UNIT-7 Environmental Management Systems

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Identify key elements of EMS
- ✓ Understand ISO Standards

Unit 7

Environmental Management Systems

Introduction

An **environmental management system** (EMS) provides a framework for managing an organization's environmental programs in a comprehensive, systematic manner. An EMS includes structure, planning, and resource management for developing and maintaining environmental protection policies. Furthermore, an EMS is flexible and allows organizations to rework existing activities to fit the new system, rather than forcing them to start completely afresh.

Thus, an EMS:

- serves as a tool to improve environmental performance,
- provides the means to manage an organization's interactions with the environment,
- analyzes the present and future impacts of production and services on the environment,
- creates a framework for allocating resources, assigning responsibility, and consistently evaluating the environmental aspects of various processes and practices, and
- constantly looks for ways in which to improve the system.

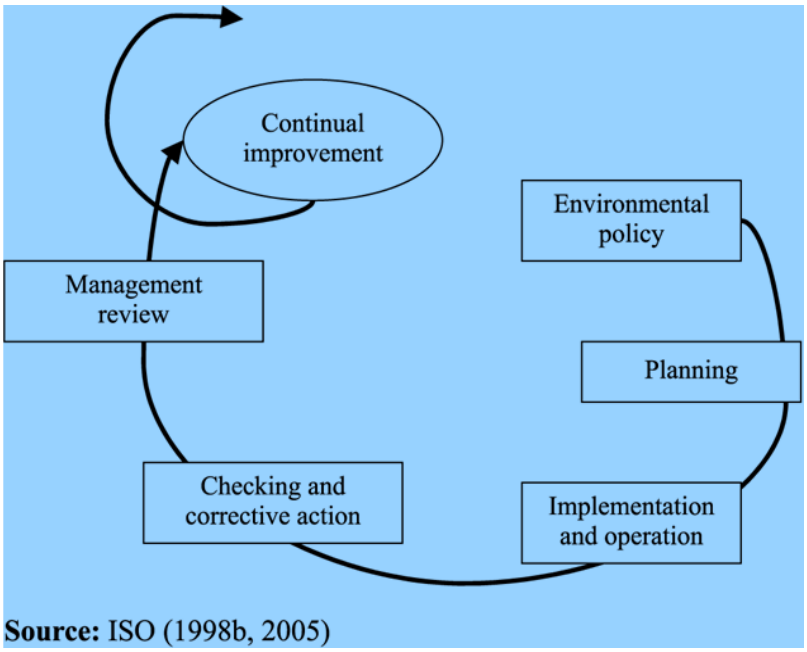

Fig: 4.1: the EMS continuous improvement cycle

The diagram above shows the process of developing, planning and implementing policy, checking the system, and using results to inform future actions. An EMS is a process of continual improvement in

which an organization is constantly working to review and revise the system. This model is sufficiently flexible for use in a wide range of organizations, including factories, service industries and government agencies.

Key elements of an EMS include:

- A policy statement outlining the organization's commitment to the environment
- Identification of the environmental impacts of various products, activities, and services
- Goals for improved relations with the environment
- Strategies for meeting the proposed goals
- Instructions on training employees to be more aware of, and more capable of fulfilling, their environmental responsibilities
- A review of management policies

Energy Efficiency

Energy is a vital component of both the natural and industrial worlds. Management is key to maintaining the wellbeing of both. Our original, primitive methods of energy use evolved from simple, local resources such as water power, firewood and coal to a petroleum-based fuel economy during the 20th century. Fossil fuels in the form of oil, natural gas and coal make up approximately 80% of the world's energy use. Despite the obvious problems with using these sources, it was not until 2000, when sudden changes to the oil market caught media attention worldwide, that the need to evolve again from petroleum to greener, renewable energy sources became widely accepted.

In addition to its basic definition, EMS can also refer to a system for achieving energy efficiency – more specifically, a computer system designed for automated control and monitoring of the heating, ventilation, and lighting needs of a building or group of buildings, such as university campuses, office buildings and factories. Most of these systems also simplify the reading of electricity, gas and water meters. The data obtained from these can then by analyzed to find trends and create consumption forecasts.

