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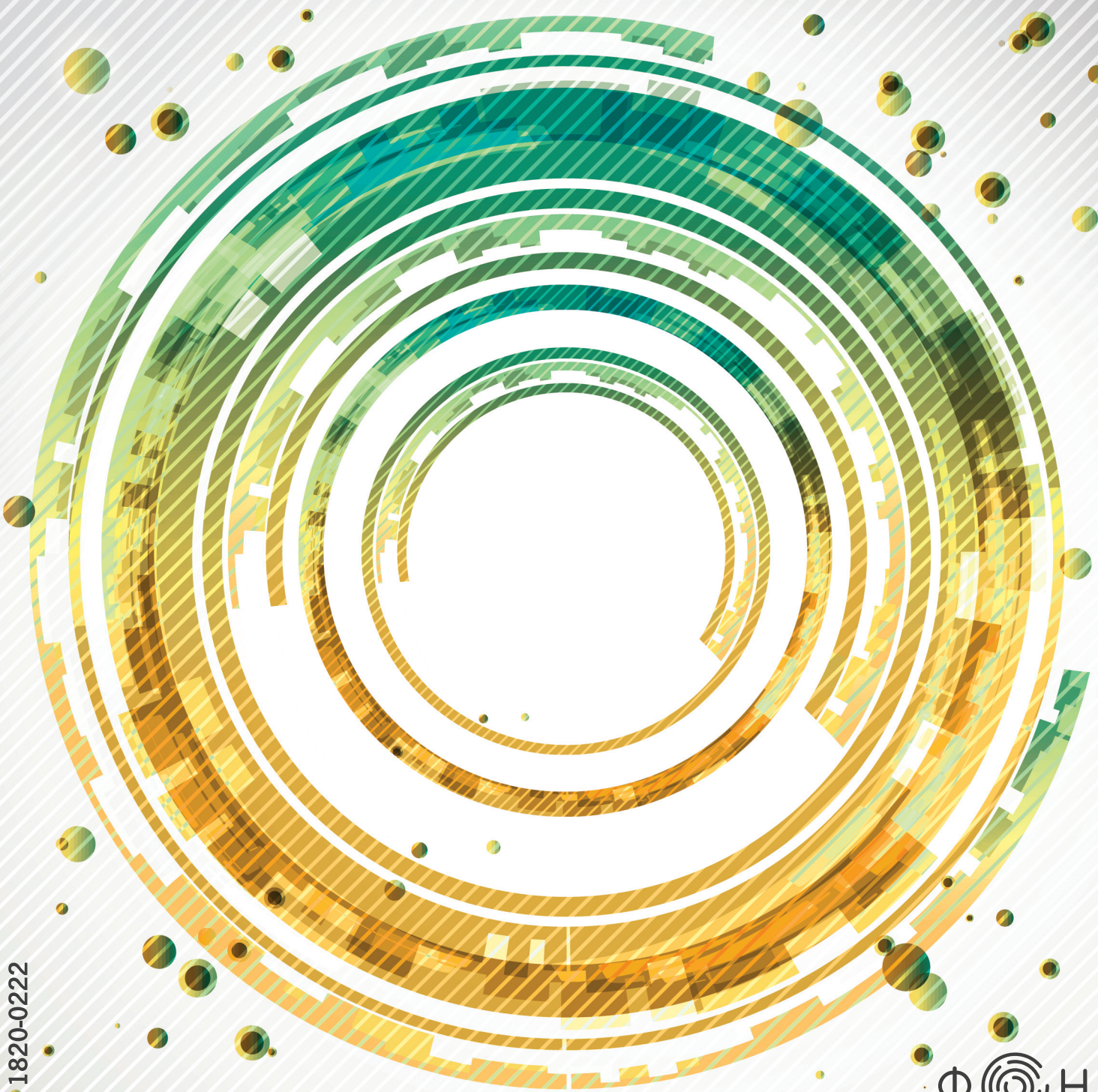

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УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАКУЛТЕТ ОРГАНИЗАЦИОНИХ НАУКА

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Environmental Performance Indicators as Guidelines Towards Sustainability

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International organizations, governments, non-governmental organizations, and corporations pay an increasing attention to sustainable development and sustainable environmental management. Consequently, a large number of environmental methods have been developed in order to achieve sustainable issues. This paper explores environmental performance indicators as a good method for achieving and measuring sustainability on the local, national, regional and global levels.

