PLANNING FOR SUSTAINABLE DEVELOPMENT

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INTRODUCTION

The need for collective efforts by developing countries, faced with multifaceted challenges both at national and global frontiers, to succeed against the changing scenarios, is no more in question this century. The imperative lies in addressing all three, namely social, economic and environmental issues of development, simultaneously, in the face of emerging economic globalisation, formation of common markets and changing political-economic imbalances at the international horizons for sustainability.

If we look in the past, the developing countries have been focusing mainly on one of the issues for development, yet discounting the rest. One true example is Pakistan that has engaged itself in pursuing policies for enhancing economic activity and, on the other hand, the investment in social sector had been discreditable, with less than a meagre 2% of national budget allocated for education.

'Sustainable development' implies a "win-win" situation, whereby all the issues of development are addressed concurrently. The basic factors of production---man, machine, material, and money---all have to excel in terms of quality and quantity, the better the input the better would be the output.

Taking a brief view of the global scenario (see Fig.1) the developing countries are set with even more difficult developmental targets than before, with ever-growing population, increased poverty, unstable economies, and depleting natural resources.

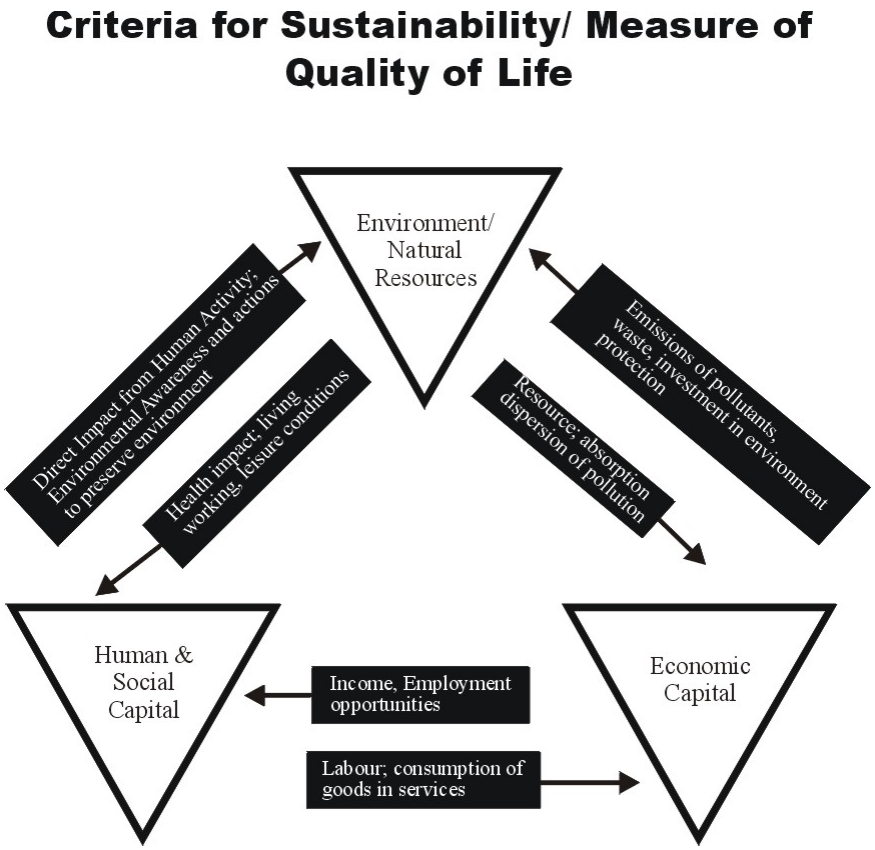

Figure - 1

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Population

Setting goals to reduce poverty is an essential part of the way forward, for which developed as well as developing countries have to make concerted efforts. Although the baby boomers' era has long passed, but its affects are being realized now and in the time to come. The world-population more than doubled in the last half century (see Fig. 2) and reached 6 billion in late 1999. It is projected that all the growth will take place in today's developing countries and that the world-population will grow by 50 per cent from 6.1 billion today to 9.3 billion by 2050. The least developing countries will nearly triple in size.