The Plan-Do-Check-Act Cycle

An EMS follows a **Plan-Do-Check-Act cycle**, or PDCA. It was first popularized by Dr. W. Edwards Deming, who originally named it the "Shewhart cycle" after fellow American scientist Walter A. Shewhart, whose work inspired the method. Later, it became the Plan, Do, Study, Act cycle (PDSA), before finally becoming more widely known as the PDCA cycle. (Deming preferred the term "study" because he felt it was closer to the meaning Shewhart intended than the word "check," since it implies a more thorough investigation of the process than merely checking the data.) In Six Sigma circles, it is known by yet another acronym, DMAIC, which stands for "define, measure, analyze, improve, and control."

The PDCA cycle was inspired by the scientific method developed from the work of Sir Francis Bacon (*Novum Organum*, 1620). Most of us are familiar with the steps of this method – hypothesis, experiment, evaluation. In other words – plan, do and check. The intention is that the final step – the evaluation or check – will be used to formulate a new hypothesis or plan and begin a new cycle of the process.

Let's take a closer look at each individual step of the cycle.

1. **Plan**: This step establishes goals and methods for meeting those goals. The focus is on expected output, which sets PDCA apart from other techniques.
2. **Do**: In this step, the plan is tested out, ideally on a small scale, since this is a testing phase.
3. **Check**: This step evaluates the effectiveness of the actions taken in the previous step. Results are compared against the original expectations established in the planning stage.
4. **Act**: In this step, differences between the expected and actual results are studied in order to determine why they occurred. This information is used to decide what improvements or refinements might be made to the original plan. This decision kick-starts the creation of a new plan, thus beginning the cycle anew.

Each run of the PDCA cycle increases knowledge and moves the system closer to achieving its goals. Think of it, if you like, as an open coil spring, with each loop representing one full circuit of the PDCA cycle as it spirals up towards the system's ultimate target.

PDCA is an approach based on the belief that while our knowledge and skills may initially be limited, they may be improved. At the beginning of a project, for example, we may be unaware of key information. Using the PDCA method, we can gain feedback which will increase our knowledge, enabling us to make better plans and predictions for the future.

PDCA is a flexible method which allows both major "jumps" or breakthroughs in performance (also known and loved as "Eureka" moments in Western culture) and "kaizen" – the frequent small improvements favoured by Eastern cultures.

Although easy to understand, the PDCA method can become tiresome and problematic in practice. This is due partly to the massive amount of detailed documentation involved in the process and partly to its openness to human error. Feedback can be misinterpreted, and mistakes may be made in applying it to revisions of the plan. Moreover, most of us don't like to admit when we're wrong. While this is a natural aversion, it can lead to a bias which may negatively influence major decisions. Thus, the more detailed and fact-based the feedback, the lower the likelihood of it being accidentally or wilfully misinterpreted.

ISO Standards

ISO, ISO 14000, and ISO 14001

ISO stands for the **International Organisation for Standardisation.** Established in Geneva, Switzerland, in 1947, the ISO is a non-governmental organization in charge of developing voluntary standards for making the production and supply of goods and services safer, cleaner, and more efficient. (Similarly, the charter on Corporate Responsibility for Environmental Protection [CREP] also calls for industrial organizations to make a voluntary commitment to responsibly caring for the environment.)

The **ISO 14000** is a set of standards and guidance documents meant to help organizations address environmental issues. These include guidelines for EMS creation, environmental and EMS auditing, environmental labelling, and life-cycle assessment. These guidelines are general enough to be applicable to any business, regardless of size, location or income. In structure, the ISO 14000 series is similar to the ISO 9000 series on quality management systems, with which it can be simultaneously applied. The purpose of the ISO 14000 is, in its own words,

- to promote more effective and efficient environmental management in organizations and to provide useful and usable tools – ones that are cost-effective, system-based, and flexible and reflect the best organizations and the best organizational practices available for gathering, interpreting and communicating environmentally relevant information. (ISO 14000, 1947)

In September 1996, the ISO published the first edition of **ISO 14001**, a set of standards specifically for EMS development. It is considered the foundation document of the ISO 14000 series. A second edition of the ISO 14001 was published in 2004 with updated standards which closed several loopholes that had been discovered in the first edition.

