learning Outcomes

After studying this chapter, you should be able to:

- explain the contents, purpose, structure, functioning and necessity of an environmental management system (EMS)
- understand the applicable terminology that applies to an EMS
- explain the relevance of the Deming Wheel to an EMS
- understand and explain the responsibility of management within an EMS
- outline the importance and value of documentation in an EMS
- clarify the integrity of EMS driving forces that influence change in corporate behaviour
- explain the spiral cyclical nature of an EMS
- motivate that it is important to effectively control the implementation of an EMS.

Overview of this chapter

Chapter 5 explains the nature of an environmental management system (EMS) in its full context. Specific issues that will be focused on are:

- the integration of the Deming Wheel in the implementation of the EMS
- the importance of meticulous and diligent accounting for the effective management of an EMS
- the establishment of a sound and directive company environmental policy
- the rigorous assessment and evaluation of EMS practices
- the indispensable role of an EMS in maintaining a company's competitive edge.

The explanation hones in on the nature and characteristics of an EMS. The focus is on the requirements to implement an EMS effectively, while maintaining links with the Deming Wheel.¹ The preventative and corrective actions needed to sustain an effective EMS are briefly specified. International requirements for implementing an EMS are also briefly listed.

¹ Deming (1982) 54.

The South African National Standard (SANS) 14001:2005,² which is an identical copy of ISO 14001:2004, forms the basis of the explanation of an EMS in this chapter.

5.1 Introduction

The EMS is of international origin. Companies and organisations which endeavour to develop their business to a level of international acceptance and recognition apply an EMS, with a view to achieving an acceptable competitive edge. Modern global society requires that businesses focus on ensuring that the environment is left as far as possible in a state of high quality for generations to come. Chapter 5 provides perspectives on maintaining the quality of the environment via effective implementation of an EMS.

5.2 The structure and functioning of an EMS

An EMS has a fairly unique nature and corresponding structure. As part of an organisation's general management function, an EMS represents all management efforts to develop and implement a planned environmental policy with due focus on dealing with environmental aspects and impacts effectively. An EMS comprises different elements that function on a cyclical basis. The purpose of the total functioning of an EMS is to sustain continual improvement under all possible conditions. The different elements follow one upon the other in consecutive order, although, at times, a return to a preceding element or elements does occur. An EMS has a relative permanent structure in the form of specific elements that are always present as part of the EMS. These elements function as an integrated cyclical system within which all elements affect one another reciprocally.

The basic structure of an EMS appears on the following page. The structure comprises the elements of environmental policy, planning, implementation and operation, checking, management review and continual improvement. These elements function on a systematical and cyclical basis within the framework of the Deming Wheel.³ The phases of the Deming Wheel are Plan-Do-Check-Act (PDCA). The different elements come into play during the different phases of the cyclically systematically functioning Wheel. The structure and functioning of an EMS need to meet specific requirements as depicted in the structure and functioning of an EMS model for sustainable environmental protection.

2 SABS (2005).

3 Deming (1982) 54.

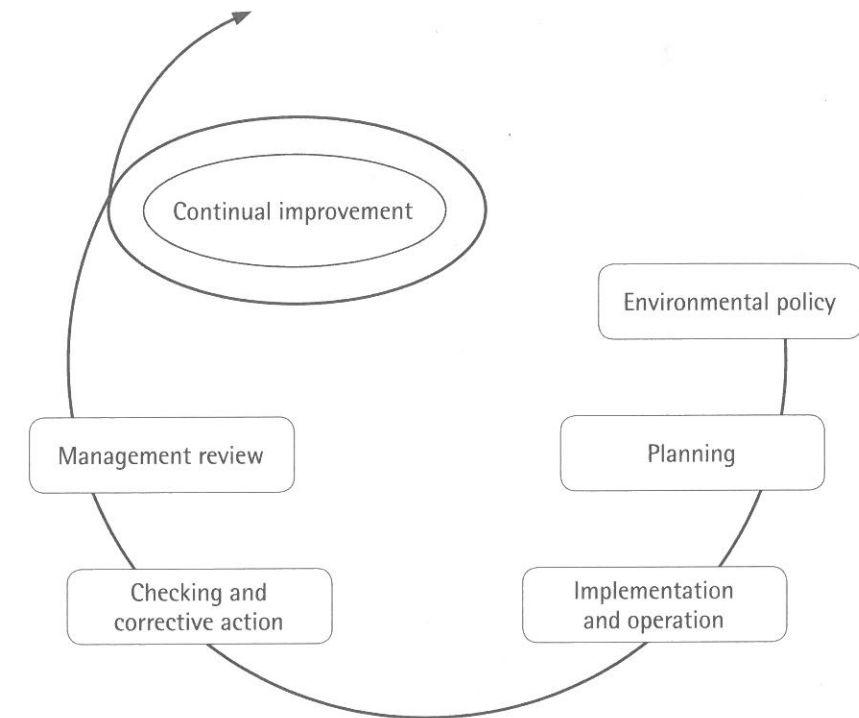


Figure 5.1: Elements of an EMS

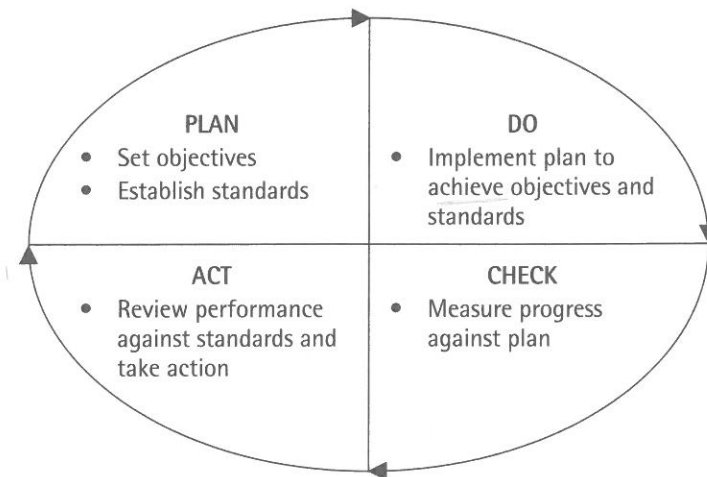
5.3 The context of the Deming Wheel⁴

The PDCA-cycle with its different phases is increasingly recognised by organisations for its strategically important contribution to ensuring consistent quality management.