Keywords: sustainable development, sustainability, environmental performance, environmental performance indicators, environmental performance reporting.

1. Introduction

The industry faces specific challenges with respect to economic and environmental sustainability. In addition to having environmentally sensitive processes, the business structure of the industry must develop and implement sustainable practices. Sustainability was defined by the International Union for Conservation of Nature in a 1969 mandate as "achieving economic growth and industrialization without environmental damage" (Keiner, 2006). In part due to some highly visible ecological disasters, the concept gained in force in 1983 when the United Nations published a report of the World Commission of Environment and Development, (called the Brundtland Report), where sustainability was redefined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Hart, 1997; Daly, 1990; WCED, 1987).

The use of this definition has led many to see sustainable development as having a major focus on intergenerational equity. Although the brief definition does not explicitly mention the environment or development, the subsequent paragraphs, while rarely quoted, are clear. On development, the report states that human needs are basic and essential; that economic growth, but also equity to share resources with the poor is required to sustain them; and that equity is encouraged by effective citizen participation. On the environment, the report is also clear: The concept of sustainable development does imply limits. These limits are not absolute; they rather represent limitations imposed by the present state of technology and social organization of environmental resources and by the ability of the biosphere to absorb the effects of human activities.

Further on, sustainable development has become a popular management philosophy in many countries throughout the world. Its popularity can be partially attributed to reports of global climate change and the declining stability of global ecosystems. However, its initiation can also be attributed to the efforts of the United Nations (UN), which have encouraged all countries to develop their own national sustainable development strategies. Today, countries on all five continents have developed and are in the process of implementing national sustainable development strategies.

2. The need for sustainability

The phenomenon of sustainable development or sustainability has been the main popular catalyst for changes in government policies and regulatory frameworks, which has dramatically changed the roles and behaviour of nations.

There is a lack of a concrete definition of sustainability because there is not, and should not be, any single definition of sustainability (Tickell, 1997; Bell & Morse, 1999; Tickell et al., 2006).

Satterthwaite suggests that sustainable development is simply development i.e. activities to fulfill the (basic) needs of current populations both human and animal, that will be sustained in such a manner that population can meet their needs in a way that will not restrict or ruin the carrying capacities in economic, social, environmental, and organizational systems (Satterthwaite, 1999).

The core ideas representing the sustainable development term, aggregated, are as follows (World Bank, 2003; Cooper & Vargas, 2004; Stead et al., 2004):

- *Environmental and economic integration.* Ensuring that economic development and environmental protection are integrated in planning and implementation simultaneously.
- *Environmental protection.* A commitment to reducing pollution and environmental degradation and with a more efficient use of resources.
- *Equity.* A commitment to meeting at least the basic needs of the poor of the present generation (as well as equity between generations).
- *Futurity.* An explicit concern about the impact of current activities on future generations.
- *Quality of life*. A recognition that human beings are concerned not only with income growth, but also with health support and satisfaction to live in their societies.
- *Participation.* The recognition that sustainable development requires the involvement of all stakeholders in a society.

Figure 1 presents the popular and adopted definitions of sustainable development, particularly in relation to the environmental context, that focus on the existing ecological capital or stocks or assets that will survive in the long term and will not transfer environmental costs to future generations.

"... development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
(WCED, 1987)

"... the capacity of a system to maintain output at a level approximately equal to or greater than its historical average, with the approximation determined by the historical level of variability."
(Lynam & Herdt, 1989)

"... development that improves the quality of human life while living within the carrying capacity of supporting ecosystems."
(IUCN, 1991)

"Nature is robust, within limits, it is morally imperative to preserve nature enough not to reduce choice of options for the future."
(O' Riordan & Rayner, 1991)

"The sustainability of natural ecosystems can be defined as the dynamic equilibrium between natural inputs and outputs."
(Fresco & Krooneberg, 1992)

"Development that maintains and improves the long term condition of environment and people's quality of life."
(Barrow, 1997)

Figure 1: Definitions of Sustainability

These definitions are prioritized more on time rather than on interest in spatial scale (i.e. local, national, regional, or global levels). In some protocols, development with a consideration of different hierarchical levels is recognized. For instance, Agenda 21 closely emphasizes activities, participation, cooperation, and governance among both local authorities and the general public, and that is how Local Agenda 21 has been popularly initiated (UNCED, 1992).