In order for an organization to be awarded an ISO 14001 certificate, it must be evaluated by an external audit group that is recognized by the International Registrar of Certification Auditors in the UK, the ANSI-ASQ National Accreditation Board in the US, or the National Accreditation Board in Ireland.

Some highlights of the ISO 14000 series include:

- ISO 14001: EMS requirements, with guidance for use
- ISO 14004: general guidelines on EMS principles, systems, and support techniques
- ISO 14015: environmental assessment of sites and organizations
- ISO 14020 series (14020 to 14025): environmental labels and declarations
- ISO 14031: guidelines for environmental performance evaluations
- ISO 14040 series (14040 to 14049): the Life Cycle Assessment (LCA), which discusses pre-production planning and environment goal-setting
- ISO 14050: relevant terms and definitions
- ISO 14062: improving environmental impact goals

- ISO 14063: guidelines for communication
- ISO 19011: although not technically part of the ISO 14000 series, this specifies auditing standards for both the ISO 14000 and 9000 series standards

In addition, ISO 19011 replaced the original 14011 meta-evaluation, which set standards for determining the effectiveness of an organization's regulatory tools. The ISO 19011 is preferred because it is more up to date and comprehensive. It provides auditing standards for both the ISO 14000 and 9000 series.

Any questions that arise when adapting an EMS to ISO 14001 standards are addressed to the U.S. TAG (Technical Advisory Group) of the TC 207 Technical Committee. Clarifying the ISO 14000 series is their specialty.

ISO Standards Development Process

The creation and implementation of any ISO standard requires the voluntary consensus of the ISO's numerous member countries. Every country gives input on each of the standards, which are then further developed through negotiation. Draft versions of the standards are sent out for formal review. Finally, votes are cast to decide whether or not to approve the drafts.

Various organizations, including federal and state governments, corporations, and other interested parties, have a say in each country's participation in the ISO. For example, the EPA, along with certain U.S. states, participated in the creation of the ISO 14001 and is currently in the process of determining its effectiveness.

Requirements of the ISO 14001:2004 Standard

To meet all 17 requirements listed in the 2004 edition of the ISO 14001, a participating organization must:

- Formally state its commitment to caring for the environment
- Identify the environmental effects of all products and services offered or implemented by the organization
- Identify and ensure access to relevant laws and regulations
- Set environmental goals and develop plans to reach these goals
- Establish relevant roles and responsibilities within the organization
- Ensure that employees are aware and capable of fulfilling their environmental responsibilities
- Encourage internal and external communication on environmental management issues
- Keep track of information on the EMS, the ISO 14001, and related forms
- Ensure effective management of various procedures
- Keep the organization's operations and activities in line with established policies and goals
- Develop procedures for preventing and responding to potential emergencies

- Monitor key activities and track performance
- Periodically evaluate compliance with legal and other requirements
- Identify and correct problems and prevent future ones
- Keep adequate records of EMS performance
- Periodically check whether the EMS is effective
- Periodically revise or renew the EMS

The Environmental Liability Directive

The **Environmental Liability Directive** (ELD) was established as law in the UK in March 2009. It made various Pollution Prevention Guidelines (PPGs), such as PPG11, 18, and 21, strict requirements rather than suggestions. The ELD particularly requires organizations to prevent spills and firewater (polluted water which has been used to put out a fire) and limit the damage they cause as much as possible. The ELD makes it clear that it is the responsibility of the site owner to contain on-site spills and firewater with any methods available to them – sealing drains, for instance.

The penalties for failing to fulfil ELD requirements include fines and reformation or reinstatement costs. The latter can be very expensive, sometimes as high as several million euros or dollars.