This functioning cycle provides the context within which an EMS functions. The application of the consecutive PDCA-cycle phases ensures that the EMS is consistently focused on achieving its objectives in accordance with applicable standards. The phases of the Deming Wheel comprise the following elements:⁵

4 Deming (1982) 54.

5 Deming (1982) 54.

Figure 5.2: The Deming Wheel⁶

5.4 Scope of an EMS

The International Standard ISO 14001:2004 sets specific requirements for an EMS to assist organisations to establish and apply an environmental policy and objectives. It focuses on applicable environmental aspects that can have a significant effect on organisational efficiency. The efficiency of an EMS is judged in relation to the scope that a particular international standard implies.

5.5 EMS requirements

When implementing an EMS an organisation must consider specific requirements set out by the international standard mentioned above. Such requirements are in the form of directives, which pertain to establishing, documenting, implementing, maintaining and continually improving an EMS, with due consideration to the suggested prescribing international standard. Particular elements must be put into place.

5.5.1 Environmental policy

An organisation must establish an environmental policy. An organisation is defined as any combination of individuals that forms a legally recognised functioning unit that has recognised functions and administration. Environmental policy is established during the planning phase of the PDCA-cycle. An organisation's EMS policy provides perspectives on intentions and achievements that the organisation will endeavour to attain with regard to environmental performance; this will

⁶ Deming (1982) 54.

demonstrate practically measured results with regard to organisational aspects and related environmental impacts.

Environmental aspects refer to any organisational activities and services that may interact with any environmental hazards and their associated energy exchange. See Chapter 4 for more on environmental hazards.

Environmental impacts refer to any changes that may occur in the environment, whether good or adverse, that may result from dealing with environmental hazards and their energy exchange.

The characteristics of an environmental policy are outlined below:

- The policy correlates with the activities, products or services of an organisation with due consideration to the nature and scale of environmental hazards and the impacts of the associated energy exchange during activities, production or service delivery.
- There is a commitment to continual improvement of all efforts to prevent environmental loss. Top management must demonstrate their intention and dedication to identify and apply the EMS to fit new demands.
- The policy contains an explicit undertaking to comply with legal and other requirements related to environmental aspects and impacts. Such legal requirements may be of local, national or international origin.
- Environmental objectives that correlate with continual reviewing and renewal of environmental targets are set. Proof must be evident that the policy is a working document that provides directives and acknowledgement of policy achievements.
- Proof of documentation of plans is kept, as well as proof of the implementation and maintenance of activities related to all elements of an organisation's EMS, including non-conformities or non-fulfilment of any one or more requirements. Appropriate records must be kept and be available.
- Proof of intentions and practical proof of the communication of all elements of an EMS to all persons working for or on behalf of the organisation must be evident. Regular and reciprocal interaction in either technological or direct personal format is essential to keep the EMS effectively functional.
- The environmental policy must be available to the public. Access must exist for any person to view and comment on the document.
- There should be consultation pertaining to environmental policy contents, objectives and processes with all employees and relevant interested parties and stakeholders, who are internal or external to the company.⁷ Interested parties refer to individuals or groups whose interests could be affected by organisational environmental activities.⁸

⁷ IoDSA (2009) 23–24.

⁸ SABS (2005) 3.

An environmental policy instigates momentum for the application and consistent improvement of an EMS in order for an organisation to achieve and sustain its competitive edge. Blunden and Thirlwell⁹ postulate that a policy statement provides the benchmark for measuring all organisational activities and endeavours. Such EMS policy must depict top management's commitment to realise effective environmental protection under all circumstances.

5.5.2 Planning

An organisation's environmental policy sets the framework for planning the different facets of the EMS. A wide range of activities need to go into planning the execution of the directives and the intentions that are set out in the organisation's environmental policy. Stranks¹⁰ is of the opinion that to be successful an organisation needs to follow a planned and systematic approach to policy implementation. The aim is to prevent and minimise environmental aspects associated with an organisation's activities, products and services. Important issues need to be considered.

Environmental aspects

An organisation needs to identify, implement and maintain specific procedures that flow forth from its environmental policy. Procedures that focus on environmental aspects that can occur when organisational activities, production or service delivery interact with environmental hazards are of particular importance. Procedures specify steps to perform activities or processes. The focus should be on control and preventative measures, especially of those environmental aspects that originate in new or modified procedures related to changes in activities, production and service delivery. The emphasis should be on those environmental aspects that can result in significant adverse environmental impacts on the environment. Keeping a record on an ongoing basis of all such planning is essential in planning for any deviances.

Environmental aspects that can result in significant environmental impacts must receive high priority to ensure the effective implementation of the EMS. Consideration of operating conditions under all circumstances, including shut-downs, commissioning and emergency situations, apply. Any form of environmental pollution, whether air, water or soil/land pollution and environmental loss must be taken into account. The purposeful use and conservation of energy or energies are also of great importance. Due consideration needs to be given to all issues related to the processes and outcomes of activities, products and services that could result in environmental aspects via the handling of environmental hazards. Examples in this regard are the manufacturing, packaging, distribution and disposal of products. Planning must focus on the prevention of potential environmental impacts, as well as on dealing with any effects of actual environmental impacts. Such preventive action focuses on eliminating the likelihood of any nonconformity.

9 Blunden & Thirlwell (2013) 228.

10 Stranks (2010) 61.

Legal and other requirements

Organisational EMS planning must include the establishment and maintenance of specific procedures in order to access and identify applicable EMS requirements, whether legal or any other, to which an organisation may subscribe. Legal requirements may be of local governmental, departmental, national, provincial or international origin. Other requirements may relate to agreements with specific groups or authorities, customers, codes of practice, company requirements, product stewardships, and more. Planning needs to address the applicability and potential effects of environmental aspects associated with an organisation's activities, products and services and the potential environmental impacts thereof on its EMS. The requirements of legal and other types of documentation are of particular significance in this regard.

