

## CRITERIA AND PRINCIPLES OF THE TECHNICAL- ECONOMIC ANALYSIS APPLICABLE IN ECOLOGY

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### ABSTRACT

Environment protection, like a new religion consists of: environmental programmes, objectives and targets, training, incentive schemes, audit frequency, site inspections, administration and community relations. This paper presents the main environmental performance indicators. They should therefore be cost-effective and appropriate to the size and type of organization and its needs and priorities. Organizations should make the optimum use of the environmental information they collect. To this end the indicators should fulfill the dual purpose of assisting the management of the organization and providing information to stakeholders. In article we present a set of Environmental Performance Indicators (EPI). These indicators should therefore be cost-effective and appropriate to the size and type of organization and its needs and priorities. We present many categories of environmental performance indicators: comparability (indicators should enable a comparison and show changes in the environmental performance); balance between problematic (bad) and prospective (good) areas, continuity (indicators should be based on the same criteria and should be taken over comparable time sections or units); timeliness (indicators should be updated frequently enough to allow action to be taken); clarity (indicators should be clear and understandable).

*Keywords: Ecology, Criteria, Principles*

### INTRODUCTION

*Creating environmental information can be expensive and time consuming. Environmental Performance Indicators (EPI) should therefore be cost-effective and appropriate to the size and type of organization and its needs and priorities. They should address primarily those environmental impacts that are most significant and which the company can influence by its operations, management, activities, products and services. They should also be sensitive enough to reflect significant changes in environmental impacts.*

Organizations should make the *optimum use of the environmental information they collect*. To this end the indicators should fulfill the dual purpose of assisting the management of the organization and providing information to stakeholders [1], [2].

Depending on an *organization's capabilities and resources*, the use of environmental performance indicators may initially be limited to those aspects considered most relevant, with the initial scope being gradually widened over time [3], [4], [8].

## MATERIALS AND METHODS

The *basic principles of environmental indicator systems* are [5], [6]:

- **Comparability:** indicators should enable a comparison and show changes in the *environmental performance*.
- **Balance between problematic (bad) and prospective (good) areas.**
- **Continuity:** indicators should be based on the same criteria and should be taken over comparable time sections or units.
- **Timeliness:** indicators should be *updated frequently* enough to allow action to be taken.
- **Clarity:** indicators should be *clear and understandable*

Usually, *three categories of environmental indicators* are defined for evaluating and reporting the environmental performance of an organization: OPIs, MPIs, and ECIs as well as most subcategories correspond directly to relevant indicator categories used in EN/ISO 14031:1999 Environmental management — Environmental performance evaluation — Guideline. The subcategories products supporting the organization's operation, transport, employee involvement, administration and planning, purchasing and investments and health and safety are specific for Eco-Management and Audit Scheme -EMAS:

1. **Operational Performance Indicators (OPIs).** These concentrate on the aspects associated with an organization's operations including activities, products or services and can cover such topics as emissions, product and raw material recycling, fuel consumption of vehicle fleet, or energy usage.

Operational performance indicators can be subdivided into:

- **Input indicators.**
- **Physical facilities and equipment indicators.**
- **Output indicators.**

They concentrate on planning, controlling and *monitoring the environmental impacts* of the organization's operations. Operational performance indicators are also *a tool for communicating environmental* data through environmental reports or environmental statements, in accordance with the *Eco-Management and Audit Scheme (EMAS)* regulation. By integrating cost aspects into them, they furthermore represent *a basis for environmental cost management*.

2. **Management Performance Indicators (MPIs).** These concentrate on the efforts of management to *provide the infrastructure for environmental management* to succeed and can, among others, cover environmental programmes, objectives and targets, training, incentive schemes, audit frequency, site inspections, administration and community relations [7].

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These indicators serve primarily as internal control and information measurements, but do not by themselves provide sufficient information to give an accurate picture of the organization's environmental performance.

**Environmental Condition Indicators (ECIs).** These give information on the *quality of the environment surrounding the organization* or the local, regional or global state of the environment. Examples include the *water quality of a nearby lake, the regional air quality, concentrations of greenhouse gases* or the *concentration of certain pollutants in the soil*.

While they may be quite wide-ranging they can be used to focus the attention of the organization on the *management of the environmental aspects associated with significant environmental impacts*.

The condition of environmental media (air, water, land) and the environmental problems that arise from it depend often on a variety of influences (Jay Gould 1980, 125). Examples are *emissions from different organizations, private households or transport*.