Environmental Auditing

The purpose of conducting **environmental audits** is to gather important data on an organization's environmental performance. Audit reports include a statement evaluating overall performance, as well as instructions on how the organization might sustain or improve its performance.

Environmental auditing has three basic goals:

- Pollution prevention and reduction
- Assessing compliance with regulatory requirements and environmental goals
- Making data on environmental performance and effects available to the public

Environmental auditors gain certification by passing a written test and accepting the Environmental Auditor Association code of ethics. Depending on the nature of an audit, different designations may be assigned by an organization such as CECAB, the Canadian Environmental Certification Approvals Board.

According to Mattsson and Olsson, there are three types of EMS audits:

- **Liability audits**, which assess whether legal requirements have been met,
- **Management audits**, which assess whether an EMS meets its own requirements, and
- **Functional audits** (sometimes called activity or issues audits), which focus on more specific areas of activity, such as water or energy usage.

Environmental impact assessment is the most important part of environmental auditing. It is essentially an investigation of how an organization's various practices affect the environment, and to what extent. It also includes instructions on how to improve efficiency and reduce the organization's ecological footprint.

During a typical audit, a team of qualified inspectors conducts a comprehensive examination of the organization's facilities to determine whether or not environmental laws and regulations are being followed. The team uses checklists, official protocols, and their own professional judgement to determine the extent of the organization's compliance. They may also evaluate the effectiveness of the organization's efforts to reduce and prevent environmental damage, as well as any risks associated with current operations.

The concept of environmental auditing is closely related to monitoring, norms and standards:

Environmental Monitoring	Environmental Norms	Environmental Standards
Environmental monitoring is the systematic observation of the state of the environment and of the factors influencing it. This helps forecast possible future effects on the environment and provides data for environmental planning. The procedure of environmental monitoring is established by the law.	Environmental norms are reference figures or use rates of natural resources per production unit – i.e., how much waste is produced per production unit.	Environmental standards are documents which set rules, guidelines and numeric values. These regulate the results of various industry activities which either have or are likely to have an impact on the environment.

Fig. 4.2: monitoring, norms, and standards

Of course, no system is without its loopholes. In the case of environmental auditing, enforcement agencies are often under-staffed and under-funded, making the process of auditing every single organization for which an agency is responsible nearly impossible; thus, only a limited number of industries may be monitored at a time. Many organizations take advantage of this and become lax in their environmental management. Additionally, environmental audits are only mandatory under certain legal circumstances; hence, some organizations are not subject to an audit unless they voluntarily accept it.

The results should always be made public at the end of the audit. The results provide information that is important not only to the organization being audited but also to outside groups, who may use the

information to further develop and improve their own environmental performance. Making the results public also helps keep an organization honest about its performance and goals.

The Eco-Management and Audit Scheme (EMAS)

The EU **Eco-Management and Audit Scheme** (EMAS) is a management tool which may be voluntarily used by organizations to evaluate and improve their environmental performance. It first became available in 1995, and was originally intended only for companies located in industrial areas. In 2001, EMAS was made available to both public and private services in all economic zones, and in 2009 it was updated yet again with Regulation (EC) No 1221/2009.

The EMAS's functions include:

- Identifying which industries are generating the most pollution
- Creating standard protocols to help industries develop self-auditing programs
- Developing methods to train auditors and other industry regulators
- Identifying and certifying environmental auditors
- Processing audit reports
- Supporting and guiding industries in pollution prevention and reduction

EMAS is generally a localized system which takes into account any relevant off-site production or services. The UK has also extended optional EMAS registration to local government operations. It requires registrants to have an existing and supported EMS with a publicly available company policy. This policy must indicate a commitment to both environmental awareness and continued improvement.

A company policy tends to be a particular consideration of ISO 9000 assessments. Often, staff members are asked if they know and understand the policy. Fortunately, policy-related problems are seldom serious, and are usually easy to fix.