Objectives, targets and programmes

An organisation must formulate and instigate a measureable EMS policy, based on objectives and targets at all hierarchical functional levels within the organisation. Such objectives and targets, which represent short- and long-term endeavours, must be documented and easily accessible. EMS objectives and targets must be related to legal and other requirements, and must set directives for commitment and for continual improvement. The main focus must be on preventing and minimising environmental impacts via environmental aspects when dealing with environmental hazards during activities, production and service delivery.

In its efforts to achieve EMS objectives and targets an organisation must focus on developing, applying and maintaining one or more programmes with specific procedures. Programmes should specify the designation of responsibility and accountability for the realisation of objectives and targets at applicable function levels in the organisation. Specifying time frames for achieving objectives and targets must be an integral part of all programmes. The PDCA-cycle must be utilised in planning and implementing each programme. The different characteristics of project management phases of planning, designing, constructing, commissioning, operation evaluating, decommissioning, and management reviewing could apply in implementing programmes.

Programmes need to be in place for the implementation of each element of the EMS and the utilisation of the PDCA-cycle. Specific objectives, targets and procedures should apply to each element and cycle in order to determine the effectiveness of the EMS.

5.5.3 Implementation and operations

Implementation and operations within an EMS forms part of the Do-phase of the Deming Wheel.¹¹ There are a number of particular issues pertaining to the operations of and implementation of an EMS.

11 Deming (1982) 54.

Resources, roles, responsibility and authority

All applicable and adequate human, technological, infrastructural and financial resources must be made available to practically implement an EMS in its total context. Responsibilities, authority and accountability must be clear pertaining to positions at different hierarchical levels. This particularly applies to top management representatives in the EMS team. The EMS team must ensure that an appropriate EMS is established, effectively applied, and maintained as required by the International Standard ISO 14001:2004. Regular reporting on the effectiveness of the EMS is an essential part of implementing the EMS. Such consistent feedback forms the basis of management reviews and leads to continual improvement of the EMS.

Competence training and awareness

All staff involved in implementing an EMS must acquire and maintain relevant expertise (training and experience). Records must be kept of their existing and ongoing competence. Such competence must directly relate to the needs and requirements of implementing an EMS effectively. Procedures must be implemented to ensure that all relevant staff is kept aware of the following issues:

- the effects of non-conformity with the requirements of the EMS, which are listed in the environmental policy, procedures and international requirements
- the existence of significant environmental aspects and their potential environmental impacts (in terms of likelihood and severity), with due emphasis on the effective and continual improvement of performance
- the importance of their roles and responsibilities in effectively implementing the EMS according to specified procedures.

Communication

In order to keep staff informed about the implementation of an EMS, an effective internal organisational communication system involving all positions at all hierarchical levels must be developed and maintained. The consistent sharing of information on implementation, progress and improvement is crucial for achieving EMS objectives and targets. The development of procedures for communication with external sources and interested groups can be established in accordance with the needs of, and agreements with, such entities.

Documentation

Documentation on the implementation of an EMS must include the following:

- the basic values, intentions and directing objectives and targets specified in the environmental policy

- the EMS scope that defines the focus of investment of resources of different kinds for a range of environmental objectives and targets
- an explanation of the nature and interactive functioning of the main elements of the EMS, with reference to applicable documents
- all documentation required by the International Standard ISO 14001:2004 to verify international accountability
- all organisationally required documentation, including records that relate to the effective development, implementation, maintenance and improvement of the EMS.

Control of documents

An organisation must keep control of all documents in connection with the development and implementation of an EMS in accordance with the International Standard ISO 14001:2004, as specified in paragraph 5.5.3.4. In this regard, an organisation must develop and maintain appropriate procedures to create and control all documentation related to the implementation of the EMS. Procedures must focus on the following:

- clarification and validation of the adequacy of all documents by the appointed authorities at different functional levels before such documents are used; such consent confirms reliability
- confirmation of the revision, reviewing, updating and reapproval of documents on an ongoing basis to ensure continual improvement
- confirming and ensuring the availability of copies of relevant current and revised documents whenever necessary
- ensuring that documents are correctly identifiable and fully legible at all times
- ensuring that documents that originate externally to the organisation are relevant to the EMS and are correctly distributed to the different functional levels within the organisation
- reviewing documents to ascertain whether they have become obsolete and are therefore no longer valid; preventing the application of such documents in the EMS.

Operational control

An EMS must concentrate on establishing operations that relate to environmental aspects and their potential environmental impacts that are identified as significant in terms of organisational environmental policy, objectives and targets. Care must be taken to ensure that such operations are applied correctly under all circumstances. In order to ensure such control, all procedural steps in all operations must be documented to give execution to environmental policies, objectives and

targets. The criteria that apply during operations must also be stipulated in writing. Procedures and operational requirements that apply within all operations related to potential environmental impacts that may flow from significant environmental aspects associated with organisational activities, products and services must be developed and communicated to all entities involved or to those who have a vested interest in the implementation and outcome of the EMS. Operational control contributes to ensuring the effective achievement of EMS objectives and targets.

Emergency preparedness and response

In order to identify and deal with emergency situations and potential environmental impacts, an organisation must put appropriate procedures in place. Applicable operations with relevant procedures must be developed and applied in dealing with emergency situations and environmental impacts, in order to prevent or mitigate potential or actual environmental loss. With the focus on continual improvement, the organisation must instigate regular reviews to revise the effectiveness of emergency preparedness, as well as the response procedures to emergency situations. This applies specifically after immediately dealing with an emergency situation. The regular testing and possible revision of emergency response procedures must form part of the effective implementation and continual improvement of an EMS.

5.5.4 Checking

Checking, the third step in the Deming Wheel, focuses on determining the efficiency of the development and implementation of an EMS.¹² Checking focuses on the following specific issues of an EMS.

Monitor and measure progress

It is important that the organisation monitors the applicability, validity and effectiveness of EMS practices in dealing with significant environmental impacts via the development and implementation of control and measuring procedures. Applicable documentation of all monitoring activities and the measurements of effects form essential parts of the checking element of an EMS. The appropriate validity and calibration of monitoring and measurement equipment must also be verified and documented.

Evaluation of compliance

The following issues pertaining to compliance need to receive attention:

- Commitment to compliance forces the organisation to put appropriate procedures in place to evaluate compliance to applicable legal requirements on a regular basis and to produce documentation on the outcome of such checking.

