

TECHNOLOGICAL IMPERATIVES–CHALLENGES AND SOLUTIONS

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Introduction

In this presentation I wish to address on three issues: a) to elaborate what is meant by technology in relation to society, b) to analyze why technology has brought us to where we are, and c) to contemplate the solutions and the directions we should be taking. In the end, it is my hope that the ideas I will have presented, ideas I have acquired from the other presentations before mine, will have gained such currency so as to be accessible to us all.

Technology means devices, hardware, production systems but, more fundamentally, technology is the application of knowledge to meet human needs. Sometimes technology is embodied in a device like a transistor or a birth control pill. But after all, technology is there to fuse basic science with knowledge. Different kinds of technological change ought to be differentiated because, if technology is part of our solution we must be certain we are dealing with the right type of technology. This means making a distinction between invention, innovation, diffusion and technology, as these are not the same.

Technology and Society

Inventions are the first prototype, the first working model of some idea like an electric light bulb or transistor. It is fair to say that the world has many inventions, but the competition is not for more inventions, but for the application of inventions in commerce, for fewer devices actually end up on the market than are invented. An innovation is what we call a first-time application to market. When we have to make decisions, the questions are: What inventions are we going to put on the market? What are the social decisions that we want to see made? Once the technologies are available on the market, the question of which one gets diffused into widespread use, i.e. which one is to become the dominant technological response, arises. There is competition between different innovations that might dominate the market. At the same time there is competition between using something already developed, inventing something anew and innovating something all over again. Thus, tension exists between our present technology and technical systems that we might yet want to develop. It's always more tempting to use what already has been proven than to design a new system or a new product that has some risk in it.

Technology transfer would be better defined to mean something other than diffusion, denoting, for example, transfers from government laboratories to industry or from one country to another. The danger of course is that we continue to transfer the wrong kinds of technology from industrialized countries to developing countries. Now that eastern Europe has become a place which wants to absorb a large amount of technology, there exists the danger of not selling cleaner technologies and products. German, American and British vendors are selling technologies which are old and tempting to buy. The pressure is on, and part of the challenge before us is to develop in the right direction, even though technology importing countries don't have a mechanism with which to select discriminately.

What, then, are the human needs technology is being asked to fulfil? Let us recognize the fact that human beings are fundamentally concerned with their health, food and supplies, shelter and housing, with transportation and communication. Frequently the list ends there, which is also where industrial firms attempt to fill those human needs. But these needs are really a small part of what we can really define as human needs, for although—fortunately—the nuclear threat is not a primary concern, our need for security has gone over to environmental issues. They were always present, but usually in the shadows of the balance of terror. As they reflect the need of humankind for security, however, environmental concerns have moved into the light. Humanity, therefore also needs to:

- engage in productive work, not simply the Protestant work ethic, but as a matter of human and cultural development;
- provide mechanisms to continue to learn formally or informally;
- experience beauty and esthetic values of life;
- provide mechanisms to continue to learn;
- foster people (the human desire to nurture children and others);
- provide a mechanism for love, a word not generally used in the technological field. (cf. Donella H. Meadows et al, The Limits to Growth)

On this last point, the aforementioned authoress finds in her second book the fundamental need to express the fact that, in order to avoid the limits to growth, society has to be able to engage in love—i.e. a concern for greater humanity which simply cannot be explained or engineered

in terms of the profit motive and economic incentives. These needs—security, work, aesthetic values, learning, nurturing and love—are a whole set of needs which are not currently the focus of profit optimizing enterprises. They don't sell these things, even though the tourist industry does sell a certain aesthetic need. Two further sets of needs are 'neurotic', based on the emergence of a basically commercially oriented world: the mindless pursuit of profit beyond a certain point disguising greed as need; and consumption neurosis.

Where Has Technology Taken Us?

What is the reason behind technological progress? It's often said that technology is neutral. Single purpose technology has been developed, especially in the United States, transportation technology is developed without concern for the environment and buildings are constructed with windows that no longer open, creating what is called the sick building syndrome, resulting in extensive indoor air pollution. This is a result of technology being consented to with a single purpose in mind. There are, of course, distributing effects with regard to technology; creating the largest possible GNP is feasible, but the distribution of the spoils within the country or between countries may not be so practicable.