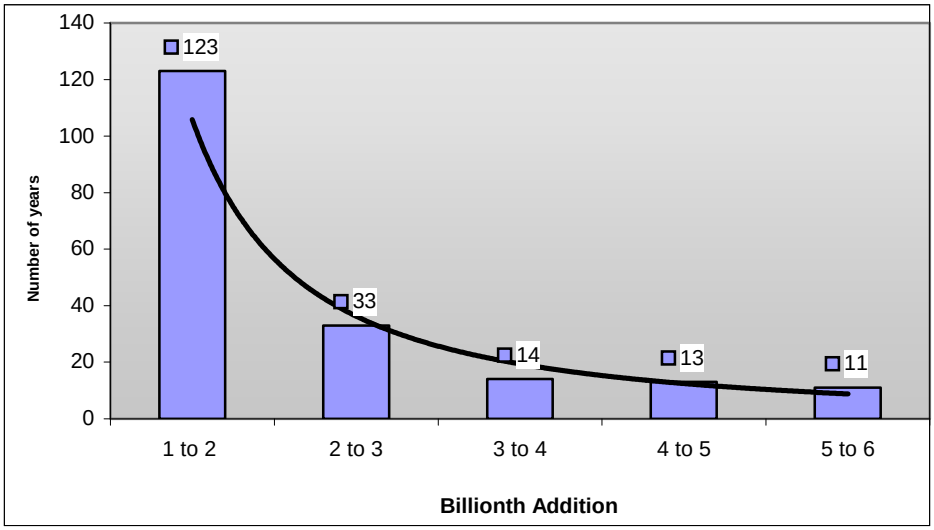

Figure - 2

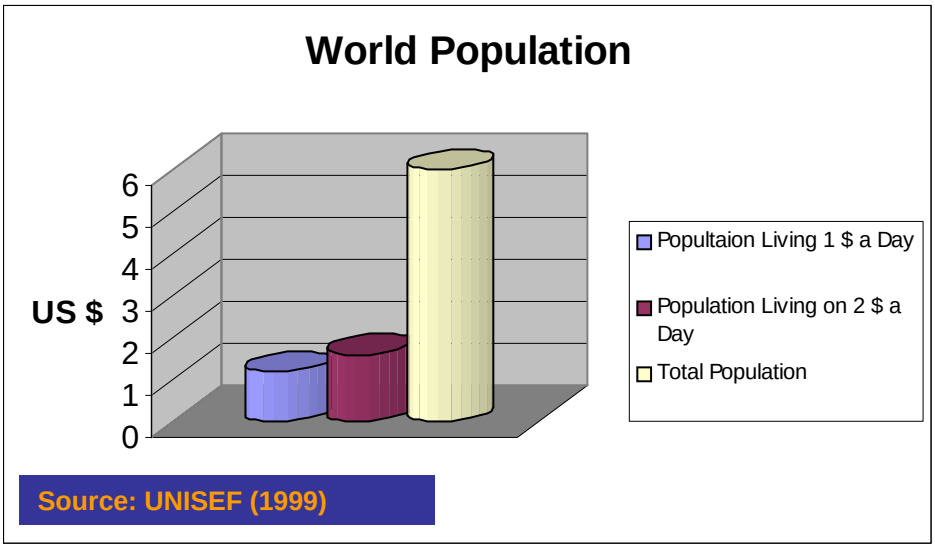

Figure - 3

Poverty

Poverty in all its forms is the greatest challenge to the international community. Of special concern are the 1.2 billion people living on less than $1 a day and the additional 1.6 billion living on less than $2 a day (see Fig. 3 and Table 1).

Illiteracy

Illiteracy and unawareness are both cause and consequence of poverty and population -growth is another major challenge, confronting the developing world. Nearly one-sixth of the world cannot read or write. More than half of those denied educations are girls, UNICEF, the United Nations children's fund, says in its annual report, "The State of the World's Children 1999:" Apart from deepening divisions between rich computerized societies and those without even the elementary tools of knowledge in the third world, illiteracy has a direct relationship to important social-indicators like health. An overwhelming percentage of illiterates are in countries with high population-growth, like India and Pakistan, where better education for women and children could significantly reduce other problems.