Moreover, in the last 20 years new global awareness that demands switching to sustainability has risen - instead of emphasizing quantity and a mass production, now emphasis is given to quality. Additional value is not knowledge-based anymore but rather resource-based. Innovation is not reflected in finding new ways of increasing existing capacities for exploiting the nature anymore but in finding alternative materials which can be used in the production process.

One of priorities for immediate actions in the strategies for sustainable development of every company is sustainable consumption and production. These strategies define the method in which sustainability is carried out, through the following promotion measures:

- Better products and services, which reduce the environmental impacts from the use of energy, resources, or hazardous substances;
- Cleaner, more efficient production processes, which strengthen competitiveness; and shifts in consumption towards goods and services with lower impacts.

The sustainable consumption issue was raised for the first time as one of the key issues of sustainability at UN Conference on Environment and Development in Rio in 1992. Two decades since, different experts from this area agree that progress in tracking consumer habits and thinking the ways of changing them is too slow. Sustainable consumption emphasizes that quality of consumption must increase, both of today's generation and the future ones. This concept demands optimization of consumption subject, in order to sustain in time utilization and quality of resources, hence environment as well (Emil, 1994).

It is understandable that responsible businesses are at the heart of society. Companies that understand their links with the communities they operate in, and their impact on the environment, are most likely to prosper in the long-term. At the same time, the interests of stakeholders in firms' environmental performance are at an all-time high. There is an increasing recognition that good environmental performance makes good business sense: companies that measure, manage and communicate their environmental performance are inherently well placed. They understand how to improve their processes, reduce their costs, comply with regulatory requirements and stakeholder environmental expectations and take advantage of new green market opportunities.

3. About environmental performance indicators

There is an increasing demand for company reporting that is stricter and more focused on the key impacts on the business and on the environment. It takes reporting of environmental performance, which will benefit in two ways:

- It will provide management information to help exploit the cost savings that good environmental performance usually brings;
- It gives the chance to identify what is significant in firm's environmental performance (Becker, 2008).

Environmental performance indicators are one of possible tools for such a quantifiable measurement and information on how to understand and assess the environmental performance. Businesses would implement meaningful activities on environmental conservation if they could select appropriate environmental performance indicators. Environmental performance indicators would facilitate environmental communication with stakeholders if they were included in environmental reporting. Through the application of environmental performance indicators, assessment and measurement of environmental conditions a set of data is obtained that are to be used to inform and assist governments, developers, planners, and decision makers in tracking their performance towards environmental sustainability (Bell & Morse, 1999; Bell & Morse, 2003). Environmental performance indicators (EPIs) have been progressively developed over the past ten years and used by international organizations such as the United Nations, the World Bank, and the World Resource Institution WBCSD - World Business Council for Sustainable Development and GRI - Global Reporting Initiative (OECD, 1993; Neimanis & Kerr, 1996).

Environmental performance indicators have been identified as essential tools for environmental assessment and measurement to improve local livelihood and overall national development and sustainable development. EPIs cover a broad spectrum and are applicable at local, national and regional levels. The users of EPIs can easily access, directly select, and promptly apply a set of indicators to measure national environmental performance. In practice, EPIs tend to assist decision making more on the global and national levels.

Environmental ISO (The International Organization for Standardization) series have been widely used in companies that apply environmental management, with an outcome being environmental reporting. They particularly work on environmental performance evaluation and set worldwide standards that require commitment to a continuous improvement of environmental performance in order to meet environmental targets and performance criteria. ISO 14031 and ISO 14032 are the extension series of ISO 14000. ISO 14031 provides guidance on the selection and implementation of indicators to evaluate an organizational environmental performance, with the support of ISO 14032 which provides examples from real organizations to illustrate the use of the guidance in the ISO 14031 ISO (Environmental Performance Evaluation – Guidelines: Specifies the purposes of environmental performance evaluation, preparation of an evaluation plan, data collection, review of results – this was regulated as JIS Q 14031 on October 20, 2000). Although the guideline defines the concept and procedure of selection of environmental performance indicators, it does not cover the development of actual indicators.