The trend toward reduced labor production and the movement of greater capital intensity within the world's economic system, as well as the globalization of the world economy should be kept in mind. In other words, producing nations now produce not only for domestic consumption but also, if not predominantly, for world-wide consumption. This may mean, for instance, that the United States is more concerned with selling to the emerging middle class in Bangkok than it is to people who cannot afford to buy cars in Los Angeles.

The point is that people who now are part of the global economic system share something, a common market and aspirations. But there are people within each country now who no longer work, no longer consume and who become part of an underclass from which we periodically seek protection by building iron gates around our factories and our homes. In other words, the concept of North and South has lost descriptive power. There is a North-South division within every country now: witness the emerging "South" in the United States. If you believe in "trickle down" theory, a country with an expanding global market and capital coming in will even benefit people at the bottom. However, when the global market is saturated—finally having sold as many computers as the people in Bangkok can afford to buy—a situation is created where the global economy of the middle class exists alongside a group of people who are no longer part of any economic, educational system or work force. This is a very dangerous situation, producing civil instability and cultural discordance. The environment, workplace, health and safety problems, will not be found among the producing class but among a group of people who are not an integrated part of the system.

What Technology Has Brought Us

What has the emerging technological system really done for us? The fragmentation of our knowledge base is now well-recognized. Students are taught to be chemical engineers, business managers, lawyers, mathematicians. Multi-discipline education is neglected. As a result, engineers know how to build plants but are ignorant about environmental issues. However, environmental engineers are not the same as process engineers. Environmental engineers solve a problem at the end of a pipe but they don't know how to build non-polluting production systems. Material scientists, chemists, trained managers are needed, but these people must be trained with new methods. This fragmentation of the knowledge base which began with specialization in Universities and secondary schools, to meet an increasingly specialized industrial system, is reflected not only in the schools but also in environmental affairs departments which do exist in industry, but suffer from a serious lack of communication between production managers. The government takes great pride in the fact that it created a Ministry of Industry, even though there appears to be no direct contact with the Ministry of the Environment. The example of Bhopal in India, is typical of the lack of feedback from the Ministry of the Environment and the Ministry of Labor, concerning the introduction of new technology under pressure from people demanding work.

The so-called balkanization of this knowledge base is disastrous. It's great that we have ministries of the environment emerging in most countries but the point is that they don't have the power to actually set the technological agenda. This implies that we need to review and provide new educational programs and to re-structure and establish a new policy for government.

After 20 years in this field, I am convinced that the single most significant barrier to progress in developed countries is the role of the economist and his predominance in the decision-making process. Economists have also dominated the political process to the detriment of the country. As a trained economist, I feel compelled to state that only when they begin to learn how to solve the problem of inflation, will I be willing to listen to their views on the environment. They have no idea about human values, knowing the price of everything but the value of nothing. Economists have insisted that we monotonize the value of human life, place the dollar figure on production and to discount future benefits which, in English, means that any long term-planning that could be good for the environment, work, health and safety or consumerism is discounted because it occurs in the future. The dollar of today is more important than the dollar of tomorrow.

A paradox which is typical is the concentration of power that we require to produce better technology and the attendant opportunity for political and technological abuse. We permit power concentration but it also sows the seeds of destruction. We must learn to reconcile power with its attendant potential for abuse. Although there may be hope to educate those with the power to change technology, optimism in the short run is misplaced, especially since the major technological forces that are driving the world economy are, despite the rhetoric, not socially responsible.

The engineers, chemists, materials scientists, biologists, managers, lawyers, must understand what these technological systems do and be educated in a different way. From kindergarten onward we must learn to make demands on our elected leaders regarding the proper control of technology and move the world toward sustainable development. The infamous "hazardous wastes" problem would not exist without economically deprived communities. The political version of the "not in my back yard" problem (Nimby)—Nimb 2—refers to politicians' retort of "not in my term of office", symbolizing the aversion of the latter to sacrificing their political careers on the altar of socially progressive legislation. So, there is a problem in terms of changing the political structure.

