THE FUTURE OF SCIENCE AND TECHNOLOGY IN ASIA

Dr. Frederick So. Pada
President
Technological University of the Philippines
The Philippines

Asia is the world's largest continent. It covers an area of about 17,334,000 square miles, approximately one-third of the world's land area. Taken as a whole, Asia constitutes a plurality of the world's population. Once classified as simple farmers, herdsmen and shallow-water fishermen whose lives were spent in isolated villages, little affected by the industrial revolution, Asians have evolved into producers, manufacturers and industrialists in this modern era. Colonization by western countries has influenced the Asians. Exposure to western civilization by direct contact with people of the western world, continuous barrage by western media, migration and inter-marriage have greatly influenced their lives. Countries like Japan, Taiwan, Singapore, and the Republic of China may be classified as industrial exporting countries. Their industrial products can compete with those of the West. Some countries like Malaysia, Indonesia and Brunei, are oil exporters. Once taken over by western colonialists for its spices, rubber, tobacco and rich natural resources, western eyes are still focused on Asia for lumber, raw materials and its strategic location in the power play of world politics.

In most Asian countries emphasis is now on science and technology. Their governments appropriate sizeable amounts in their national budget for the promotion of science and technology. Once superstitious people, dismissing any occurrence not understood as the work of the supernatural, Asians are now analyzing and studying events around them that affect their lives. Once divided into various tribes ruled by elders and wise men in their respective communities, Asians have moved towards centralized governments patterned after those of the western states. Once in need of capable men with economic and general cultural background for political action, Asian nations now have capable men and women who can lead their country in developing democratic participation in government.

Analyzing the present scenario it appears that the Asian nations have realized the importance of science and technology for their national development and survival in a competitive world, and that this advancement is uncontrolled and without restraints. While some of a nations' scientific advancements make life more comfortable, many are considered destructive and potential hazards to life itself. Consequently, man has realized that technology needs to be continually controlled, improved and evaluated with emphasis on its impact on cultural and societal values, survival and equilibrium, as well as in the preservation of the environment.

It is an accepted fact that the West is more advanced in technology than its counterparts in the East. The harmful effects of science and technology cannot be confined within its territorial boundaries and will affect other nations, especially the underdeveloped Asian ones. Asia is a continent which comprises approximately 10% advanced, 40% developing and 50% underdeveloped countries.

Unfortunately, Asia - nature's most favored continent in the globe, with its green fields, sunshine and rain throughout the year - has been exploited by continents with more dominant economies in the Temperate Zone with a view to developing economic interaction which ultimately turn to their advantage and enable them to consolidate their power. Most Asian countries produce raw materials. They find themselves obliged, owing to the structure of the world market and their globe-political structure, to sell their commodities to industrially more powerful countries at prices which are too low. Yet they have to pay very high prices for capital or consumer goods from these same countries. In such cases, the foregoing economic imperialism of the powerful nations has slowed down science and technological developments among Asian nations. Capitalism, essentially based on posession of land, has caused developed countries to offer attractive rentals for underdeveloped land resources in Asia to dump their refuse, with the result that the host countries become victims of pollution effects on both man and his environment. A year ago, a capitalist country offered a high monthly rental for Iligan City, Mindanao, in the Philippines, to dump their nuclear waste which they claim was to neutralize the expected adverse effects. How can the host country be assured about the ill-effects of the pollution? The Bophal Case marked the greatest tradegy in India, where thousands and thousands died of gas poisoning caused by gas leakage of Union Carbide.

Economic reasons and ignorance compel underdeveloped countries of Asia to accept unwanted industries of the West, thus polluting rivers and destroying their environment. Uncontrolled industrial activities of the West destroy the ozone layer that protects the earth from the sun's radiation. This ozone destruction not only affects the industrialized countries of the West, but also those of the East. Unmitigated encroachment of the fishing grounds of Asian nations by advanced fishing technologies have brought about economic dislocations among the small fishermen of Asia. In effect Asian countries, most of them developing or underdeveloped, become victims of the transfer of technology, the rejects and second-class types from the advanced countries of the West. In some instances, these countries become their laboratories, with Asians as their "guinea pigs". Eventually, the Asian environment became polluted, depriving bios of abundance and degrading the environmental resources affecting humankind.