¹² Deming (1982) 54.

- An organisation must also determine its compliance to all other requirements to which it subscribes and must produce the appropriate outcomes of such checking of documentation.

Action to correct and prevent non-conformities

An organisation must outline procedures to deal with potential and actual non-conformities, as well as to implement preventive and corrective action. Such procedures will stipulate requirements pertaining to the following:

- dealing with non-conformities, with the focus on mitigating the effects of their environmental impacts
- identifying the causes of non-conformities through incident analysis and applying appropriate actions to prevent the recurrence of such non-conformities
- determining whether a need for the prevention of non-conformities exists and instigating actions to prevent their occurrence
- documenting the procedures and actions taken to correct or prevent non-conformities, together with the results of such interventions
- validating the effectiveness of action(s) taken to prevent or correct non-conformities.

All preventive and corrective actions must directly relate to the significance and loss potential of environmental impacts foreseen or dealt with. EMS documentation must be changed and adjusted in accordance with all newly identified issues pertaining to the handling of non-conformities.

Record control

An organisation must generate applicable documental proof in order to confirm conformity to all the requirements that apply within an EMS, whether legal, self-determined or those relating to the International Standard ISO 14001:2004; the results that were achieved must also be recorded. Appropriate procedures must be instigated, applied and maintained to ensure that records related to all activities involved in implementing an EMS are kept in an acceptable functional condition.

Internal audit

Pain¹³ suggests that auditing represents a unique opportunity to assess an organisation's performance with regard to its EMS. Fuller and Vassie¹⁴ specify that internal auditing delivers support to management with regard to the achievement of organisational objectives and targets. Implementation of the EMS requires that internal auditing of such implementation be applied at stipulated intervals.

¹³ Pain (2010) 111.

¹⁴ Fuller & Vassie (2004) 377.

Auditing forms an integral part of the Check-phase of the Deming Wheel.¹⁵ Such auditing is necessary in order to verify the congruency of the planned arrangements and procedures of the EMS in accordance with the International Standard ISO 14001:2004. Furthermore, an audit must determine to what extent an EMS has been effectively implemented. The outcome of the audit will serve as a basis for a management review of the overall EMS. The objectivity and impartiality of EMS auditors and the auditing process are non-negotiable in order to deliver valid information concerning the achievement of objectives and targets, as well as shortfalls that require intensive management review. The effectiveness of an audit is determined by its focus on continual improvement with specific reference to the prevention and reduction of non-conformities.¹⁶

5.5.5 Management review

Determining the continuing applicability, quality and effectiveness of an EMS is an essential function of top management. Management performs such responsibility via management reviews at predetermined intervals. Such overviews serve as bases for decisions on improvements and adjustments of the EMS. Management reviews need to be intensive and extensive. Geller¹⁷ indicates that continual improvement requires valid evaluation. Changes may apply to the environmental policy, objectives, targets and procedures. The outcome of management reviews and decisions about change need to form part of EMS overall documentation.

Management reviews of an EMS must consider the following:

- the outcome of internal audits, especially assessment of legal compliance (eg with ISO 14001:2014) and compliance with any other self-determined requirements
- information (eg recommendations and complaints) provided by interested parties external to the organisation
- success in achieving objectives and targets as the basis for determining the efficiency of an EMS
- the relevance of, and progress in, applying corrective and preventive actions
- the extent to which recommendations of previous reviews have been implemented
- any new or changing conditions and circumstances, especially changes in legal requirements that apply to environmental aspects and changes to environmental impacts
- directives to improve the EMS and to advance continual improvements in order to sustain a competitive edge

15 Deming (1982) 54.

16 Pain (2010) 109.

17 Geller (1998) 119.

- accident statistics, related recommendations, lessons learnt and effectiveness of the implementation of recommendations
- corrective actions and their effects carried out since the previous review
- recorded instances of any ineffective procedures, with a view to improvement
- the adequacy of emergency procedures as a basis for determining emergency preparedness.

Management reviews must in all cases focus on recommendations with regard to environmental policies, objectives, and targets and associated changes to any one or all elements of an EMS, thereby demonstrating that they are committed to continual improvement.

5.5.6 Continual improvement

Pain¹⁸ contends that continual improvement represents a process of improvement that is ongoing and that never ends. Continual improvement is an integral part of the Act-phase of the Deming Wheel¹⁹ because recommendations of management reviews are implemented by EMS actions. Management needs to be fully committed to and focus on creating an organisational culture of continual improvement. The emphasis must be on advancing performance in order to improve the EMS and to phase out weaknesses that adversely impact on the implementation of an EMS.²⁰ Maintaining qualitative development and implementation of an EMS is the ultimate endeavour of an organisation. Continual improvement to keep abreast with innovation and to sustain a competitive edge in terms of products and services is absolutely essential.

As depicted in Figure 5.3, the process of developing and sustaining an effective EMS takes place in the context of an inclining spiral. The management review provides the directives and guidelines for increasing the quality of an EMS to an advanced level of effectiveness. Such spiralling runs consecutively with the phases of the PDCA-cycle.

