Chapter IV

CONCEPTUAL FRAME

Technology is dominated by those who manage what they do not understand.

-Murphy
CHAPTER IV

CONCEPTUAL FRAMEWORK

The term sustainable development came into prominence in 1980, when the International Union for the Conservation of Nature and Natural Resources (IUCN) presented the world Conservation Strategy (WCS) with "the overall aim of achieving sustainable development through the conservation of living resources" (IUCN, 1980). This definition however is oriented towards Ecological sustainability.

In contrast, one of the most accepted definitions world over - the currently popular definition of SD is the one adopted by the World Commission on Environment and Development (WCED): Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). The constraint of "not compromising the ability of future generations to meet their needs" is considered by the Commission to be equivalent to the requirement of some level of ecological and social sustainability.

The last decade has seen a dramatic transformation in the environment-industrial development debate. The question being asked is no longer "Do industrial development and environmental concerns contradict each other?" but "How can sustainable industrial development be achieved?". The industries throughout the world have been forced to embrace sustainability due to the increased awareness on the seriousness of the environmental impacts of ill-conceived/unplanned industrial growth. Thus, sustainable industrial development has become the watchword for all the concerned stake holders—international aid agencies, the development planners, the academic researchers, industrial firms and environmental activists. It appears to have gained the broad-based support that earlier development concept such as "eco-development" lacked, and has blossomed to become the developmental paradigm of the 1990s.
Industry provides a typical example of a sectoral aspect of sustainable development; industrial issues - cutting across the environmental, economic and social dimensions figure prominently in the sustainability debate.

Environmental constraints to development are acutely felt in the industrial sector in relation to both production and consumption of manufactured goods. Here the key to solving many of the problems lies in selecting appropriate technologies for pollution prevention and control. Since environmental problems caused by industrial production are due to so-called external effects - outside the realm of the market mechanism - corrective policy measures are needed to reduce or eliminate such effects. The response of industry to such policies is in almost all cases are technological in nature. Hence industrial technology and its continuous innovative change - if properly shaped by market and policy incentives - makes an important contribution to solving the environmental sustainability problem.

The importance of industrialisation in economic development is crucial for a growing economy with a large population like India. Hence, prosperity through industrialisation has been a long-term strategy for the Indian government. Communities, businesses, and governments have debated the results of industrialisation, a debate that has continued to grow unabated. Being reliant on agriculture and having a large population base has made India impoverished, and hence industrialisation is roughly a synonym for economic development as a means to conquer poverty and provide employment. In fact, these facts have accelerated the pace of industrial development to such a level, that we hardly paid any attention to the inevitable environmental impacts of the industrial production processes. If we do not pay adequate attention to these impacts – some of them irreversible, the industrial pollution will inevitably rise rapidly with economic growth and reach unbearable proportions – just as it did in the industrialised countries in the 1950s and 1960s within a decade or so of the post Second World War economic boom.
The growing numbers of industrial air pollution episodes such as the Bhopal gas tragedy and the numerous sporadical, but widely prevalent instances of soil/ground water contamination in the length and breadth of our vast country have necessitated a radical change in our development policy. We need development – but the essential questions are at what costs? Who should bear these costs? How? How best should industries manage productivity and at the same time increase profits without causing damage to the environment? These are the major challenge faced by Indian industries, and in addition, they are faced with the problem of how to effectively make use of their industrial processes and deliver environment friendly products.

In India, industrial pollution is regarded the worst among the many environmental impacts that are causing damage through excessive exploitation of natural resources and degradation of the environment. Although, industrialisation is seen as a solution to providing economic growth and increasing employment levels, irrespectively, all industries, whether large or small, inevitably pollute the air, soil and water. Where higher population and economic growth demands more resources (inputs) and by consequence generates heavier discharges (outputs) in the form of pollutants, not many industries could adopt sustainable industrial technologies for several reasons (chief among them being the longer pay back period for adopting the available pollution technologies, lack of access/ know how on best practice case studies on Industrial Ecology, and the lop sided Govt. policies such as subsidies on power and ground water use; thus, they have miserably failed to identify the much needed trade-offs between economic growth, profitability, and sustainable development), thus exerting enormous pressure on the environment. Hence, there is an urgent need for a re-awakening on sustainable industrial development.

The World Bank study done in the mid-1990s indicated that the toxicity intensity of the industrial economy, the toxic load generated per unit of industrial output increased 1.11 times between 1977-87 in Japan, a developed country but increased 5.4 times in Indonesia between 1976-86, around 3.17 times in Pakistan between 1974-84 and 3.05 times in Malaysia between 1977 - 87. In twenty years after 1975, the gross domestic product (GDP) grew 2.6 times in India but industrial pollution more than tripled and vehicular pollution increased by almost eight times. The
pattern of industrialization followed in the developing countries clearly shows that if a country like India is going to double its GDP, without looking at pollution control, then pollution load will increase rapidly and disproportionately by as much as ten times. It is, therefore, vital to avoid the apocalyptic collision between economic growth and environment, by monitoring and influencing the future industrialisation of India.