Consumers must also be educated—i.e. from the roots. Developing countries must empower consumers, workers and citizens to challenge governmental and private sector decisions. We've got to provide the means. That's the reason progress has been made in the American system and in England, Australia, Canada and Germany. but, if this is not provided in Turkey, Greece, Egypt and Nigeria, the system will never really be checked. Citizens must be in a position to challenge the decisions that are being made, which translates into financial and legal empowerment. The collapse of the centrally planned economy concept is not to be gloated over. A market economy tacitly implies a free market, the winner of the conceptual debate. What is needed is not a free market and its attendant abuses and monopolistic tendencies, which the United States has enjoyed for the past twelve years, but a competitive market with unique government interventions. It doesn't work by itself because the institutions of power grasp, and capture the political and legal system. So I would argue that the opposite of a planned economy is not a free market, it is a competitive market—and they are not the same!

We must use economics as economic criteria for decision making. That is, to have taxes, investment incentives, the right kind of understanding of institutional and economic behavior. One must understand how industry behaves if one is going to provide the incentives that have already changed what industry does. I do not believe cost benefit analysis to be the proper criterion for planning and think one ought to understand what drives economic institutions, taxation and reward structures.

Industries become large and dominate markets and political systems. One must provide an easy entrance for new technologies and new products, be they biotechnology or semiconductors. New agricultural production must be provided and decentralized. It is not certain, for example, that the American concept of agribusiness, which is a large, centralized production system, is exactly what we need in terms of pollution, pesticides and a variety of other things.

The random growth of large urban areas poses the question of whether or not we need a different concept of the city as a center of production and consumption. Co-optimization of industrial, environmental, energy and employment policies is required and single-purpose technologies are to be avoided. The international dimensions—the Montreal Protocol, the E.C. directives on health and safety and the environment, as well as U.N. efforts—are an indicator of progress, but they are often weak. They suffer two faults: their standards are woefully inadequate and they are not "technology-forcing", i.e., they allow existing economic forces to retain their market share. Countries are not willing to relinquish control over their economy.

The Basel Convention on the export of hazardous wastes to places like Nigeria, where people need hard cash, is one example. If one cannot enforce the fact that countries will have a hazardous waste-treatment plant then why are they exporting hazardous wastes? The Basel Convention is a paper tiger because no country wants to relinquish its autonomy. The same holds true for the much-lauded Mediterranean Action Plan and E.C. directives in this area. These are not enforced nor are they enforceable.

At M.I.T., a group of people convened to discuss the concept of industrial ecology—an oxymoron. What is meant by this is that the developers of manufacturing systems have discovered the potential value of their wastes to someone else. Thus, they are sold to other industries. This, however, perpetuates waste-production rather than introducing waste-free production processes. Therefore, industrial ecology is neither the answer to our question, nor the answer to the direction in which we are going.

The G.A.T.T. standards are another issue. It is often argued that countries with stringent environmental standards provide unfair trade barriers to countries who would like to export their goods there. It is not that there is an unfair restriction by stringent environment laws but is an unfair subsidy on the backs of workers and citizens in those countries that do not have rigorous standards. In other words, if one can produce a substance in South Africa without protecting miners then one's investments are cheaper. Why, then, should one complain about the fact that U.S. Standards are stringent? The point is that firms produce what turns out to be the asbestos on the lungs of workers in South Africa. And yet the only thing that is talked about in the G.A.T.T. is the fact that these regulations are too burdensome, and should be relaxed so as to have the lowest common denominator in terms of international standards.

What all of this implies is that we need a place to harbor the International University for the Bio-Environment (I.U.B.E.) as conceived of and launched by the Biopolitics International Organisation in Athens—a place where people can meet and express themselves with respect to these issues. We need an institution that operates year-round in order to stimulate people into thinking about these issues seriously, to change institutions' minds, and mold opinion-makers. Let us, therefore, institutionalize and internationalize the debate on biopolitics, the bio-environment and international cooperation.

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