18 Pain (2010) 126.

19 Deming (1982) 54.

20 Fuller & Vassie (2004) 393.

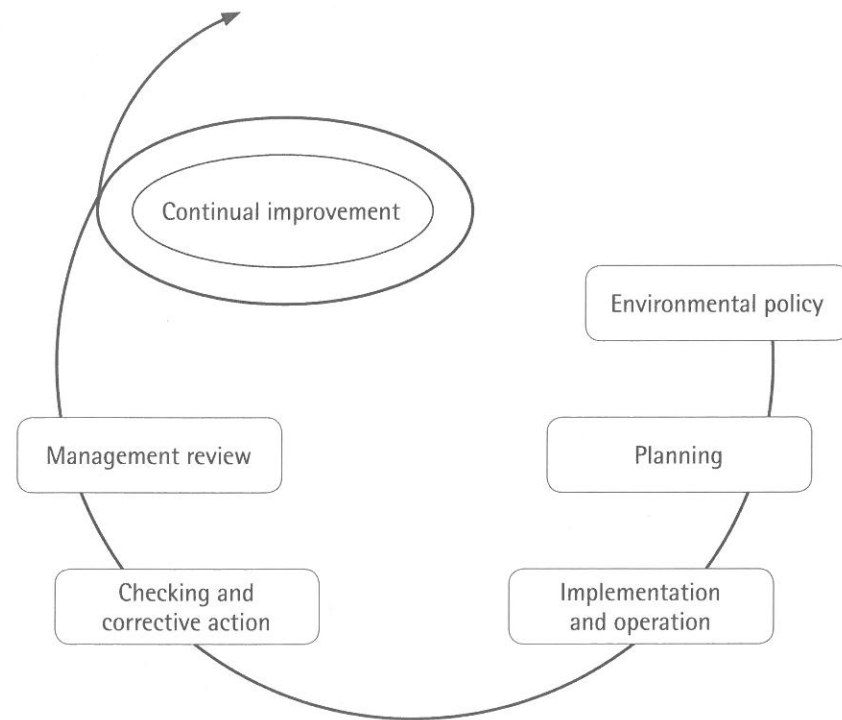


Figure 5.3: An EMS spirals to advanced levels of effectiveness

5.6 Conclusion

This chapter has focused on the nature and functioning of an EMS. The context of the PDCA-cycle of the Deming Wheel²¹ was incorporated into the discussion. The role and effects of the International Standard ISO 14001:2004 were also highlighted. The importance of an EMS policy and the consistent measurement to determine progress and success were also explained. The leading contribution of top management in determining and enhancing the effectiveness of an EMS was clearly elucidated. Finally, the focus on the effectiveness and continual improvement of an EMS to sustain organisational continuation was discussed.

Review questions

1. What elements constitute an environmental management system and how do they relate to one another? Use a diagram to support your answer.
2. Explain the functioning of the Deming Wheel.

²¹ Deming (1982) 54.

3. Clarify where the different phases of the PDCA-cycle link in with the elements of an environmental management system.
4. Why should a management review focus on continual improvement?
5. An internal audit represents organisational efforts to check to what extent an environmental management system policy statement is being realised. Is this statement true or false? Motivate your choice.
6. What international institution sets legal requirements that management must consider and apply in an organisational environmental management system? Explain.

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Chapter Six

Pollution and waste management

Elriza Esterhuyzen

Learning Outcomes

After studying this chapter, you should be able to:

- provide a brief overview of pollution and waste management
- define pollution
- describe the types of pollution
- explain the relevance of the National Environmental Management: Air Quality Act 39 of 2004 (Air Quality Act) regarding air pollution
- indicate the importance of the National Water Act 36 of 1998 (Water Act) and the Water Services Act 108 of 1997 (Water Services Act) with regard to water pollution
- explain the applicability of the Environmental Management: Biodiversity Act 10 of 2004 (Biodiversity Act) with regard to soil pollution
- indicate the relevance of the Environment Conservation Act 73 of 1989 regarding noise pollution
- define waste
- elucidate the importance of the National Environmental Management: Waste Act 59 of 2008 (Waste Act)
- elaborate on sustainable development
- describe business strategies for managing pollution and waste
- explain some consequences of polluting practices
- explain the meaning of the 'cradle to grave' and 'polluter pays' principles.

Overview of this chapter

Waste and pollution are two aspects of environmental concern that need to be managed properly. This chapter will clarify the meaning of pollution and waste and indicate some of the types of pollution. As sustainable development is of great importance, waste and pollution should be incorporated into business strategies in order to ensure that corporate social responsibility is taken into account and also to ensure legal compliance. This chapter will briefly depict some applicable legislation and business strategies with regard to pollution and waste.

6.1 Introduction

Due to the ever-increasing global population rate and industrialisation, more strain is constantly being put on the environment. More waste is generated, and coupled with increased pollution rates, has led to rapid environmental degradation and social as well as economic problems.

6.2 Pollution and waste management – a brief overview

As indicated in Chapter 1, everyone has the constitutional right to have an environment that is not harmful to his or her health and to have the environment protected for the benefit of present and future generations. Section 24(a) of the Constitution¹, as well as the Waste Act, indicate that this is achieved by reasonable legislative and other measures that:

- prevent pollution and ecological degradation
- promote conservation
- secure ecologically sustainable development and the use of natural resources, while promoting justifiable economic and social development.

Pollution prevention (or minimisation) and the control of the potential impact of waste are the responsibility of all sectors of society. Private households, businesses and industry (such as mining) impact on the environment. Both pollution and waste management are regulatory requirements and therefore necessitate careful consideration.

6.3 Definition of pollution

The National Environmental Management Act (NEMA) defines pollution as any change in the environment caused by:

- substances
- radioactive or other waves
- noise, odours, dust or heat.

The above can be the result of:

- any activity, including the storage or treatment of waste or substances
- construction
- provision of services.

The above can be caused by:

- any person or
- organ of state.

¹ Constitution of the Republic of South Africa, 1996.

Such a change in the environment has, or will in the future have, an adverse effect on:

- human health or well-being
- the composition, resilience and productivity of natural or managed ecosystems
- materials useful to people.

From the above, it can be seen that pollution is much more than what one can see at any given point in time. This definition specifically includes negative effects on the environment that might only be realised in future.

6.4 Types of pollution

Pollution can take many forms. The air that we breathe, the water that we drink and use, the ground in which we grow our food, and even the increasing noise we hear every day, to name a few. These all contribute to a lower quality of life and to health problems. In this section, we will briefly look at some of the major types of pollution: air, water, soil and noise pollution.

6.4.1 Air pollution

Air pollution is seen as 'the condition in which air is contaminated by foreign substances, or the substances themselves. Air pollution consists of gaseous, liquid, or solid substances that, when present in sufficient concentration, for a sufficient time, and under certain conditions, tend to interfere with human comfort, health or welfare, and cause environmental damage. Air pollution causes acid rain, ozone depletion, photochemical smog, and other such phenomena.'² The Air Quality Act states that air pollution encompasses any change in the composition of the air which could be caused by, among others, solid particles, gases, fumes and dust.

6.4.2 Water pollution

Water pollution is defined as 'the presence in water of harmful or objectionable material in sufficient quantity to measurably degrade water quality.'³ The Water Act further indicates that water pollution includes direct and indirect changes to the physical, chemical or biological properties of any water resource.