An organization's environmental policy, however, is subject to much more serious and thorough assessment than an ISO 9000 review. Good environmental policy outlines the sites within the organization that are included in the EMS and describes in detail any and all company activity taking place on those sites. The policy must also include solid data on current gas and waste emissions, how much and how quickly energy, water and raw materials are consumed, and the effects of these activities, as well as any other factor that may impact the environment. Finally, it must be written in language that is simple, clear, and free of technical jargon in order that it might be easily understood.

EMAS assessment includes a thorough preparatory review (British Standard BS7750 does not). The review is meant to identify the environmental consequences of every aspect of an organization, including all past, present and possible future activities. The review also involves any legal considerations which may apply to the site. Preparatory reviews often uncover laws and regulations of which companies were previously unaware.

EMAS has become increasingly popular over the years. More than 4,100 organizations have received legal EMAS registration. These companies can be identified by the EMAS logo, which guarantees the reliability of the information they provide and ensures proper certification. Industrial companies, small businesses, services, third-sector organizations, and various administrations and international organizations have been certified, including the European Commission and the European Parliament themselves.

EMAS Requirements

Most companies publish annual reports detailing the organization's general activities in the past year, as well as plans for the future. EMAS expects similar reporting for a company's environmental performance in the form of a periodic statement. This statement should include environmental performance data and documentation, as well as any changes that may take place in the future.

Additionally, EMAS certification requires an organization to be audited at least once every three years, although companies may elect to do so more frequently if they wish.

The following are some of the other main requirements for EMAS certification:

- The organization must have a policy that includes environmental commitments.
- The organization must issue a clear statement regarding these commitments.
- There must be an on-site review of the policy.
- The policy must set clear environmental goals for the organization, as determined by the review.
- The company and policy must be subject to environmental audits.

Enforcing these requirements is critical for both EMAS certification and, more importantly, for protecting the environment. An EMS provides further details for fulfilling these requirements and establishes procedures, instructions and restrictions to ensure that the policy will be followed and the goals met. Communication, especially regarding responsibilities and goals, is vital for the system's success.

Environmental Valuation

From scenic beauty and recreational opportunities to resources for the production process, the environment represents a complex set of values and benefits for society. Coastal areas, for example, provide direct benefits such as stunning sunset views, nutrition (in the form of fish and other edible sea life) and an excellent recreational area for relaxing, birdwatching and exercise. But beaches also provide numerous indirect benefits that may not be obvious, such as climate moderation and physical protection.

Environmental valuation takes both direct and indirect benefits into account. In terms of environmental economy, nature is treated just like any other commodity in terms of its usefulness in providing human

satisfaction. In other words, environmental valuation provides a way to determine the overall value of an ecological system based on the value of its individual parts.

Methods of Environmental Valuation

Environmental valuation is largely based on the assumption that individuals are willing to pay certain prices to achieve environmental gains or, conversely, to accept gains as compensation for losses. The individual's preferences then dictate the value they place on various environmental issues. That society values the environment (at least to some extent) is obvious; how to monetize the value placed on natural assets such as coastal regions and water quality is not.

Environmental economists have developed a number of techniques to value the environment. The figure below presents some of these techniques, which are classified according to whether the monetary valuation is market-based, surrogate market-based, or non-market-based.