4. Characteristicss and criteria of environmental performance indicators

Environmental performance indicators can be signs, statistics, measures, or parameters that are developed and used in informing and measuring the changes of environmental components, status, stresses and trends. These indicators can influence the management actions leading towards environmental management and sustainable development. They need to be developed to provide solid bases for decision making, and to contribute to self-regulating, integrated environments and development systems. EPIs should not only inform us whether or not what we are doing is leading to sustainability, but they must also be developed to synthesize scientific and technical data into fruitful information for decision makers to take policy decision on present and future issues. EPIs could be characterized as follows (Morrison & Pearce, 2000; Bossel, 2001):

- Indicators must represent all important concerns and cover all relevant aspects. It means that indicators must look systematically at the interaction between systems and their environment. Indicators have to be clearly defined, reproducible, unambiguous, easy to understand, practical, and sensitive to the changes that they are intended to measure.
- Indicators must reflect the interests of different stakeholders. Thus, the process of finding an indicator set must be participatory to ensure that it encompasses the visions and values of the community or region or other geographical scales for which it has been developed.
- Finally, they should be able to show trends over time and guide policies and decisions at all levels of the society and all its institutions.

According to the International Network for Environmental Compliance and Enforcement (2012), environmental indicators were defined to address the issues of:

- *Implementation Indicators*. Governments are required to take steps to implement commitments they have made in international agreements and national policies in the form of laws or programs.
- *Enforcement Indicators.* Once a government has adopted environmental laws they need to enforce them.
- *Compliance Indicators.* Once the laws are in place and are being enforced, other indicators are needed to measure the level of compliance.

5. Types of environmental performance indicators

In organizational operations, the basis of environmental performance indicators can be divided into two types of measures:

- The first is the environmental management indicators undertaken within an organization management system. They include internal information on the efforts the organization makes to affect its environmental impact, but not information on the environmental performance. For example, some of these indicators are the number of environmental audits, percentage of employees with environmental training, and the number of environmentally friendly suppliers.
- The second, the environmental condition indicators are external indicators describing the direct strains and impacts on the environment, for example, indicators of water emissions on waterways in the vicinity of a production site. Condition indicators are usually applied by public institutions. They are national indicators that can be used by organizations to aid in the selection of their performance indicators (Jasch, 2000).

6. Themes of environmental performance indicators

Environmental indicators include ecological, biological, chemical, and physical measurements and indices that attempt to characterize or identify critical and complex components of an ecosystem. Table 1 illustrates the aggregation of standard environmental indicators categorized according to the environmental themes and sub-themes (Kurtz et al., 2001).

Table 1: Environmental themes indicators

Environmental Themes	Sub-Themes	Environmental Indicators
Atmosphere	Climate change	Emissions of direct and indirect greenhouse gases
	Ozone layer depletion	Consumption of ozone depleting substances
	Air quality	Ambient concentration of air pollutants in urban areas and industrial estates
		Number of vehicles
Land	Agriculture	Arable and permanent crop land area
		Use of fertilizers
		Use of agricultural pesticides
	Forests	Forest area as a percentage of land area
		Wood harvesting intensity
	Desertification	Land affected by desertification
	Urbanization	Area of urban formal and informal settlements
Oceans, Seas, and Coasts	Coastal zone	Algae concentration in coastal waters
		Percentage of total population living in coastal areas
		Number of IUCN red list species* with habitats in areas affected by operations
	Fisheries	Annual catch by major species
Freshwater	Water Quantity	Annual withdrawal of ground and surface water as a percentage of total annual renewable quantity of water available from the sources (breakdown by region)
		Total water use and its impact on water sources and related ecosystems
		Total recycling and reuse of water
	Water Quality	BOD** in water bodies
		Concentration of faucal coli form in freshwater
		Water sources and ecosystems affected by discharges of water and runoff
		Waste discharge to water
		Total amount of waste by type and treated methods
Biodiversity	Ecosystem	Area of selected key ecosystems
		Location and size of land owned, leased, or managed in biodiversity-rich habitats
		Impacts of activities and operations on protected and sensitive areas
		Business units currently operating or planning operations in or around protected or sensitive areas
	Species	Protected area as a percentage of total area
		Abundance of selected key species
		Objectives, programs, and targets for protecting and restoring native species in degraded areas
Waste	Material	Percentage of materials used that are wastes (processed or unprocessed) from sources external to the reporting organization
Performance and Management	Policy	National, sub-national, regional, and local environmental policies and regulations
		Incidents of applicable international declarations/conventions/treaties associated with environmental issues