6.4.3 Soil pollution

Soil pollution is mainly due to the presence of man-made waste. Soil, which has different names such as ground, dirt and mud, mainly becomes contaminated due to humans. Waste produced by nature itself, such as dead animals, plants and

² Business Dictionary (2015).

³ Business Dictionary (2015).

rotten fruit, actually increases the fertility of the soil. Man-made waste contains chemicals, not naturally found in nature, thus causing soil pollution.⁴ The main causes of soil pollution are: industrial activities, agricultural activities, waste disposal, accidental oil spills and acid rain; the effects of soil pollution include: the effect on human health, the effect on plant growth, decreased soil fertility, toxic dust and changes in the structure of soil.⁵

6.4.4 Noise pollution

Noise pollution is seen as any noise that is disturbing or excessive and may negatively impact on human or animal life. Excessive noise levels might lead to cardiovascular effects and elevated blood pressure in people, among other conditions. Such pollution affects health and behaviour, damages psychological health and leads to increased levels of stress.⁶ Any noise which disrupts normal activities, such as conversation and sleep, can be seen as noise pollution. A noise nuisance is seen as 'any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person'.⁷

6.5 National Environmental Management: Air Quality Act 39 of 2004

The National Environmental Management: Air Quality Act 39 of 2004 (Air Quality Act) sets out to protect the environment by providing reasonable measures for pollution prevention, the prevention of ecological degradation and securing ecologically sustainable development. All of the above should be achieved while enhancing economic and social development. Furthermore, the Air Quality Act provides national norms and standards for the regulation, management and monitoring of air quality in South Africa.

The quality of the ambient air in parts of South Africa does not provide for a healthy environment for the people living in those parts of the country. The Air Quality Act further indicates that the poor are mostly affected by the polluted air. Air pollution leads to high social, economic and environmental costs. Air pollution should be minimised through control, technology and production processes that are cleaner. Legislation (such as the Air Quality Act) protects the environment and ensures that the ambient air is not harmful to the health or well-being of people.

Businesses should ensure that they adhere to applicable legislation in order to minimise the pollution that they cause. Each business should include an air quality management plan (AQMP) in their environmental management plan. According to the Air Quality Act, such an AQMP must ensure the following:

⁴ Conserve Energy Future (2015) 1.

⁵ Conserve Energy Future (2015) 2-4.

⁶ Mann (2014) 1.

⁷ Noise Control Regulations GN R154 of 1992, in terms of s 25 of the Environment Conservation Act.

- improve air quality
- identify and reduce negative impacts on human health and the environment
- address issues arising from the use of fossil fuels in residential areas
- address issues with regard to emissions from industrial sources
- implement South Africa's obligations in respect of international agreements
- ensure that best practice is followed with regard to air quality management.

6.6 National Water Act 36 of 1998 and Water Services Act 108 of 1997

The National Water Act 36 of 1998 (Water Act) states that the control of water resources should focus on sustainability and equity, as the guiding principles, with regard to the protection, use, development, conservation and management of water. By adhering to the guiding principles of sustainability and equity, the basic human water needs of the present and future generations should be protected and fulfilled. The Water Act also indicates that social and economic development should be promoted through the use of water resources. Water resource management needs to be implemented to ensure the sustainable use of water for the benefit of all users.

As is well known, water is a scarce resource and is unevenly distributed nationally (some areas of South Africa have a lot of water and others do not). Care needs to be taken in order to conserve water. Conservation of water includes the efficient use of water and the saving of water, which can be achieved by taking appropriate measures such as implementing water efficient processes; managing the demand for water; making use of water saving devices; and rationing water.⁸

As described above, water pollution refers to the direct or indirect change to the physical, chemical or biological elements of a water resource. The Water Act indicates that such water pollution causes water to be:

- less fit for any purpose for which it could reasonably be used
- harmful or potentially harmful to the health, safety and/or welfare of humans; to any organisms in the water; to the quality of the resource; and to property.

The Water Services Act 108 of 1997 (Water Services Act) makes provision for the rights of access to basic water supply and basic sanitation in order to ensure an environment that is not harmful to health and well-being. Basic sanitation refers to the 'prescribed minimum standard of services necessary for the safe, hygienic and adequate collection, removal, disposal or purification of human excreta, domestic waste-water and sewage from households'. Basic water supply refers to the 'prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity and quality of water to households' which is

⁸ Water Act, s 1(1).

necessary to support life and for personal hygiene. It is important to note that both rights (basic water supply and basic sanitation) also apply to informal settlements.

As previously mentioned, it is the poor who suffer most from the adverse effects of pollution. The Water Services Act also makes provision for the disposal of industrial waste water which needs to be collected, removed, disposed of or treated in such a way as to avoid or minimise pollution.

6.7 National Environmental Management: Biodiversity Act 10 of 2004

The National Environmental Management: Biodiversity Act 10 of 2004 (Biodiversity Act) supports the conservation of both plant and animal biodiversity, also including the soil and water upon which it depends. This Act further sets out to enhance the sustainable use of indigenous biological resources and the fair and equitable sharing of benefits involving these resources.

The sustainable use of biological resources implies the use of resources in such a way and at such a rate that does not lead to long-term decline, that does not change the ecological integrity of ecosystems and that ensures that the needs of present and future generations of people will be met. Pollution and waste must clearly be managed in such a way that the sustainability of these biological resources is not harmed.

6.8 Environment Conservation Act 73 of 1989

The environment is defined in the Environment Conservation Act 73 of 1989 as the sum of all surrounding objects, conditions and influences that may affect the life and habits of humans or of any other organism or collection of organisms. As any kind of pollution may affect the life of humans or any other organism or collection of organisms, the management of pollution is clearly necessary. Furthermore, section 25 of this Act indicates that noise (also vibration and shock) must be prevented, or if prevention is not possible, it should be reduced or eliminated.

6.9 Definition of waste

In a general sense of the word, waste refers to anything that is no longer required and is therefore discarded. The decision to discard something can be a decision that is taken lightly, without really thinking about it, for example throwing away an empty can. The decision to discard something can also take a lot of thought before deciding to throw it away, for example deciding to throw away a family heirloom that is no longer of any use.