Table - 1

Population Living Below US$1 Per Day in Developing Countries 1990 and 1998				
	Number of People Below US$1 A Day (millions)		Poverty Rate (%)	
	1990	**1998 (estimate)**	**1990**	**1998 (estimate)**
East Asia	452.4	278.3	27.6	15.3
Excluding China	92.0	65.1	18.5	11.3
South Asia	495.1	522.0	44.0	40.0
Sub-Saharan Africa	242.3	290.9	47.7	46.3
Latin America	73.8	78.2	16.8	15.6
Middle East/N.Africa	5.7	5.5	2.4	1.9
Europe & Cent. Asia	7.1	24.0	1.6	5.1
Total	1276.4	1198.9	29.0	24.0
Source: World Bank. Global Economic Prospects and the Developing Countries 2000. (2000) [1].				

Food Insecurity and Malnutrition

In 1990 a total of 780 million people out of 4 billion, in the developing world, were living on diets that are not sufficient to maintain a healthy life, according to the Food and Agriculture Organization (FAO). This implies food-insecurity for every fifth person in the developing world. Insufficient food-consumption is one of the primary causes of malnutrition; the others are infection and poor health. The nutrition situation-reports found that protein-energy malnutrition (PEM), measured by the proportion of children falling below the accepted weight standards, affects 34 percent of all preschool children in the Third World. Another study shows that PEM, even in its mild-to-moderate form, contributes to 56 percent of child deaths in 53 developing countries, suggesting that malnutrition has a far more powerful impact on child-mortality than is generally believed.

Health

In addition to Protein-energy Malnutrition, insufficient food-consumption leads to other problems that are of public-health significance. Every year, 250,000 to 500,000 children go blind due to vitamin-A deficiency. Estimates by Marito Garcia, a world-bank economist in a brief “Malnutrition and food insecurity projections, 2020” quoted Administrative Committee on Coordination /Sub Committee On Nutrition(ACC/SCN) that in 1990, 370 million women between 15 and 49 years of age were anemic, a condition that contributes to high maternal mortality-rates, especially during childbirth. A recent assessment by WHO indicates that some 655 million people in the developing world are affected by goiter. This figure is nearly three times the previous estimates.

Depleting Natural Resources

Developing countries have long been depending on the factor-endowments for sustainable growth and development, especially the oil-rich Arab countries, but there should be no doubt in any one's mind that these resources shall come to an end. Accordingly, sole reliance on the factors of endowment does not respond to the challenges ahead.

Lack of Basic Amenities of Life

According to a study by the International Water-Management Institute (IWMI), nearly one billion people may not have access to water by the year 2025[2]. The study projects the water supply and demand pattern across 118 countries and concluded that 25% of the world's population or 33% of the population of developing countries live in the region that will not have sufficient water to maintain the 1990 level of food-production from irrigated agriculture.

ISSUES AND CHALLENGES

In addition to the problems at the national level, the developing countries' governments are faced with even more acute complexities at the international or global level.

Globalisation

Economic "globalisation" is a historical process, the result of human innovation and technological progress. It refers to the increasing integration of economies around the world, particularly through trade and financial flows. Mostly, globalisation is termed with a meaning of trade, movement of people, capital movement and spread of knowledge.

Whereas economic globalisation has had a positive impact in integrating the world with more choices, it has a flip side to its credit too. Globalisation has been the cause of unparalleled growth and increased inequality, mostly benefiting the industrial world with strong infrastructure for export and production; so the gaps between rich and poor countries, and rich and poor people within countries, have grown. The richest quarter of the world's population saw its per-capita GDP increase nearly six-fold during the century, while the poorest quarter experienced less than a three-fold increase, according to one analysis.

Countries must be prepared to embrace the policies needed and, in the case of the poorest countries, may need the support of the international community and interdependence to endure the consequences of globalisation.

Trade Liberalization

The effects of trade liberalization has been overtly realized by the developing countries with its effects in form of reduction in government control and revenues, trade deficits, wage and income inequality, the threat to national sovereignty, environmental pollution, and health and safety of common man. With expected opening up of markets by 2005, the situation tends to worsen for the trade-partners with no or modest infrastructure for production, unskilled labor, outmoded technology and specially depleting natural resources, in brief, the developing states.