With the above-cited scenario of technology trap, (UNESCO-Asian Working Group Meeting, 1978), it is seen that:

1. As advanced countries impinge upon less developed countries (LDCs), there is disruption of traditional forms and values. Western consumer objects stand for a "modern" identity ideal to be achieved: there is a "demonstration" effect that must be met by changes in local industry.
2. The burgeoning demand in LDCs (particularly during an import-substitution stage in development) is for products that mirror the West. Access to technologies and managerial competencies tend to be in the hands of a metropolitan elite, so that new incomes generated are distributed disproportionately across the society. Demand from the higher income sector is for the more innovative and sophisticated commodities, and even brand names - such as are used in the West. Consequently, there is a widespread use of proprietary technologies, controlled and guaranteed reliable by the technologically-rich advanced countries' interests. This generates no demand for the development of indigenous technological capability, and locks the LDCs into continuing technological dependence.
3. The character of this dependence is reflected in very little technical training in indigenous firms other than on how to operate the techniques, rather than understanding and improving them. There is very little post-investment technical change as no indigenous capability exists to make this possible. Consequently, while the same technology in advanced countries may become more efficient as time passes, in LDCs it may become less efficient.
4. There are two further consequences due to the gap between the advanced country's knowledge used in industrial enterprise and local expertise. First, advanced country's enterprises may export obsolete technologies into LDCs, making international competition particularly difficult. Second, modernizing technologies may have great difficulty integrating with the local industrial infrastructure, particularly due to mismatch between the quality control standards required for modern technology input and local capabilities to produce such rigidly specified input. The result is an increasing dominance of other industrial enterprises which is related to the original enterprise's production by foreign-controlled technological competences and interests.
5. Local science and technology activities have great difficulty in bridging the gap between indigenous capability and the knowledge necessary to develop an autonomously controlled, new technology-based enterprize. Local science and technology resources may only be possible to integrate with the modern consumer sector. Science and technology may thus be co-opted into sustaining the circle of dependence of LDCs on advanced countries.

Thailand has embarked on a course of rapid technological development involving social and educational adjustments and developments in line with scientific thinking in the West. It is generally accepted in this country that elements of traditional rituals may be time-consuming, but that essential characteristics of traditional expression should not be abandoned. Science and technology can be reconciled with traditional activities. Both religion and science represent a quest for knowledge and require similar qualities of mind - discipline, sacrifice and determination - to achieve understanding.

In most Asian countries culture is a factor that encroaches on scientific and technological development. In countries like Thailand, Burma and Indonesia, culture is based on a strong belief in religion and magical power. It emphasizes the importance of faith in religion and interpersonal relationships. With this cultural trait, Technology Transfer (TT) poses difficulties in its dissemination. Due to the faith in their religious leaders, TT should be presented to these leaders for efficient and effective promotion.

India is another example whose backward rural areas are generally under the influence of tradition and custom. There is lack of supplementary and subsidiary occupation and viability of the industrial sector to absorb these people. Since the citizens of such areas have few marketing facilities, entrepreneurs and resources, even higher prices for agricultural products have not increased their income. These areas also face severe malnutrition - since a considerable portion have a comparatively low purchasing power and maldistribution of food among different socio-economic groups and even among different members of the family. This has resulted in low working ability. Goiter and Fleurosis are endemic to specific areas. Deprived of access to basic facilities for drinking water, the people are frequently forced to drink exposed water only fit for washing and cleaning. With the strong adherence to tradition and culture among the majority of Asians, if a given technology is to be socially accepted, it must correspond to certain motivations and must give the impression of satisfying certain needs.

Not all countries in Asia are among the Third World. Hong Kong, Japan, Singapore and others have accelerated their pace of economic development through science and technology. For example, urban population growth in Hong Kong has grown with the tempo of scientific and technological development. Some 38% of the world's 5 billion people live in towns and cities with consequent high-density living in urban areas.

High-quality living has become a normal way of life in urban Hong Kong which has been transformed in the past few decades from a commercial center to a modern cosmopolitan industrial city-state. Neither unemployment nor under-employment are major issues there. The main problems are the social and health problems created by high-density living, particularly within individual dwelling units. People living under these conditions are more likely to suffer from psychic distress, a poor state of general physical health, a low degree of personal well-being and a lack of life-enjoyment. Similar studies in Singapore have concluded that high-density living has very little effect on biopsychic maladjustment or social disorder.6

One of the greatest challenges facing society today (advanced, developing and underdeveloped) is the need to find ways of ensuring that technology is applied selectively and wisely in the best interests of humanity.

While it is true that science and technology are the key to the nation's progress, it should also be stressed that population growth be minimized in order for man to gain its maximum benefit.