Data about the *condition of environmental media* are usually measured and recorded by governmental institutions. These data are used to derive *specific environmental indicator systems* for the main environmental problems.

In connection with *environmental policy goals*, public environmental indicators can be used by organizations as an *orientation for setting priorities in determining their own indicators and objectives*. This is especially the case when the organization is one of the *main sources of an environmental problem*, for example the impact of an airport on its surroundings in respect of noise or the impact of a direct effluent discharge on local water quality. In particular in these cases, ECIs enable the measurement of environmental impacts of the organization.

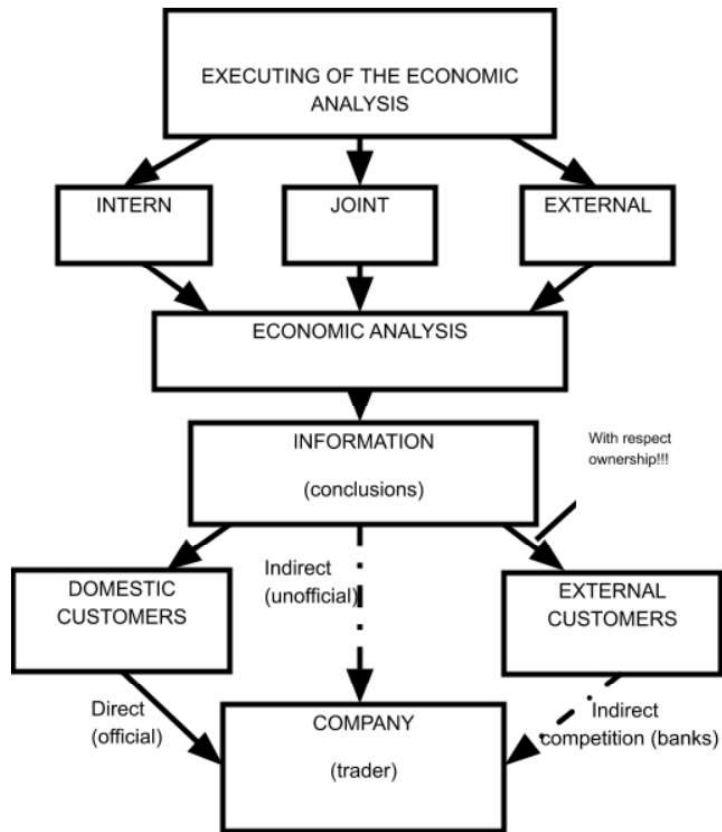
## RESULTS

These three categories of environmental indicators have become widely accepted and organizations should consider a *combination of these indicators in order to be able to demonstrate*, that:

- They understand the environmental impacts associated with their activities, products and services (ECIs).
- They are taking appropriate measures to ensure the management of environmental aspects associated with the environmental impacts (MPIs) and
- The result of the management of environmental aspects is improved environmental performance of their operations (OPIs).

It is recognized however that for organizations with less significant environmental impacts and a less *complex environmental management system* the most important indicators will be those relating to operational performance.

Figure 1 presents a model of economic analysis.



*Fig. 1. Model of economic analysis*

The model of economic analysis presented has as its starting point the 3 categories of performers:

- Intern performers
- Joint performers
- External performers

Information (including conclusions) of economic analysis conducted can be passed to the three distinct pathways:

- Domestic Customers □ Direct (Official) □ Company (trader)
- Indirect (unofficial) □ Company (trader)
- External Customers (with respect ownership) □ Indirect Competition (banks) □ Company (trader)

## CONCLUSIONS

In selecting *environmental performance indicators* for a particular environmental aspect an organization should ask itself the following questions:

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- What are the organization's main environmental aspects and impacts?
- Where can most improvements be achieved?
- Where can environmental improvements also lead to cost reduction?

The selected environmental indicators should comply with *environmental policy priorities*:

- How does the organization affect the local or regional environmental situation in relation to important local or regional environmental policy issues?
- What environmental problems dominate the current political discussions?
- What external requirements, for example from interested parties, affect the organization?

Organizations should select *indicators which enhance their management*. Indicators which do not contribute to the management of the organization will ultimately not be incorporated in *day-to-day management* and hence will have little effect in improving performance. In short, only those indicators which enable the employees and management to perform their tasks better are the ones which are most appropriate to the organization.

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