The National Environmental Management: Waste Act 59 of 2008 (Waste Act) defines waste as any substance, whether or not that substance can be reduced, re-used, recycled and recovered:

- that is surplus, unwanted, rejected, discarded, abandoned or disposed of
- which the generator has no further use of for the purposes of production
- that must be treated or disposed of
- that is identified as a waste by the Minister by notice in the *Government Gazette*, and includes waste generated by the mining, medical or other sectors.

It is important to note that the Waste Act further indicates that a by-product is not considered waste; and that any part or portion of waste that has been re-used, recovered and recycled is no longer considered waste.

6.10 National Environmental Management: Waste Act 59 of 2008

The minimisation of pollution and the minimisation of the use of natural resources are priorities in the National Environmental Management: Waste Act 59 of 2008 (Waste Act). In order to ensure that the environment is protected from the impact of waste, the Waste Act indicates that the following should be implemented:

- vigorous control measures
- cleaner technologies
- cleaner production and consumption practices
- waste minimisation.

The Waste Act sets out to:

- reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development
- provide for institutional arrangements and planning matters
- provide for national norms and standards for regulating the management of waste by all spheres of government
- provide for specific waste management measures
- provide for the licensing and control of waste management activities
- provide for the remediation of contaminated land
- provide for a national waste information system
- provide for compliance and enforcement
- provide for matters connected therewith.

Waste management practices in many areas of South Africa are not conducive to a healthy environment; such improper waste management practices impact disproportionately negatively on the poor. Such negative impacts may reflect locally as well as globally (such as global warming).

It is important to remember that waste can, under certain circumstances, be a resource and as such offer economic opportunities. An example of this is when cooldrink cans are recycled to produce other products. As mentioned earlier, waste (such as discarded cans) stops being waste as soon as it is recycled.

The Waste Act indicates that waste and related waste management practices are matters that:

- require national legislation to maintain essential national standards
- require uniform norms and standards that apply throughout the country, in order to be dealt with effectively
- have to apply uniformly, in order to promote and give effect to the right to an environment that is not harmful to health and well-being
- require strategies, norms and standards which seek to ensure best waste practices within a system of co-operative governance.

From the above, it is clear that the regulation of waste management practices should be applied throughout South Africa and is the responsibility of all entities generating waste (including individuals, businesses and the government).

The objective of the Waste Act is to protect health and well-being, as well as the environment, by promoting the following measures (this list is not exhaustive as further measures are included in s 2 of the Waste Act):

- Keep consumption of natural resources to a minimum.
- Avoid or minimise, if it cannot be avoided, the generation of waste.
- Reduce, re-use, recycle and recover waste; treating and disposing of waste is a last resort.
- Prevent pollution as well as ecological degradation.
- Make sure that development is undertaken in an ecologically sustainable way, while also promoting economic and social development that is justifiable.
- Ensure remediation of polluted land.
- Ensure waste management reporting and planning.
- Ensure that people are aware of the impact that waste might have on their health and well-being and on the environment.

6.11 Sustainable development

Sustainability is seen as being able to grow and endure, while taking care of the present generation and those to come, and is key to economic and social development while protecting the natural environment.⁹ Sustainable development,

⁹ Sernau (2014) 354.

according to the National Environmental Management Act 107 of 1998 (NEMA) should ensure that the environment is preserved for present and future generations. In ensuring this, social, economic and environmental factors must be integrated when planning, implementation and decision making is undertaken.

This is reiterated in the Waste Act, as it indicates that sustainable development requires that the generation of waste must be avoided, or where it cannot be avoided, that it is reduced, re-used, recycled or recovered; only as a last resort is it treated and safely disposed of. Development should be sustainable and should be carried out in such a way that the environment is protected for present and future generations by, for example, effective waste and pollution management.

South Africa is currently experiencing an unsustainable scenario in which the supply of natural resources is decreasing and the demand for these resources is constantly increasing. Pollution and waste are two of the factors leading to a decreasing supply of natural resources as it leads to contamination of natural resources, which in turn leads to less resources being available. One example of this is the contamination of drinking water. If drinking water gets contaminated, it may no longer be fit for human consumption.

Pollution and waste can have devastating effects on the quality of human, animal and plant life. It can lead to diseases and death; economic losses (for example in the tourism industry – no one wants to visit a polluted wetland where all animals and plants are sick and/or dying); the depletion of natural resources; and long-term financial burdens (refer to the 'polluter pays' principle below). Soil pollution may lead to less soil that is conducive for farming purposes, leading to a shortage of food for the population.

Businesses and individuals alike may encounter legal liabilities if they do not comply with legislation applicable to pollution and waste. They may be unaware of such legislation or they may hope to get away with their actions. However, ignorance is not an acceptable defence when in contravention of a legal liability. Managers, in particular, should be aware of applicable legislation in order to ensure compliance to avoid prosecution and/or fines.

Sustainable development is of great importance as it indicates the ability of a generation to take care of its own needs and to do so without compromising the ability of future generations to take care of their needs.¹⁰

6.12 Managing pollution and waste – business strategies

As pollution is caused by waste, we will look at some of the legal regulations which apply to businesses. The Waste Act specifically mentions business waste as being waste coming from premises that are used mainly (or totally) for commercial, retail, wholesale, entertainment or government administration purposes. Waste management includes waste collection, treatment, recycling and disposal. In terms of

¹⁰ Sernau (2014) 356.

the Waste Act, disposal of waste includes the 'burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land'. Businesses need to take special care to ensure legal compliance with regard to waste.

In order to deal with waste in a legally compliant way, businesses need strategies. This can include plans, objectives, guidelines, systems and procedures. Provision is made in the Waste Act¹¹ for the preparation of waste management plans aimed at avoiding or minimising the generation of waste, reducing negative impacts on health and the environment and conserving natural resources.

6.12.1 Elements of a waste management plan

Section 30 of the Waste Act outlines what should be included in a business's waste management plan. These elements include:

- the amount of waste that is generated
- measures to prevent pollution as well as ecological degradation
- targets for waste minimisation (through waste reduction, re-use, recycling and recovery)
- programmes to minimise the generation and final disposal of waste
- reduction of waste by changes to packaging, product design and/or production processes
- informing the public of the impact of waste-generating products or packaging on the environment and the financial contribution that needs to be made in order to support consumer-based waste reduction programmes
- the period that is required for the implementation of the waste management plan
- methods for monitoring and reporting the waste management plan.