Transnational Corporations' Hold on World Economy

The emerging global order is spearheaded by a few hundred corporate giants, many of them larger than most sovereign nations. For example, Ford's economy is bigger than that of Saudi Arabia or Norway.

By acquiring earth-spanning technologies, by developing products that can be produced anywhere and sold everywhere, by spreading credit around the world, and by connecting global channels of

communication that can penetrate any village or neighborhood, these institutions we normally think of as economic rather than political, private rather than public, are becoming the world empires of the 21st century.

The Transnational corporations exert a more profound influence on the lives of the people of the world than national government who are increasingly finding it difficult to comprehend, still less control, these corporate giants.

Widening Gap Between Rich and the Poor

Globalisation and trade-liberalization have not turned the tide against poverty, as projected in early yester-century. In fact the gap between rich and poor countries as well as wealth-disparities within countries have increased. The UN Human Development Report shows that the rich have become richer, while the poor have become poorer. In 1960, 20% of the world's richest earned 34 times more than the 20% of the world's poor. In 1997, it was 74 times more! The assets of the three richest people in the world are worth more than the GDP of the 48 least developed countries. The net worth of the 200 richest people has increased from $440 billion in 1994 to 1 trillion in 1998.

It has been acknowledge that all the major targets set to reduce poverty have failed. Furthermore, the notion that export-led growth is the answer has failed. Not only are the poor worse off in most developing countries, but globally the rich are getting richer and more powerful.

Widening Digital Divide

The industrial countries cherish economic growth on the thrust of their knowledge-based society; whereas one of the main causes of third-world distress lies in their incapacity due to fragmentation and isolation of research institutes and academia. The divide between developed countries' knowledge-based society and developing World is due to disintegration and individual efforts by knowledge-centres. The digital divide is one of the many reasons for the developing nations' inability to cope with present-day problems.

FRAMEWORK TO FACE THE CHALLENGES

As the developing countries are confronted with greater problems, the urgent need arises for them to plan comprehensively, so that they should address all the issues and challenges, concurrently, and to strategize for the shortest, most effective, and reliable way out to sustainable development.

"Sustainability" implies a win-win situation in all areas, hence sustainable development means enhancement and better utilization of economic capital, human capital and natural resources, concurrently and effectively, but not on each others' cost. The planning for sustainable development should therefore entail these aspects for durability, to not only relish benefits of today but to ensure safe and promising future.

The problems are common to all the developing countries and therefore a common framework can be adopted to find a solution. The options that developing countries have are very clear: the question for uniting against the forces of change and socio-economic problems, the close cooperation in all spheres of life with science and technology as the tool for achieving sustainability in the development process.

Science and Technology as 'Rescue Agent'

With science and technology bringing revolution in all spheres of life, changing the way we socialize, communicate, work, commute, produce & consume and entertain ourselves it is going to work as change-agent in the lives of both developing and developed nations. As we are all aware, change, competition, and complexity will be the feature of modern era in a world increasingly dominated by science and technology. Science and technology is progressing faster than before, and nobody will be able to master and handle it alone. Therefore we must share information, knowledge and expertise, funds and facilities. The normal ethics of science and technology must guide every endeavor for the benefit of mankind. In the 21st century; industries will be more technology-intensive and human society increasingly knowledge-

intensive. Therefore, science and technology will assume an increasingly crucial role and it can prove to be the 'Rescue Agent' for the developing countries.

Through science and technology, the developing countries can shield themselves, with the global problems uprising rapidly, and can avert the challenges at national level, whether social, economic or environmental. Science and technology bears great potential in addressing the issues and challenges confronting the Third-World and can contribute immensely towards taking out itself from the projected economic and social havoc.

The Way Out

Science and technology is the key to sustainable growth and development and there is no denying the revolutionary powers it possesses in the form of information technology, biotechnology, such that, the future trade and commerce and economic growth would largely depend on the applicability and utilization of information technology. Information technology is a means to cheap and accessible information and education for all.

Research done in the field of Biotechnology up-till now empowers the scientist to address horrifying forecasts for food insecurity, health and malnutrition. The use of depleting natural resources for energy production can be optimised with supplement of renewable-energy technologies, like photovoltaic, thermal, wind and geothermal technologies.