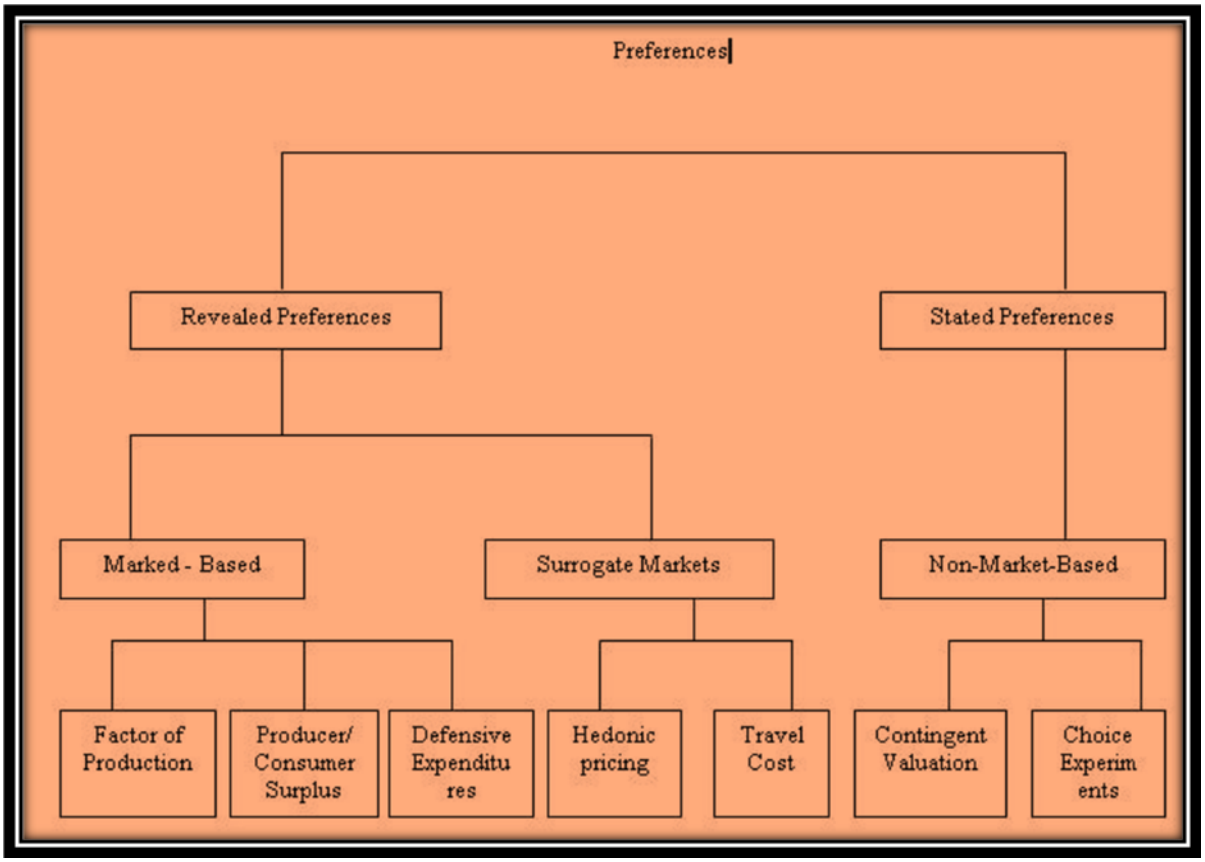

Fig. 4.3: environmental valuation methods

Market Methods

Economists generally prefer to rely on direct, observable market interactions when placing monetary values on goods and services. Markets help economists measure an individual's willingness to pay a price

in order to gain or preserve environmental services. How consumers choose to distribute limited resources exposes their preferences.

There are three market-based techniques:

1) factor of production approach,
2) change in producer/consumer surplus, and
3) examination of defensive expenditures (expenses which are meant to protect an organization from future damage or greater expenses, i.e. insurance)

One way to value a natural resource is to consider its value as a **factor of production** – that is, how it is used for manufacturing and other industrial operations. If a natural resource is directly valuable as a factor of production and the impact of environmental degradation on its future supply can be accurately measured, then its monetary value can be measured in terms of how much production will decline or how much more expensive production will be in the future.

This technique is fairly straightforward. However, it is limited to those resources that are used in the production process of goods and services. Because many goods and services produced by the environment are not sold in markets, the factor of production method generally fails to capture the total value of a given resource to society. For instance, **existence values** – that is, the values people place on the pure existence of certain natural resources – are difficult to assess because they cannot be measured in terms of market and are often based on unselfish motives.

Surrogate Market Methods

The value of natural resources can also be determined by information from surrogate markets, such as those for property and labour. Two common surrogate market methods are the hedonic price method and the travel cost method.

