

Chapter 9

Sustainability Assessment Approaches: Towards a Global Sustainability Development

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ABSTRACT

The beginnings and progress in implementing sustainable development in different areas with large impacts on the environment, society, and economy in the last decade is summarized. Thus, the different existing approaches and possible future developments for applying the sustainability concept are analyzed, starting with municipalities and urban planning but also including the applications to engineering projects and companies in the recent search for global sustainable development. An analysis is developed of the weaknesses and strengths in existing proposals for assessing sustainability and the consideration of the basis for sustainable development in all sustainability assessment applications is proposed. Through this approach, from the lessons learned in previous experiences, a framework to manage and to create sustainability assessment models is proposed, including standard procedures, allowing trend settings to designers, the government, developers, and decision-making centers. Key performance indicators are being widely used in such applications, becoming the sustainability assessment tool of any project or activity. The ultimate aim of this chapter is to enhance the awareness of all stakeholders in the need for a more sustainable global development, considering actions not only in the immediate environment but also in indirect environments in space and time.

INTRODUCTION

The impacts on the planet as a result of human activity, mainly from industrialized countries, are undoubtedly enormous. In 1972, *Blueprint for Survival* and *The Limits to Growth* was published,

where the “unsustainability” of our development model is mentioned for the first time. Similarly, in 1972, Stockholm Summit brought up a possible Climate Change (CC) which results in 1988 with the establishment of an Intergovernmental Panel on Climate Change (IPCC) composed of the World Meteorological Organization (WMO) and United Nations Environment Program (UNEP)

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to evaluate the available scientific information about CC and to assess its environmental, social and economic impacts. These early approaches eventually became a central theme at successive Summits of the Earth, finally regarded as a fundamental goal and a challenge to establish a new model of sustainable development in the Rio Summit in 1992, supported by three pillars: the environmental, social, and economic.

This new development mode, to be considered in all human activities, has as a common objective the development without compromising the ability of future generations (WCED, 1987) and the ability of all areas of the planet to allow their own development. This new vision has mobilized all sectors and companies to search for a new focus among corporate and institutional priorities: the sustainability of their own activity as a contribution to global sustainability. Therefore, projects and products, in addition to meeting the triple objective of cost, time, and quality, should begin to give special attention to the strategic goals of global sustainable development, such as control, knowledge, and information of their impacts on environment, society and the economy.

However, the complexity inherent in the sustainability concept of an activity or project raises controversy between what sustainability is and how it should be measured or evaluated. Therefore, the objectives for this chapter are mainly:

- To analyze and define what is meant by sustainability and its basic differences within the environmental impact assessment already established in many sectors.
- To identify some approaches used in other engineering industries, allowing us to know existing trends in the implementation of sustainability in different activities.
- And finally, to propose a methodology for implementing sustainability in business and institutional activities in general but additionally engineering projects in particular. This will include a focus on ensuring

consistency with the previously established definition of sustainability in addition to leveraging the strengths of the existing proposals and improving the weaknesses and threats identified in the literature.

BACKGROUND

Following the objectives' structure defined in the introduction, it seems logical to start with what is meant by sustainability applied mainly to engineering projects and products. We understand that a sustainable activity is able to minimize the resources used, such as materials, water, soil, energy; minimizing waste generated through waste reduction, recycling, reuse, or energy recovery; decreasing the direct and indirect emissions into the atmosphere, soil, and water through innovative techniques or the use of alternative materials and energy sources; identifying and analyzing the impacts of activity on local and global society, economy and environment; and, finally, counting the economical cost integrally. All these aspects should be considered in a full-frame, the Life Cycle Assessment (LCA), from initial design and implementation but also including the impacts of their use, maintenance and finally to the restoration of their origins. It is understood, therefore, that a project or activity is closer to sustainability when trying to analyze and apply all the above improvements without significant damage on the cost, time, quality, or performance features (Fernández-Sánchez & Rodríguez-López, 2012). The importance of analyzing impacts upstream and downstream, generated by the resources and services used during the activity is a differentiating factor with respect to the classical environmental assessments. However, the application of many aspects and their integration into normal project management is seemingly complex.

As reflected, the difference between the typical environmental impact assessment of a product or project and the application of sustainability

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