** IUCN red list species - is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species.*

*** BOD - Biochemical oxygen demand*

7. Managing and reporting on environmental performance

Managing and reporting on environmental performance can lead to significant business benefits as well as benefits for the environment:

- *Cost savings and productivity gains*. Businesses can save costs and increase efficiency through reducing and managing the resource use. Typical areas where cost savings are identified include the use of raw materials and supplies, reductions in waste, water and energy use and transport, travel, and packaging. By reducing environmental impacts, such as waste to landfill, businesses can significantly reduce any associated taxes or levies, or avoid the cost of compliance altogether. Responsible management of risks and liabilities can lead to reduced insurance costs.
- *Improved sales*. Businesses can benefit from improved reputation amongst their customers (and potential customers) by reporting on relevant environmental issues in a clear and transparent way. Good reporting improves customer confidence. Informing customers of efforts to improve organization's environmental performance can lead to increased confidence in products and services.
- *Preferred supplier status*. Large organizations increasingly require that suppliers and contractors should submit environmental performance information to satisfy the expectations of their own shareholders. Reporting on environmental information can make a more attractive supplier than competitors.
- *Increased attractiveness to the investment community*. Investors, financial analysts and brokers are now asking questions about the sustainability of business operations. Reporting on environmental matters provides a good indication of what measures an organization is taking to reduce risks and develop opportunities.
- *Product and service innovation*. Measuring and managing environmental impacts drives and supports innovation in product and service development, helping to secure new markets and customers or safeguard the existing ones.
- *Employee recruitment*. Clear reporting of an organization's efforts to manage its environmental performance helps attract high-caliber employees as good environmental reputation and performance can be an important factor in an employee's choice of employer.
- *License to operate*. Managing environmental impacts and minimizing the organization's impact on the environment can reduce the exposure to fines. It can improve relations with regulators and help ensure the company maintains its license to operate by providing assurances about compliance with environmental legislation and conformity with other relevant laws and regulations.

Furthermore, it should be emphasized that environmental impact is defined as the degree to which an organization's business processes, activities and operations positively or negatively affect the natural environment. The environmental impact is the consequence of the organization's actions in relation to the quality and cleanliness of air, water and soil and, more generally, to the short-term and long-term health of the planet Earth's global ecosystem. Also, environmental impact can be defined as every change to the environment.

8. Key drivers of environmental performance reporting

Key drivers of environmental performance reporting are:

- *Regulations.* Governments at most levels have increased the pressure on corporations to measure the impact of their operations on the environment. Legislation is becoming more innovative and is covering an ever wider range of activities.
- *Customers.* Public opinion and consumer preferences are a more abstract but powerful factor that exerts considerable influence on companies, particularly those that are consumer-oriented. This factor has led firms to provide much more information about the products they produce, the suppliers who produce them, and the product's environmental impact from creation to disposal.
- *Peer pressure from other organizations*. Each organization is part of an industry, with the peer pressures and alliances that go along with it. Matching industry standards for sustainability reporting can be a factor; particularly for those who operate in the same supply chain and have environmental or social standards they expect of their partners. There is a growing trend for large organizations to request sustainability information from their suppliers as part of their evaluation criteria.
- *Organizations themselves.* Organizations, as public citizens, feel their own pressure to create a credible sustainability policy, with performance measures to back it up - but with an eye on the bottom line as well. Increasingly, stakeholders are demanding explicit sustainability - reporting strategies and a proof of the results. Balancing financial growth, corporate responsibility, shareholder returns and stakeholder demands also leads to an evaluation of the trade-off between short-term gains and long-term profits.

- *Investors.* Increasingly, investors want to know that companies they have targeted have responsible, sustainable, long-term business approaches. Institutional investors and stock exchange CEOs, for example, have moved to request increased sustainability reporting from listed companies, and environmental, social and corporate governance indices have been established, such as the Dow Jones Sustainability Index. The Carbon Disclosure Project was developed in response to investor demand for a system for firms to measure and report greenhouse gas emissions and climate change strategies as a tool to set reduction targets and also set individual goals.