Lele (1991) in his classical review article has pointed out that over the past few years, “Sustainable Development” (SD) has emerged as the latest development catchphrase. A wide range of nongovernmental as well as governmental organizations has embraced it as the new paradigm of development. A review of the literature that has sprung up around the concept of SD indicates, however, a lack of consistency in its interpretation. More important, while the all-encompassing nature of the concept gives it political strength, its current formulation by the mainstream of SD thinking contains significant weaknesses. These include an incomplete perception of the problems of poverty and environmental degradation, and confusion about the role of economic growth and about the concepts of sustainability and participation. It is suggested that if SD is to have a fundamental impact, politically expedient fuzziness will have to be given up in favor of intellectual clarity and rigor.

The industrial policy in India is undergoing major paradigm shifts. Notable among them are:

- from the policy focus on reactive/end-of the pipeline/pollution control to pro-active/preventive strategies/technologies
- from the narrow focus on ‘maximizing’ for the economic profit to ‘optimizing’ for sustainable industrial development (industrial growth with minimal negative impacts on the Ecosystems and the local communities)
- from “command and control” policies to the emergence of “corporate environmental responsibility”
In a nutshell, we have moved very far from the narrow focus on quantitative aspects of industrial growth to "total quality management" or "cradle to grave" or "life cycle cost analysis". However, a majority of our industries, especially in the medium and smaller scale categories have so far failed to make use of these shifts so that they can come out of the vicious cycle of the non-affordability/accessibility/availability or the lack of technical know how on appropriate pollution prevention technologies and the consequent environmental pollution.

The recent decade has seen a clear recognition and acceptance of preventive strategies, embodied in the concept of Cleaner Production, as a long-term, cost-effective and more sustainable approach to tackling environmental problems associated with industrial production. The Cleaner Production concept, founded by UNEP in 1989, along with other similar meaning terms e.g. eco-efficiency, green productivity, pollution prevention has earned global recognition.

Transforming the use of materials in production from a linear to a cyclic mode is the conceptual framework of industrial ecology (IE), a field about fourteen years old. The idea of an industrial ecology is based upon a straightforward analogy with natural ecological system. In nature an ecological system operates through a web of connections, in which organisms live and consume each other and each other's waste. In industrial context we may think of this as being use of products and waste products. The system structure of a natural ecology and the structure of an industrial system, or an economic system, are extremely similar. The core of industrial ecology-the industrial ecosystem model-has become a framework for studying the interactions of the modern technological developments with the environment. As an emerging field, IE has grappled with challenges such as establishing itself as a unique field, gaining academic merit, developing quality standards, and guiding applications in industrial operations. Within the context of such challenges, distinct research branches have emerged: conceptual framework studies, development of operational tools (e.g. design for environment), and systemic studies (e.g. industrial symbiosis). The field began by conceptualizing industrial systems and has now made the transition to gathering the data that characterize such systems. One of the greatest
challenges now facing IE is applying the knowledge gained from these endeavors to defining and setting goals for sustainable technological activity and development (Harper and Gradel, 2004). The industrial ecology metaphor is effective but disturbing. This paradigm provides a framework for integrating many tools belonging to the second generation of environmental policymaking. Indeed, it claims to be a framework for achieving sustainable development. It asks planners and policymakers to admit their lack of direct control over dispersed individual polluters. It uses the language of markets and incentives. It highlights the big picture and encourages systematic thinking. It operates at any scale. It separates the provision of environmental information from the regulatory control function. It expects innovation. For all of these reasons, industrial ecological analysis belongs in the planner's toolkit (Clinton, 1999).

Despite recent efforts by a variety of industrial organisations to apply Industrial Ecology concepts to the management of materials produced by industries, several constraints to its widespread applications still exist. Among these constraints are the lacks of easily implementable decision-making support systems that include significant externalities. In decision-making processes about materials management, recycling costs need to be compared with disposal costs. In some cases, it may be advantageous to provide the byproducts for use as raw materials outside the plant or industry that produce them. Lack of enabling technology and regulatory support can pose significant constraints with respect to large-scale material substitution and recycling. Some factors that are needed for comprehensive analysis of materials and energy management options are still not easily quantifiable. For example, valuation of natural resources is an important issue on which research advances need to be made in order to expand the application of Industrial Ecology in regional sustainable development. Approaches, techniques and programs such as material and energy flow studies, environmental cost accounting, life-cycle inventory assessment and design (CLA), and design for environment, need to be better interlinked to provide an effective decision-making tool on material and process substitutes.
Environmental risk liability is an issue that is gaining increasing attention among the Indian industrialists, due to the following reasons:

- International financial institutions and investors are keen to know more about the potential liability they could be involved in by investing in emerging markets like India, which are lacking in environmental commitments.
- Investors associate poor social and environmental performance with financial risks and liabilities.
- Environment conscious consumers express their support to responsible companies by purchasing their products in the market.
- With the increased thrust on exports, the companies will have to present themselves as environmentally responsible to be able to withstand international scrutiny.
- Public interest litigation, encouraged by an active judiciary, has led to the closure of a number of industrial plants by the Supreme Court and the High Courts. With increasing environmental consciousness of investors, investments in companies with poor environmental track record are likely to go down.
- The emerging GATT regime makes it mandatory on the part of the industries to strictly adhere to the pollution prevention/control norms as otherwise their products will find no buyers in the global economy.

Thus, the age-old concept of inverse relationship between environment and industrial economy has become obsolete. Today an industry with better environment practices is more likely to improve its bottom line than its not so environmentally conscious competitors.