The hedonic price method uses surrogate markets to place value on the quality of the environment. The most common surrogate market for this approach is the real estate market, because of its close and obvious ties to the state of the environment. Water, air and noise pollution directly impact property values. The public's willingness to pay for environmental quality can therefore be determined by comparing the prices of similar properties, or by studying the effects of changing environmental conditions on the price of a property.

Travel cost method, on the other hand, measures the value of a recreational site by examining how much travellers are willing to pay (in terms of time and out-of-pocket travel expenses) in order to visit the site. Paying more indicates a higher willingness to enjoy the benefits of the site; paying less indicates the opposite.

Environmental Accounting

A business is a corporate citizen. Like a citizen, it is judged based on how it behaves as part of a community, as well as by its economic performance. Responsibility towards the environment has become one of the most important areas of social responsibility. Environmental concern has greatly risen in recent years, with particular attention focused on the subject of pollution.

Pollution is present all over the world. It affects health, economic productivity, and supplies of already limited natural resources. Developing countries such as India are faced with the dual burden of protecting the environment while still striving for economic development. A compromise between conservation and industrialization is vital to such countries. Careful assessment of the benefits and costs of those activities which affect the environment are necessary in determining safe limits for both environmental loss and industrial gain.

Forms of Environmental Accounting

There are three basic branches of environmental accounting, as shown in the diagram below.

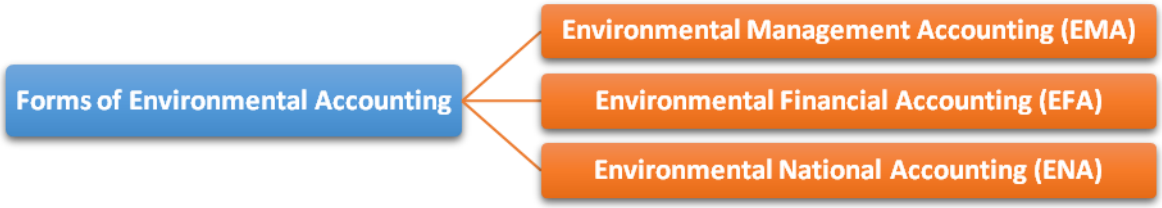

Fig. 4.4: forms of environmental accounting

The first of these is **Environmental Management Accounting (EMA)**. EMA refers to environmental accounting that focuses on the flow of materials and energy in a system and their environmental costs. This type of accounting can be further broken down into three subtypes:

- **Segment Environmental Accounting** is a tool for selecting a particular investment activity or project related to environmental conservation and evaluating its effects for a period of time.
- **Eco Balance Environmental Accounting** is a tool for supporting the PDCA cycle for sustainable environmental management activities.
- **Corporate Environmental Accounting** is a tool for sharing accounting data with the public. This includes the monetary cost and environmental effect of conservation activities.

Environmental Financial Accounting (EFA), on the other hand, focuses on reporting both legal and environmental costs.
Finally, **Environmental National Accounting (ENA)**, as its name suggests, is accounting on a national level. ENA focuses on the supply and flow of natural resources, as well as environmental losses.

Environmental accounting at a corporate level is also necessary. It is important to know whether or not an organization has been fulfilling the following environmental responsibilities:

- Meeting or exceeding regulatory expectations

- Cleaning up pre-existing pollution and properly disposing of hazardous materials
- Disclosing the nature and extent of any preventative measures taken to both potential and current investors (this is required if the estimated legal cost is greater than a certain percentage of the company's total value)
- Operating in such a way that those environmental damages do not occur, or recur
- Promoting company-wide concern for the environment
- Controlling operational and material gains driven by the competitive global market
- Controlling increases in costs for raw materials, waste management, and the potential liability of the political environment in which they occur

Environmental Trade Shifts

International trade can affect sustainable development and the environment in a number of ways. Trade trends may cause production activities to move from places where the environment is less sustainable to places where it is more sustainable, or vice versa. Increased freedom of trade affects global consumption, production and income, which in turn can affect the quality and quantity of natural resources. Trade also influences economic development by creating fresh opportunities for the profitable use of natural resources. For instance, farm produce provides a large and important source of foreign exchange earnings for many countries.