From the above elements, it can be seen that pollution prevention should form part of the waste management plan of businesses.

6.12.2 Waste management activities

Waste management activities are listed in the Waste Act¹² in order to ensure that businesses do not undertake any such activities without meeting the set standards or having a waste management licence, if required.¹³ As waste can easily lead to pollution, the following are some of the activities listed as waste management activities and are regulated: transportation of waste; accumulation and storage of waste; transfer of waste; disposal of waste; treatment of waste; collection and handling of waste; reduction, re-use, recycling, and recovery of waste; and also the generation of waste.

¹¹ Waste Act, s 28.

¹² Waste Act, Schedule 1 & s 19.

¹³ Waste Act, s 20.

6.12.3 Integrated waste management (IWM)

Integrated waste management (IWM) refers to a holistic and integrated system (refer to the Deming PDCA-Cycle in Chapter 1) which is aimed at the prevention and minimisation of waste impacts during the entire life cycle of products and is driven by the need for sustainable development. In order to achieve such a holistic approach to sustainable development, social, financial and environmental aspects should be taken into consideration. Section 12 of the Waste Act outlines the content of an IWM plan. An IWM plan should include the following:

- a description of the population and development profiles of the area to which the plan relates
- an assessment of the quantities and types of waste that are generated in the area
- a description of the services related to waste collection, minimisation, re-use, recycling and recovery, treatment and disposal.

The IWM approach is linked to the principle of 'cradle to grave' as discussed below.

6.13 Consequences of polluting practices

Businesses need to be competitive in order to survive. However, polluting practices may have devastating consequences for businesses. As indicated above, businesses need to be legally compliant in order to avoid prosecution and liability. Besides this, being identified as a polluter and causing harm to the health and well-being of people and/or to the environment (contamination and degradation of scarce natural resources) may lead to the destruction of a business's public image, a drop in share prices (if applicable) and long-term financial implications. The 'polluter pays' principle discussed below will explain this point in more detail.

6.14 'Cradle to grave' principle

A business is responsible for its products from creation to disposal, in other words, throughout the entire life cycle of a product.¹⁴ This means that as we have the right to use natural resources, we have the responsibility to prevent environmental harm. In a business context, a business should take responsibility from the conception of a product right through to the end of its life cycle. Businesses should be moving towards a 'cradle to cradle' approach and recycle products instead of sending them to their grave. One example of how this can be achieved is when a business produces printer cartridges; it can buy back the used cartridges from its customers in order to recycle and re-use them.

¹⁴ Business Dictionary (2015).

6.15 'Polluter pays' principle

This is the rule that says the cost of pollution control, prevention, and remediation should be borne by the entity which profits from the process that causes the pollution.¹⁵ It is important to note here that this principle does not give anyone the right to pollute, even if there is money to pay for the cost of such pollution. If a business wants to produce something, for example recycling motor vehicle tyres to manufacture floor covering, and the community feels that it might pollute the air, the burden of proof lies with the business that the activity will not cause pollution. The business will be liable for any damage caused by their actions.

As discussed previously in the definition of pollution, pollution may not be immediately visible. However, even if the pollution only becomes apparent later, the polluter will still have to pay. Remember that 'paying' does not only include money; it can also include legal responsibilities and associated fines and/or imprisonment. Furthermore, the business stays responsible, even when making use of contractors.

6.16 Conclusion

This chapter showed that it is possible to manage waste properly and to integrate this into business strategies. As sustainable development is of great importance, waste and pollution management should be incorporated into business strategies in order to demonstrate corporate social responsibility and to ensure legal compliance. The needs of growing populations place increased strain on the environment; sustainability measures and legal compliance become ever more vital. Not only will current and future generations be responsible for their own sustainable development and waste management, but they will also have to find a way to deal with the damage caused by past generations.

Review questions

1. Define pollution.
2. Describe the different types of pollution and give an example of each type.
3. Explain the relevance of the National Environmental Management: Air Quality Act 39 of 2004 (Air Quality Act) regarding air pollution.
4. Indicate the importance of the Water Act and the Water Services Act with regard to water pollution.
5. Explain the applicability of the Biodiversity Act with regard to soil pollution.
6. Indicate the relevance of the Environment Conservation Act 73 of 1989 regarding noise pollution.

¹⁵ Business Dictionary (2015).

7. Define waste.
8. Elucidate the importance of the Waste Act with regard to waste management.
9. Explain the concept of sustainable development.
10. What are the business strategies that can be utilised in managing pollution and waste?
11. Explain some of the consequences of polluting practices.
12. What is meant by the 'cradle to grave' and 'polluter pays' principles?

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Chapter Seven

Impact of industry and agriculture on the environment

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Learning Outcomes

After studying this chapter, you should be able to:

- elicit and define the important terms relevant to climate change and the impact of human activity on the environment
- explain the importance of biodiversity
- briefly explain the impact of various industries on the environment
- explain the differences between natural and agroecosystems
- identify and explain the impact of the great ocean conveyor belt on climate and how this acts as proof of the human-induced climate change phenomenon
- state the causes of climate change and how climate change impacts on the environment and on economies
- provide a brief overview of the applicable legislation, agreements and protocols
- implement business strategies that will minimise the impact of industry.

Overview of this chapter

The focus of this chapter is the impact of human activity on the environment. These activities, both industrial and agricultural, can be reduced by implementing responsible business practices. The endeavour is to explain climate change at a very basic level and to expand on the role businesses and individuals can play to limit the emission of greenhouse gases. The responsibility businesses and individuals have towards the environment will also be discussed.

7.1 Introduction

It is important to understand that human activity has a great impact on the environment. Understanding the extent of this impact and how it can be managed is the first step towards becoming responsible global citizens. This chapter provides a very brief overview of the damage human activity is inflicting on the environment, as well as how this damage might be mitigated and possibly reversed. In order to understand the full extent of the impact human activity has on the environment, this chapter will investigate the impact of industry, agriculture and human-induced climate change.