The Newly Industrialized Economies (NIE) like South Korea and Malaysia are good archetype, their efforts and initiatives can be bench marked to pursue the path of sustainable development.

Where Do We Need Planning?

The need of the hour is to identify the areas that need planning. First of all, taking a look at the present status of science and technology in the developing countries, we find out that the developing nations are good at some fields of science and technology and lack expertise in others, mostly working in isolation. Secondly, the infrastructure required for proliferation of science is far behind the international standards; thirdly, the developing nations need capacity-building in the key-areas of science to make proper use of technology.

Most of the developing countries have agriculture-based economies, and the economies thrive on the status of yearly yield. With the usage of science and application of technology, the crop cannot only be salvaged from external threats, but also the yield can be raised. Usage of agro-sciences can help the economies to achieve higher levels of sustenance. After achieving the higher level of sustenance, the economies transform and can broaden the base for growth and progress, through other industries.

The number of scientists per thousand people in the developing countries range mostly from 0.1 to 1, whereas the industrialized nations have figures in the range of more than 2 to 3 persons per thousand. In addition, the developing countries have failed in retaining the critical mass that move to developed countries, for better returns.

SCIENCE AND TECHNOLOGY ISSUES IN THE DEVELOPING WORLD

Although the challenges and issues are common to the developing world but, due to disparities in their economic and technological state of development, the key-issues regarding science and technology need to be identified at national and regional level for proper strategizing.

NATIONAL LEVEL

Cooperation, Coordination and Interaction. Communications and interaction between the technology and user sectors are important in deriving maximum benefits for any technology-application efforts. This is also true for the S&T sector, where there is a need for agencies/space centers, research and development (R&D) organizations, end-users, industry, universities, planners and decision-makers to

cooperate closely on various aspects viz policy formulation, programming, planning and implementation of S&T projects.

Human Resources Development: Science and technology are dynamic and the need to develop human resources is growing continuously. Training and education of scientists, as well as end-users, are required in the important sectors like that of natural resources and the environment, telecommunications, meteorology, survey and cartography, agriculture, water resources, urban planning, geology and mineral exploration, forestry, oceanography, disaster-warning and relief.

Resistance to Change: There is a general resistance to change in the institutional structure and to the introduction of new technologies. Better management-techniques, in-service training and education of professional staff and their career-planning would be important in curbing this tendency.

Lack of Awareness: Lack of awareness of the benefits to be obtained from applications of science and technology may constitute a serious limitation at the national level in promoting these applications. Therefore, promotional efforts are necessary, at the national level, to raise awareness of the benefits of such applications.

Adoption/Adaptation of Technologies: There is a need for adoption/adaptation of technologies, imported from abroad, to suit the social and cultural environment of the countries.

Rapid Technological Developments: The field of science and technology is in a state of rapid development. To develop applications from this rapidly evolving technology is therefore a highly challenging task.

Involvement of the Private Sector: The private sector needs to be involved in S&T applications, as well as in the development and production of related hardware and software, and value-added information.

REGIONAL AND INTERNATIONAL LEVELS

Regional Cooperation: The success and achievement in regional cooperation in S&T applications promoted have been convincing. The continued promotion of substantive cooperation, coordination and collaboration among the countries' regional programme is considered essential.

Closer Cooperation with Existing Initiatives: It is recognized that there are a number of well intentioned initiatives for regional cooperation in S&T applications in the South. Therefore, in the larger interest of the region, the need for a study for their coordination through the regional programmes is considered important.

Resource Mobilization: There is need for a regional effort to mobilize resources, both in cash and in kind, as well as for substantive activities on S&T for development in the region.

Interaction: The need for enhancement of interaction between Governments, various agencies in the United Nations system, and entities such as the end-users, NGOs, and industry, in the fields of science and technology applications, is recognized. This will give great impetus to the national and regional S&T applications programmes.

Human Resources Development: There is a need for regional assistance for the training and education of scientists, technologists, users, decision-makers and planners in various facets of S&T for the development of indigenous capabilities in the countries of the region. The facilities and expertise available in the region could also be usefully harnessed.

Restrictions on the Transfer of Technology: Restrictions on the transfer, from North to South, of technology and information regarded as "sensitive" or of "commercial value" frequently limit the domain of applications of science and technology.