As incomes rise, demands on resources increase. At the same time, income growth can lead to higher demand for better environmental quality. Increased incomes also make investing in resource-conserving strategies more affordable. Moreover, higher incomes are associated with lower population growth rates, reducing the pressure on environmental resources. Higher incomes and better employment opportunities widen the range of choices, thus leaving fewer rural people dependent on environmentally fragile areas.

Trade separates production from consumption. When environmental effects are national (not transborder) and mainly associated with production, trade may shift the effects from one country to another. In addition, where consumption produces waste that has become an important part of the ecological cycle (for example, when nutrients are returned to the farmers' fields), separation of production and consumption in trade may put stable ecosystems out of balance.

In some cases, production in one country may have environmental effects on neighbouring countries. For instance, water used for irrigation that then drains back into the river system raises the salt content for users in other countries downstream. In other cases, the act of production has beneficial global environmental effects – for instance, planting trees that absorb and store carbon.

Although shifting the location of environmental damage may not affect global environmental damage, it often poses problems of international concern. When a country attempts to cope with national issues on its own, production costs may be raised, which in turn may increase world trade prices. In other cases,

such as when an importer raises food safety standards, environmental protection measures may negatively affect exports from other countries.

Trade shapes global production and consumption. If there were no trade in coffee, for example, world consumption and production would be far lower than it currently is, because coffee cannot be produced everywhere. Additionally, by exploiting comparative advantages, a country can enjoy higher levels of consumption and production. This influences how natural and environmental resources are used and protected.

The connection between trade and the environment is obvious. It is in recognition of this two-way relationship that UNCED has called for mutually supportive environmental and trade policies.

Measuring the Effects

The impact of trade on the environment depends on the volume of trade, the share of trade in production and consumption, and the environmental impact of production and consumption. Large amounts of forestry and fishery products are traded, along with agricultural products such as cereals, sugar, fats, oils, meat, bananas, fresh citrus, cotton, pulses, dairy products, wine, coffee and rubber.

At the global level, the production ratio for trade in agricultural products is usually low, while goods such as tropical beverages and rubber stimulate production. Trade in cereals accounts for little more than 12% of world production.

Production Ratio

Although not always a global issue, production ratio in certain goods can be very important to individual countries. For example, while only 3 to 4% of the world's rice production is traded, exports account for more than 20% of production in Australia, the EC, Guyana, Pakistan, Thailand, Uruguay and the United States. At the same time, imports of rice account for more than 80% of consumption in as many as 43 countries.

The production and processing of goods can result in a variety of environmental effects. These effects depend on numerous factors, including technology, soils, topography, water quality and the ecosystem. There is no overall measure of pollution produced or consumed per tonne of a given product that can be applied to all countries and ecosystems.

Green Funding

Environmental management practices are directed towards the welfare of the community and economy as a whole. The biggest obstacle to environmental management is a lack of knowledge, support and funding. To support sustainable development, governments of various countries have begun funding more and more environmental projects. The funding for these projects is made available through central, regional and local governments, as well as government offices and local development agencies.

Government funding for environmental management is usually calculated as a percentage of the economic stimulus package, which is money provided by the government to boost the country's economic growth. The stimulus package consists of government funding for economic and social activities. It also includes tax rebates.

Funding is particularly focused on increasing energy efficiency, developing and increasing use of renewable resources, reducing greenhouse gases and carbon emissions, creating and developing hybrid and other "greener" vehicles, developing clean technologies, and finding greener alternatives for use in waterways, roads and railways, as well as the conservation of water resources.

Further Reading:

- ✓ ***Environmental Management Systems,*** **Stephen Tinsley, Ilona Pillai (2012)**
- ✓ ***Environmental Management Systems,*** **Christopher Sheldon, Mark Yoxon (2012)**