Population is the core dimension that affects survival. Today, the population of Homo sapiens is the largest in the history of the species, with the highest average density. In 1970, Asia's population was 1,990 million and was predicted to reach 7,753 million by the year 2000. Asia's current growth rate is 2.0% (Phil. 2.7%) and her doubling time is 35 years. It is alarming to note that crowding increases the chances for development of a virus epidemic. In such a case, developed countries could quickly produce enough vaccine to save most of their population. Needless to say, the problem would be severe among underdeveloped countries whose capability to produce the necessary vaccines is less, and thus unable to save their population.[3]

As mentioned earlier, Asia constitutes the major bulk of the world's population. On October 24 1987, during the worldwide observance of United Nations Day, Mr. Turhan K. Mangun, representative of the United Nations Fund for Population Activities (UNFPA) in the Philippines, gave President Corazon C. Aquino and the Philippine government a "population clock" produced by Seiko Industry. It monitors the growth of the national population by the minute, hour, day and year based on a United Nations projection of a 2.5% population growth-rate. The clock carried the message that of 150 nations in the world, only 11 countries had a larger annual increase in population than the Philippines. In terms of annual growth rate, it had one of the highest in the world, and the highest in southeast Asia. At the time of this presentation, the Philippine population was reported to be increasing by: 1 person born every 23 seconds; 3 per minute; 157 per hour; 3,781 per day; 1.4 million per year.

It appears that as the Philippines approach the next millennium, population growth will increase by leaps, attributable to two biolegislative acts concerning the population program:

1. The removal of the population provision of the 1973 Philippine Constitution which stated that it is the responsibility of the state to achieve and maintain population levels most conducive to the national welfare.
2. The Church's recommendation to eliminate any mention of family planning as a national concern; lobbying to the legislators to insert in the Constitution a new provision that sought to: "equally protect the life of the mother and the life of the unborn from conception".

The above-cited biolegislation has been destructive to activities aimed at fertility reduction in the country. Thus, as the Philippines approaches its first centennial in 1998 and the coming 21st century, it may well have reason to marvel at their demographic evolution as a race. Here are data projecting the Philippino population:

Year	Population	
1591	667,000	First estimate of the archipelago's population
1799	1.5 million	A doubling over a 200 year period
1896	6.2 million	when censuses were being taken every 10 years just after the war
1948	19.3 million	
1970	26.6 million	
1987	58.6 million	
2000	78.0 million	

The Philippine Experience on the present population is described as "the silent plague". With the population growing as fast as it does, resources become more scarce and basic services to people become impossible. With hunger, malnutrition and ill-health rising from the situation, human survival becomes the final issue. At the root of the problems is a population policy that will protect life and opportunity for future generations of Philippinos. (Yen Makahenta, Philippine Free Press, October 1, 1988).

Looking at the economic side World Bank GNP per capita estimates show:

Year	Korea	Thailand	Philippines
1960	$ 180	$ 100	P 150
1985	2,150	800	580

It is perceived that the foregoing GNP jump in Korea and Thailand has been particularly facilitated by strong and unequivocal population policies and programs leading to sustained fertility reduction.

Another aspect affecting the bio-environment of Asia is the mismanagement of the natural resources by its populace. Swidden cultivation - the practice of felling trees and burning debris which also includes burning of other important crops/plants - often results in the erosion of soil and other nutrients important for productivity. It is thought that the quality of life of the swidden cultivators is poor, and that this cultivation has become one attribute of environmental degradation in Asia.

One major concern that poses a problem is the diminishing tropical forest which comprise nearly half of the total forested land area of the world. The region of Asia and Australia (excluding the Pacific) share 19.5% of the tropical forest area (3.6 million km2 is closed forest). The countries of Asia falling under the tropical category have 55% of the total population (584 million) living in forest areas, 25% in tropical Africa, and 20% in South and Central America.

Because of the man/nature interaction in the tropical forests, vegetation cover has been greatly modified, and this modification has had consequences that have become a concern for ecologists. Logging, swiddening and agricultural development in the forest areas are said to have disturbed the structure of the forests in terms of phytonses distribution, leaf and crown geometry and acrodynamic surface roughness which are regarded as essential for safeguarding sustained productivity and preventing the development of excessive stress. With rising populations and increasing mastery of man over nature, the tropical humid forest area is rapidly decreasing.

It is alleged that man is the principal culprit in causing the greatest amount of disturbance in the tropical forest ecosystem. These disturbances are caused by shifting cultivation, burning (for purposes other than cultivation) and exploitation of forests (logging, removal of ligneous vegetation resulting in soil erosion, fertility loss, growth of gross savannah and the creation of gaps in the upper canopy). Some countries are left with no primary forests. In others the degradation of forests has caused extreme concern challenging each to cooperate in replenishing the forests.

