

Engineering Sustainability

– Is it an Achievable Outcome?

At no point in the past have we ever been more acutely aware of the environmental and social impacts of our economic activities. Awareness comes with age, and age with time. Technological evolution, through the ages, has inadvertently continued to increase the size of the human society's footprint on the planet than any other co-inhabiting species. Economic activity was born through stone, bronze, iron, and the industrial age. So also born was the notion of sustainability.

Today, many a leader of countries, companies and governments mention environmental and social sustainability in the same breath as economic issues. Whether indeed the next 100 years are termed the 'Information Age' or 'Sustainability Age' will, to a certain extent, be a result of the awareness and progress achieved in these, necessarily not mutually exclusive, fields. To go forward, we must be aware of the past. This is also a pre-requisite to understand sustainability.

Sustain-Ability was first coined by the UK-based strategic consulting firm SustainAbility Ltd. To 'sustain' is to keep in existence, but interestingly it also refers to the capacity to endure or to suffer. Would we also endure suffering as a result of environmental and social inaction?

There are numerous definitions of sustainability and sustainable development, but the best known is the World Commission on Environment and Development's. Phrased by the Brundtland Commission, this suggests that development is sustainable where it "meets the needs of the present without compromising the ability of future generations to meet their own needs." The scientific and political communities are yet to agree on the level of natural resource exploitation that can be sustained indefinitely.

Economic success has the potential to carry with it a heavy burden on the environment, and in some cases, the quality of life. Many scientists and leaders in society believe that increasing the

stress on the biosphere will reach the limits of the earth's capacity to carry these burdens in the next 50 to 100 years. Many others disagree. The following quote illustrates the typical debate.

"You got a guy with four Ph.D.'s saying no fish were hurt, then you got a guy with four Ph.D.'s saying, yeah, a lot of fish were hurt ... They just kind of cancel each other out."- ***Juror in the \$5 billion Exxon Valdez trial***

Sustainability, from an anthropocentric point of view, is a function of such issues as: the ecological footprint of economic development; the world's carrying capacity; population growth; consumption patterns of society; education levels; biodiversity; standard of living conditions; employment levels; extent of diseases and wars; and the effects of natural as well as external forces.

Below are some of the factors that I believe have given birth to the notion of sustainability and the need for sustainable development.

Human Population Growth: According to the United Nations Population Division, over the past fifty years, the human population has grown from 2.5 billion to 6 billion people.

Increase in Human Life Expectancy: The human life expectancy has escalated from a mere 47 to over 65 in the past fifty years. This is a contributor to population growth.

Increased human consumption: According to the World Resources Institute, the world economic output has more than doubled in the past 25 years. An estimated calorie per day per person has grown by nearly 40% in the past fifty years. The richest 1% of the population receive as much income as the entire bottom 57%; i.e., less than 50 million richest people receive as much income as 2,700 million poor.

Engineering Sustainability

Continued...

Increased waste and emissions: Atmospheric pollution levels have increased in developing countries, whereas they have fallen in the developed world. Waste and emissions represent lost business value, business costs, and a threat to present and future human generations and to ecosystem health (World Resources Institute).

Degradation of natural resources – Nearly 26,000 plant species, more than 1,100 birds, 700 freshwater fish, and hundreds of reptiles and amphibians are threatened with extinction. Over the past century, world water withdrawals increased almost twice as fast as population growth (World Resources Institute).

From these extremities, it would seem that achieving true sustainability is perhaps a dream alone. But, there is every indication from man's capacity to adapt and continue with progress that it will be achieved in some form. The one-child policy has worked well in China, stalling population growth; the use of chloro-flouro-carbons (CFC's), as a result of an international treaty, has declined dramatically throughout the world; energy efficiency rates in industries has continued to increase, both because of the rising cost, as well as greenhouse pressures; and the extent of recycling and re-use continues to grow throughout the world. The question is whether sustainability is being engineered as a re-action or pro-action. Most would agree that, to date, it has primarily been reactive.

The next fifty years, to me, represent the fifty years in which we will do the most to protect, and restore the environment, and facilitate sustainability. We will do so because it will increasingly be more economically unfeasible, and socially unacceptable not to do so. Accordingly, engineers will have the significant task of re-engineering thought processes, challenging accepted wisdom, changing corporate thinking, accounting for the natural environment and remaining resources, increasing eco-efficiency, managing growth, and integrating the triple bottom line.

Written by Terence Jeyaretnam,
Director, Net Balance Management Group
Director, Net Balance Foundation