ROLE OF COMSATS IN PROMOTING SCIENCE AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT

The establishment of the Commission on Science and Technology for Sustainable development in the South (COMSATS) was envisaged, keeping in view the identified issues in the field of science for sustainable development. The objectives and functions incorporated in the mission-statement highlight the scope and direct the path towards development, as:

- To sensitise the countries of the south to the centrality of science and technology in the development process, to the adequate resource allocation for research and development, and to the integration of science and technology in the national and regional development plans;
- To support the establishment of a network of international science and technology centers of excellence for sustainable development in the south;
- To support other major initiatives designed to promote indigenous capacity in science and technology for science-led sustainable development, and to help mobilize long-term financial support from international donor-agencies and from governments /institutions in the north and the south, to supplement the financing of international scientific projects in the south;
- To provide leadership and support for major North-South and South-South cooperative schemes in education, training and research, such as the proposal to set up programs of scholarships for research at centers of excellence in the South;
- To support the relevant programs and initiatives of major scientific organizations working for the development and promotion of science and technology in the south.

The cooperation amongst the developing countries in the field of science and technology would not only be economic, but also a shield from the vested interests of the developed countries. In light of the science and technology scenario, some suggestions and recommendations are made to attain sustainability in the development process:

1. *Sensitise to the Centrality of Science and Application of Technology:* This necessitates sensitising the countries in the south to the centrality of science and technology in the development process, both in public and private sector, to foster awareness regarding the application of science and technology to meet various present-day challenges;

2. *Establish Centres of Excellence:* Establishment and strengthening a network of Centres Of Excellence i.e. research organizations, knowledge-imparting institutes;

3. *Cooperation in Capacity Building:* Indulge in providing cooperation schemes in education, training and research for capacity-building;

4. *Combined Research Projects:* Undertaking combined research, both in basic and applied sciences;

5. *Support Developmental Programs:* Support the relevant programs and initiatives of major research organizations and working for the development and promotion of science and technology.

6. *Articulate Objectives and Develop Implementation Mechanism:* An analysis of the national S&T programmes in the region indicates that a clearly targeted objective, an appropriate implementing mechanism and the necessary institutional structure are the three fundamental elements for the success of national programmes. The strategy for developing science and technology for sustainable development should cover these three fundamental elements, as well as technological cooperation, financial mechanisms, legal arrangements and human resources development programmes.

7. *National Mechanism to be Responsible for Coordination and Promotion:* On account of the multi-disciplinary and inter-sectoral nature of S&T applications, it is desirable that a national mechanism should be made responsible for the coordination and promotion of S&T applications and their integration with national development.

8. *National Committee for Science and Technology:* Such a mechanism could be named as the national committee for science and technology in the national development programmes. Its secretariat should be located in the same ministry. The head of the national committee should be a member/secretary of the committee and in that capacity provide, to the secretariat, all the necessary expert-advice on science and technology matters. Other members of the committee should be at the permanent-secretary level, from the ministries of education, finance, planning, agriculture, environment, forestry, mineral exploration, urban and rural development and telecommunications. The committee may also have sectoral experts, as technical advisers, in areas such as agriculture, water-resources, cartography and surveying, meteorology, disaster-management and relief. In addition, it may have advisers from the universities, consultancy-firms and private-sector industry, especially those which are already engaged in science and technology activities or have the potential to do so in the near future.

9. *National Action Plan:* The committee could be responsible for drawing up national action plans, say for five-year periods, identifying the problems to be addressed through science and technology and the resources required to implement the plan. It will ensure coordination and implementation of the action- plan and monitor its progress. It may also decide on the composition of the national delegations to regional and international meetings on applications of science and technology. It may also provide overall policy-guidelines and directions to the national focal point.

10. *User Groups to be set up:* Various user-groups may be set up in respective fields of S&T applications, to provide enlightened and down-to-earth inputs for linkage of science and technology with the solution of national problems. A link with provincial-level ministries and national and provincial-level departments, dealing with these sectors, should be ensured through such groups.

