

**SUSTAINABLE DESIGN SOLUTIONS: AN INTERDISCIPLINARY PERSPECTIVE****Indeesh Mukhopadhyay**Cornell University
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Sustainable design is the operational aspect of creating an eco-effective and eco-efficient world. The purpose is to solve large-scale global problems like climate change, poverty and wars through micro and macro processes of individual, local and international efforts at problem-solving. It encompasses all aspects of green construction inclusive of productive and consumptive dimensions at the industrial and community level.

To understand the problem solving aspects of sustainable design, however, it is critical to understand what sustainability entails. The concept of sustainability, in terms of the relation between man and nature, has gone through various discursive avatars over time. These discourses have typically swung between two extremes of utilitarian and non-utilitarian values. One vision has centered on viewing the world as anthropomorphic, and hence, dominated purely by human wants and subservient to human control and instrumental extraction. The other view has taken the world as being purely eco-centric, where conservation as an intrinsic drive has been the predominant concern, with growth as a subsidiary spillover. Recent streams of thought, however, have sought to reconcile these polar viewpoints. Such views tend to look at the world holistically from a combination of weak anthropocentrism and values derived from contingent social, economic and environmental contexts. The hope is that it will lead to mutual flourishing of man and nature.

These neo-viewpoints on sustainability are open to seeking active innovative technological solutions by tapping into human creativity in order to meet future social needs. Multiple frameworks of thought have emerged for both conceptualizing and operationalizing the various ways that people can go about solving complex issues of sustainable development. For example, there has been the trend of cradle-to-cradle solutions. There have also been solutions based on the TRIZ (The Theory of the Solution of Inventive Problems) model of innovativeness and derivatives from it, like the ASIT (Advanced Systematic Inventive Thinking). There has also been recommendation for developing emergent problem-solving processes based on open-ended or multiple definitions of problems (and hence, multiple types of solutions). Such definitions are expected to encompass multiple values like cost-benefit, aesthetic, technical, spiritual etc. But all such values are expected to have as their core concern ethics, as derived from negotiation of various power hierarchies and interests within and across communities. The focus here is on constant dialogue to create moral responsibility, at both individual and social level within the domestic and international arena.

Cradle-to-cradle solutions seek to create innovations based on miming nature's capability to create food or nutrients from wastes. This solution is based on the view that the world is ever-abundant rather than a scarce resource base, as visualized in typical economic literature. If managed effectively, such resources will continue to enrich human life without the human society feeling the burden of guilt for exploiting mother-nature. The focus then is on cyclical use of non-biodegradable products; use of solar energy; and safe non-toxic products with a focus on harnessing local resources. Such problem-solving strategies have resulted in products, like fuel cell based on the process of photosynthesis, designed by a team from MIT.

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The TRIZ paradigm was developed in Russia within the context of complex engineering-based problem-solving strategies. Recent derivatives like ASIT focus on a more simplified version of the complex system of TRIZ. The focus here is on solving design-problems from within the problem itself, without the introduction of additional or new resources. This creates for a closed world of design that repositions the problem-puzzles to create a more productive and qualitatively different design configuration. Key tools in such a process include methods like assigning a new use to an existing component, dividing an object and reorganizing its parts, etc.

Sustainable design solutions are not limited within the purview of industrial organizations, but need to be also built up from the ground-level. Hence, the focus has increasingly shifted to educating people through multi-disciplinary perspectives. The purpose is to help them become innovative designers of green environments through development of pragmatic skills and changes in moral attitudes. Hence, developing proper 'green' educational curriculum with a focus on coherent, hands-on projects has become a leading issue for sustainable design proponents. This was evident in the first European Conference on Education for Sustainable Development, held in Greece in October 2007. Education for sustainable development and technology education are increasingly seen as being symbiotic in relationship. The focus then has been on generating diverse forms of relevant technology and critiquing non-sustainable technology.

Active projects for achieving a healthy symbiosis of technology and development can be enhanced through linkages between industry, non-governmental organizations and educational system. Such enhancement can be implemented through varied research grants, internships and community participation activities. This would enable the emergence of education *through* sustainable development rather than just education *for* sustainable development. Instead of textbook problems and typical solutions, education would become more relevant for local needs. More critically, it would help in creating products through interaction of knowledge input based on users' perception of needs and producers' execution of those requirements within a sustainable framework.

Such sustainable frameworks could be based on pre-structured laws. They could also be the products of initially ill-defined processes that through the process of consultation transform into concrete matrices of problem-solving. Such activities are helpful in generating information about innovation processes and can help guide dynamic public policy. Increasingly, institutions like the Active Technology Program (within the OECD) are emerging to create data banks about innovation metrics that are being generated within the business communities. With due attention paid to confidentiality of information, such collaborative activities help generate public data for free and fair use. This helps propel further innovation. It also helps open up democratic debates about the risks involved in using such innovations in public life.

What the above emerging activities indicate is that active projects as learning strategies enable people to understand the process of formulating tasks, undertaking requisite research, the development and evaluation of ideas and finally their skilful execution. This would enable the emergence of participatory, transparent and just models of sustainability, like fair trade. These models take into consideration organic styles of production based on traditional knowledge of the local environment. It also seeks to integrate appropriate modern techniques that help reinterpret and integrate indigenous knowledge into new productive versions. This would help increase competencies of the local populace and help them to better identify and adapt to changes.

Along with such educational efforts, there have also been attempts to create regional awards like Sustainable Design Awards and international awards like the Engineering Award from the UNESCO and the UN. Such awards seek to recognize and stimulate the production of constructive eco-effective designs. They focus on rewarding global projects with a holistic orientation to halting pollution; and providing sustainable shelter, clean water, energy, food and education all basic human needs.

All the above outlined activities stimulate lobbying efforts for changes in policy environment and continuous principled vigilance of various activities in the socio-economic arena. Overall, such activities create a frame of mind



that fosters sustainable values. They also seek to create social movements that are oriented towards closing the value-action gap in order to steward the earth towards a sustainable realm. This would help mediate the short-term economic tendency of rushing products like fuel-inefficient sports utility vehicles, or appliances and textiles with organic pollutants like poly-carbonated biphenyls as fire retardants to markets; and the long-term need to consider environmental and health issues. This should help people to avoid the 'Tragedy of the Commons,' and help preserve ecological integrity of bio-diversity and social cohesion through creation of sustainable structures like eco-industrial parks.

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