9. Tools for measuring environmental performance

Selecting meaningful and effective tools for measuring environmental performance is becoming increasingly important due to the increasing costs of environmental operations; market, regulatory and public pressures… Many metrics are already in use. These include lagging indicators, which measure outputs such as pounds of pollutants emitted or discharged; leading indicators, which are in-process measures of performance; and environmental condition indicators, which measure the direct effect of an activity on the environment. Each type of indicator has its own strengths and weaknesses, and different audiences; most organizations use a mixture of them.

Metrics can measure the business value of environmental programs or progress as well as the environmental performance of business operations. This can be particularly effective in demonstrating the value of environmental efforts to management. It can also provide data with which business units can design more efficient processes, decreasing material usage and environmental impacts while at the same time increasing yield and profitability. The last several years have seen the development of several trends in environmental metrics. Some of these trends are:

- the globalization of metrics,
- increasing emphasis on sustainability in its environmental context (the efficient use of resources) and efforts to develop sustainability metrics,
- increasing use of environmental management systems as benchmarks of environmental performance and
- emphasis on the integration of environmental performance with business performance with the goal of reducing costs and material losses, and improving yield, market share, and profitability.

Environmental performance indicators are essential tools for tracking environmental progress, supporting policy evaluation and informing the public. Usually, three categories of environmental indicators are defined for evaluating and reporting the environmental performance of an organization (Defra, 2012; EC EUROPA, 2012):

- Operational Performance Indicators (OPIs):
  - o Input indicators:
    - ▪ Materials,
    - ▪ Energy,
    - ▪ Services supporting the organization's operation,
    - ▪ Products supporting the organization's operation.
  - o Physical facilities and equipment indicators:
    - ▪ Design,
    - ▪ Installation,
    - ▪ Operation,
    - ▪ Maintenance,
    - ▪ Land use,
    - ▪ Transport.
  - o Output indicators:
    - ▪ Products provided by the organization,
    - ▪ Services provided by the organization,
    - ▪ Waste,
    - ▪ Emissions.
- Management Performance Indicators (MPIs):
  - o System indicators:
    - ▪ Implementation of policies and programs,
    - ▪ Conformance,

    - Financial performance,
    - Employee involvement.
  - Functional area indicators:
    - Administration and planning,
    - Purchasing and investments,
    - Health and safety,
    - Community relations.
- Environmental Condition Indicators (ECIs):
  - Environmental media indicators:
    - Air,
    - Water,
    - Land.
  - Bio and anthroposphere indicators:
    - Flora,
    - Fauna,
    - Humans,
    - Aesthetics, heritage and culture.

Operational performance indicators (OPIs) concentrate on the aspects associated with the 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.

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

Environmental Condition Indicators (ECIs) 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.

Conclusion

Since the United Nations Conference on Environment and Development in 1992, sustainability has become a widely shared goal. Although information can provide an improved basis for decision making and gauging progress, accountability is possible only if goals and measures of progress are explicit. Appropriately formulated indicators can provide such measures, enhancing the diagnosis of the situation and making progress or stalemate obvious to all.

Environmental performance indicators provide businesses with a tool for measurement. They are quantifiable metrics that reflect the environmental performance of a business in the context of achieving its wider goals and objectives. They also help businesses implement strategies by linking various levels of an organization (business units, departments and individuals) with clearly defined targets and benchmarks.

The impact of environmental matters on organizational performance is increasing and will continue to do so. For example, poor management of energy, natural resources or waste can affect current performance; failure to plan for a future in which environmental factors are likely to be significant may put the long-term value and future of a business at risk. Therefore, governments expect that businesses will need to use environmental performance indicators to adequately capture the link between environmental and financial performances (UNCED, 1992).

The green and sustainability trends are manifested in the pressure from consumers, shareholders, employees, partners and governments (regulations) put upon companies to embrace more sustainable and green practices. Many companies resorted to greenwashing instead of actually creating green innovations by marketing their product in a way that suggests green practices.

However, there are many companies that have taken the sustainability trend seriously and are doing so profitably.

Organizations that give back to the community, whether through employees volunteering their time or through charitable donations are often considered to be socially sustainable. Organizations can also encourage education in their communities by training their employees and offering internships to younger members of the community. Practices such as these increase the education level and quality of life in the community.

In order for an organization to be truly sustainable, it must sustain not only the necessary environmental resources, but also its social resources, including employees, customers (the community), and its reputation.

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