11. The user groups could assist the respective ministries by providing them with information and suggestions based on their expertise. They could also advise on the implementation of the national initiative that aims to enlarge the base of science and technology users. The precise partnership between the user-groups and the national committee for science and technology applications, under the national action-plan, could be determined through close consultations between the two. The role of each entity should be determined in such a manner as to maximize their comparative advantages. For this purpose, the user-group of each Sector might even propose its own specific projects, in support of the national programme.

12. The national science and technology centre and universities (especially those having science and technology) might encourage the popularisation of S&T applications for addressing national problems and the integration of S&T techniques with developmental planning, through the organization of seminars, workshops, discussion panels, demonstrations, lectures, publications, newspaper articles, radio and television programmes. This activity would develop public awareness of the potential of science and technology. Further, it would provide feedback on the effectiveness of the national action-plan, which could go directly to making improvements and the requisite adjustments.

Human Resources Development

13. *Human Development Policies:* This serves the dual purpose of stimulating economic growth and social development. It also has close links with technological change. Human-resources development-policies should therefore be coordinated with those of economic and social development. In the context of science and technology and applications, it is proposed that selected national universities should offer courses, at Postgraduate level, in science and technology. Bearing in mind the application-dimensions of the technologies, these courses should not only focus on theory, but also emphasize the practical applied dimensions. This will enable the education of the requisite number of scientists and engineers at the postgraduate level, over time, to meet the requirements of the expanded national science and technology programme.

14. *Integration of Technologies into the Development Process:* Moreover, in developing human resources for S&T applications, adequate emphasis should also be placed on the integration of technologies into the development process, as such integration calls for harmonized development: between

hardware and software (technical aspect) and the human element and "Orga-ware" (institutional aspect).

15. *Joint Ventures with Foreign Firms:* Concurrently with human resources development-programmes, the alternatives for technological change should be explored. These should include the assimilation of imported technology, indigenous innovation, and joint-ventures with foreign firms and entrepreneurs, in the development of equipment and software for applications of S&T in the national development process. Public and private-sector industries may be encouraged to develop ancillary products for commercial use, through technology transfer in the S&T applications field.

16. *Long-term Career Planning:* Careful planning of the long-term careers of scientists and technologists, establishment of adequately equipped R&D laboratories, the creation of the proper environment, conducive to scientific work in laboratories, would all go a long way to retaining qualified and trained individuals in their countries of origin and also provide creative job-opportunities to those returning from abroad, after obtaining high qualifications. This approach would arrest the brain-drain taking place from the developing to the developed countries.

17. *Specialized Training:* To put the persons with specialized training and education to optimum use, they should be retained in the job for which they were trained or educated, for a sufficient length of time, to enable them to perform specialized duties and train others according to future needs. The training opportunities provided by international organizations and others, in the form of fellowships, workshops and seminars, should be used to train and educate the maximum number of persons. Prompt processing of the nomination of candidates for such activities should be encouraged, keeping in the forefront the objective of widening the base of knowledgeable users.

18. *Grant Autonomy to S&T Institutions:* Some of the steps necessary to make the environment conducive to productive scientific work are to grant full autonomy to the universities and R&D organizations, allow scientists to go through continuing-education programmes and encourage the movement of scientific and technical staff between universities, private-sector industry, public-sector industry and R&D establishments, to broaden their vision, promote interaction among these entities and lift isolation barriers.

19. *Upgrade Technical Skill:* Another important element for the successful introduction of any technology, which is high technology, is to upgrade the technical skills of the existing staff so as not to render them redundant upon the introduction of such technologies as require a high level of skills, like the use of computers and the development of software packages. The national applications centre, either on its own or in collaboration with the universities, should organize continuing-education programmes for its staff on a regular basis.

20. *Provision of Basic Infrastructure for Cooperation:* For cooperation and information-sharing to develop knowledge-intensive societies, the paramount task in this goal would be to first understand the need and status of each other to reduce the information gap, for which information-technology provides the information-vehicle, in form of information highways, information communication technologies.

21. *Science education at Early School Level:* Science education should be imparted at the early school level, so that children can mentally adapt and adopt the aptitude required to be good scientists and researchers. It would help them in deciding their future at an early stage of their life.