Hand-in-hand with environmental degradation is environmental pollution. One major problem the Philippines is facing today is the occurrence of "red tide" caused by toxic dinoflagellates, pycodinium and bahamenese var. Compressa. The organism is known to be responsible for paralytic shellfish poisoning (PSP) in the coastal waters of Papua New Guinea (1975), Brunei and Sabah (1977) and the Palau Islands (1982). It was also noted on the southern coast of Korea in 1981.

Marine pollutants - due to chemical and organic wastes poured into these bodies - promote the growth of dinoflagellates. PSP is a potent neurotoxin which may be readily diagnosed by symptoms which usually manifest within 30 minutes of eating contaminated food (said symptoms are characterized by tingling or burning sensation of the lips, face and tongue and then numbness of these areas as well as the fingers and toes). If toxicity is high, numbness may change to weakness and muscular paralysis. In severe cases, this may lead to respiratory failure and result in death. Patients who have survived 12 bouts normally completely recover.

The "Red Tide" chaos in the Philippines has also been observed in other Asian countries like Malaysia, Brunei, and the Palau Islands. Cognizant of this phenomenon, with more wastes being poured into Asian waters, it is certain that in the next millennium hunger, malnutrition and disease will plague these people. Similarly, we recall the Minamata disease in Japan caused by mercury pollution.

In spite of political, scientific and industrial advances, the technologies and economic conditions of most nations in Asia lag behind their western neighbors. Western technologies affect their territorial boundaries and challenge the laws passed in Asian countries for the protection and welfare of their people. To cite an example, in their recently passed Constitution, Section 8 on State Policies, the Philippines provide that: "The Philippines, consistent with national interest, adopts and pursues a policy of freedom from nuclear weapons in its territory."

Yet western technologies recognize no territorial boundaries. Technology has reached the "Cosmos", and as yet, mankind has no laws to regulate the stratosphere. The wayward Russian Cosmos satellite 1900 is scheduled to enter the earth's atmosphere between October 4 and 10 1988. This device is powered by a nuclear reactor. While the Philippines declared its territory free from nuclear elements, technology may violate this policy and the nations of the world would be helpless to prevent it. Hence, there is a need for biopolitics among nations to regulate and address technological advances with laws adopted by world nations. While the Western world has benefited from this uncontrolled satellite, the Asians may suffer from its fallout.

Cosmos 1900 is a combined satellite and final rocket stage 7m long and 2m in diameter with a mass of around 5000 kgs. A slot-type radar

aerial is fixed to one side of the body. It was launched by the Soviets on December 12 1987 in an orbit 257 x 271 kms above the ground to track United States navy vessels and nuclear submarines. When its mission was accomplished the Soviet ground controllers tried, from April 10 to 14, to reactivate its rocket which would have sent its nuclear reactor to an altitude of 900 kms. They failed. (Manila Bulletin, October 2 1988).

With technological discoveries and investigations being conducted by advanced and powerful countries, Asia has become a testing ground. It is probable that computers and programming of this launching are designed in such a way that the possible ill-effects of their experiments will not affect their native land but others of a weaker capability.

Although now advanced Asian countries like Japan, Korea and Taiwan are appearing in the field of scientific and technological development, they are still inferior to their western counterparts. Not only are the Asians at a disadvantage in the development of technologies, they are also on the lower rung of the consumer goods consumption ladder. Medicine and food found not suitable for human consumption in the West is dumped in the Third World. To cite an example, milk produced in a country polluted by the recent Chernobyl explosion found its way to Asia. Radioactive milk was dumped in the Asian market and authorities in the Philippines had a difficult time re-exporting the milk to its source. Manila Bulletin, a Philippine newspaper, urged people daily to report supermarkets still selling "Birch Tree" milk with an expiration date of May 1 1989. This milk product was believed to have been exposed to the Chernobyl explosion.

ON MANPOWER

For lack of employment, Asian labor is moving to the West and other industrialized nations because of sufficient opportunities. Asian skills and intellect are attracted to western nations and their industries in spite of the difficulties encountered due to cultural differences and family separation, leaving their respective countries depleted of know-how and skills necessary for their development. If this migration continues, how will the Asian nations stand 1000 years from now? This movement will certainly affect bios in Asia. The intellectuals go to the United States, Canada, and the United Kingdom in search of greener pastures. Thus brain drain affects Asia.