22. *Broaden the Base of Science Capital:* The science education should not only be in general basic disciplines like physics, chemistry; rather, further divisions and branches of various fields of science should be entailed in the curriculum, to produce human capital with diverse disciplines, following the wise saying "not to put all the eggs in one basket".

23. *Vocational Training:* Vocational training needs to be included as a compulsory ingredient in the overall educational system, so that students can assess their academic weaknesses at the high school and college and adjust in time for greater responsibilities.
24. *Expert Exchange Programs:* Expert-exchange programs should be promoted aggressively, for

orienting the work-force with a broader perspective, and to benefit from foreign expertise in the field, this is essential for developing countries specializing in a particular field.

Research and Development

25. *R&D Spending:* Scientific R&D is a prerequisite for building indigenous capability. In several countries of the region, one may find large numbers of R&D organizations, but with little or no money for undertaking R&D – the purpose for which these organizations were established in the first place. The allocations for R&D in most of the developing countries of the region may vary somewhere around 0.15 per cent of gross national product, (GNP) depending on the country. Under these conditions, for satisfactory results, it would be necessary to concentrate only on a few selected areas of R&D at a time, so as to avoid spreading the limited resources of scientific staff and funds too thinly. Further, the allocations for R&D should be raised to at least 1 per cent of GNP, to be able to deliver discernible outputs.

26. *Optimise R&D Efforts:* The countries of the region, beginning R&D activities in S&T programmes, may concentrate on one or a few particular S&T applications. Cooperation, between these countries and those with already advanced R&D activities, would contribute to optimising R&D efforts in trying to solve common problems in the region.

27. *Emphasis on Basic Research as well:* Research in both basic, as well as applied sciences, needs support; basic research should be supported much more for long-term gains.

28. *Information Services:* As is true for any planning or development activity, it is essential to back up science and technology projects with adequate information and data required by the project team, so that these are completed without undue loss of time and with the least expenditure. The more reliable and exhaustive the information on a project, the better it will be for the success of the project. There are numerous cases of a country seeking transfer of technology from abroad, even when the same technology is already available within the country. Such a situation arises on account of the information-gap in the country, which results in loss of national resources and waste of time. In addition to establishing and operating a computerized database, the national representative should develop national documentation centers on S&T applications-related books, magazines, research papers and project-reports, to serve the needs of national and international users. Such facilities, though on a limited scale and sectoral in character, should also be developed in each major applications user group.

Resource Allocation

29. It is always difficult to introduce a new technology. This is especially true for the emerging field of science and technology for development planning. The financial aspects related to the introduction of this technology must be analysed carefully, in order to convince the decision-makers and planners of its benefits. Resource optimisation could be achieved by utilizing the scientific and technical staff and facilities of existing national R&D organizations. Cooperation among the countries of the region would also assist in reducing the cost of launching and implementing a space-applications programme at the national level. Some of the countries of South already have an established base for development and applications of science and technology. A number of these countries may have sufficient capacity in relevant S&T fields.

30. *Utilization of Existing Resources:* Utilization of existing resources in the establishment of national committees and user groups, through appropriate restructuring and opening up of the national R&D facilities. However, there is still a need for additional funds:

    a. To establish science and technology applications-related academic programmes at selected universities;
    b. To augment the facilities of S&T applications centres with the necessary additional hardware and software;
    c. To enhance the capability of national focal points; and

d. To develop documentation centres, including library facilities, with the sectoral user groups.

The importance of science and technology for addressing national and regional problems, and their becoming an essential element in sustainable developmental planning, will keep growing with time. Investments made in capacity-building for increasing the domain of applications of scientific techniques are expected to yield rich dividends. In fact, these may determine whether a country joins the ranks of the developed countries or remains in the class of developing countries.

The issues and challenges that are global in nature should be addressed concurrently and through proper exploitation of science and applications of technology, which encompass the much-needed potential to achieve and maintain sustainability. Social, economic and environmental problems are interrelated in a way and the development engines, of the like of, information technology can avert the projected horrifying scenarios, but the impetus lies in proper management of science and technology, with revolutionary powers that can turn the tide of developing countries as well as developed nations. For science and technology to play its due role in development, key-issues in developing countries regarding science and technology need to be tackled that need planning and cooperation at national, regional and international level.

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