THE ROLE OF BIOPOLITICS

In relation to biopolitics, it behoves Asian countries to join hands to institute biolegislatives, biopolitics or policies to protect bios, especially humankind, from the adverse effects of the aforementioned technologies, experiments and research. With this in mind, a vision for the next millennium, Asians, with their wholehearted dedication and noble aspirations, must cooperate with one another to preserve their cultural heritage and ethical values in maintaining and sustaining life for their survival in terms of their scientific and technological developments by organizing a body aimed at establishing "Asia Co-Science - Technology Bio-environment Impact and Survival Sphere" (ACSTBISS) in:

1. Formulating guidelines for the selection and local application of foreign technologies and ensuring the organization, coordination and direction in every aspect of the processes involved in Technology Transfer so as to attain the objectives of the development plan;

    1.1 investigate and assess western technologies - their long and short-term effects on life;
    1.2 technologies appropriate for the needs of Asians;
    1.3 technologies that merit social relevance;
    1.4 technologies adaptable to the physical environment of Asians as well as the modernization of the countries' indigenous resources; and,
    1.5 technologies that match the manpower resource capabilities for their maintenance.

2. Developing scientific and technological manpower to conceptualize and actualize the production of high technologies that would generate high economic returns; appropriate technologies for labor-intensive use to reduce unemployment, technologies that would preserve man and his environment, encouraging exchange of expertise without reservations with the objective of gaining mutual benefits cooperation;
3. Maximizing research and development outputs to meet each country's needs; sharing of ideas, experiences and data gathered, with one another in the context of Asian development; determining the ideal balance between basic research, applied research and experimental development.
4. Strengthening monitoring systems, informing planners as to the country's scientific and technological capability, possible alternative solutions and other opportunities; and,
5. Each country creating a body in charge of the government's science and technology policy, the general strategy of which is formulated in the light of the country's overall objectives and priorities. At this juncture, the plans of different agencies are coordinated and necessary resources are allocated in accordance with the priorities of the national science and technology system. The needs of the different sectors of the country's economy, the availability of funds and such scientific and technological potential that exists in each country or must be created. The coordination of these policies with those for education, labor employment, industry, environment, culture, etc.; each country must develop the relationship between producers and users of science and technology. There is a need then,

to strengthen biopolitics and biolegislations among governments of the Asian nations to develop scientific and technological cooperation in the region, along:

1. Food production - increasing and diversifying nutritional and food products through bio-technology and promoting their acceptability; combatting malnutrition with the production of high-protein, low-cost foods such as nutritional snack foods, high-protein biscuits, soy milk, soy milk powder and infant food; increase the utilization of local raw food materials through improved processing, packaging and distribution; developing a pool of traditional food sources and techniques of preparation. Pest and vector control, pest harvest technology, fishing, farming, livestock productivity, etc; reinforced R and D activities isolating and identifying the most resistant spoilage micro-organism (Phil.) study of potential presence of Carcinogens in food (Singapore) preserving and processing of local fruits (Thailand).
2. Preservation of natural resources - resource survey, forest and mineral resources, sharing of expertise in the utilization of natural resources, e.g., Tilapia sex reversal which can be shared with other countries for multiple effect (Dr. Guevarra).
3. Health - improving the health of the people and their living conditions; bringing about such social and economic changes as well as stabilizing population growth and keeping it at the desired level; utilization of medicinal plants, pharmaceutical production and prenatal medicine; eradication of drug abuse and institution of rehabilitation for users.
4. Industry - reducing unemployment, underemployment and raising the real income of poor classes by increasing and strengthening appropriate rural and urban industries; harvesting of tropical hardwood and fibers, utilization of waste, abating problems of corrosion; application of micro-electronics; methodology and standardization of technological and construction materials.
5. Natural Environment - protecting and developing water resources, soils and other environmental resources; developing forest and marine resources; ground water, meteorology, ecology of air or tropical zones; natural hazards, river basins, oceanographs, etc..
6. Energy - expanding the range and quantity of energy resources for agriculture, industrial and domestic uses in rural areas and developing means for more rational energy utilization; utilization of solar energy; non-conventional energy sources, biomass conversion.
7. Transport and Communication - developing transportation facilities and improving vehicles used for transport; manufacture of motor vehicles or components; space technology (communication satellites).
8. Science Education - improvement and extension of science education and vocational training for youth development motivating them to pursue science and technology courses needed in industries and in other scientific and technological fields of development.

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Dr. **Frederick So. Pada** is the President of the Technological University of the Philippines in Manila. He received his B.Sc. and M.A. degrees in the same university and his Ed.D. at Centro Escolar University. He has had many years of experience in government service in scientific, technological and educational fields. He is a member of numerous committees on local and international topics and has also won awards for his activities in the field of education. He is the author of Vocational Education: New Directions and Imperatives, published in 1974, and has attended conferences and seminars in the Philippines and abroad, and presented papers on educational topics.