BIISS JOURNAL, VOL. 24, NO. 3, JULY 2003: 295-324

Mahendra P. Lama

TECHNOLOGY CO-OPERATION AMONG THE BIMST-EC COUNTRIES: ISSUES, CHALLENGES AND OPPORTUNITIES

Abstract

The Science and Technology as a strategic variable for socio-economic development planning has been well recognised by the development planners and thinkers alike. The emphasis on Research and Development activities with more and more resources set aside for this purpose has both strengthened the process of re-skilling the work force and reinforced the competitive edge of the industrialised economies. On the other hand, the developing economies are caught in the process of a vicious circle of poverty contributing to low investment in technology resulting in low productivity. If the South is to benefit from the advances of the world, this state of affairs needs to be changed to its advantage. Despite gains achieved in the BIMST-EC region consisting of Bangladesh, India, Myanmar, Sri Lanka and Thailand, especially during the last two decades, these countries fall under a category of developing region with vast unexploited potentials for development. In order to explore the vast potentials for development, for the countries in the BIMST-EC region, the development of scientific and technological institutions, and manpower must be an important objective in national and collective planning for the future. For this, co-operation among them is of crucial importance. This article deals with some of the issues, challenges and opportunities that characterise the technology co-operation among the BIMST-EC countries. It also discusses the prospects for co-operation in software and information technology at the regional as well as inter-regional levels and finally deals with the policy options aimed at harnessing these opportunities.

Mahendra P. Lama, Ph. D., is Professor of South Asian Economies, School of International Studies, Jawaharlal Nehru University, New Delhi, India. His e-mail contact is: mahendra.lama@vsnl.com

Introduction

The Science and Technology (S & T) as a strategic variable for socio-economic development planning of the country has been well recognised by the development planners and thinkers alike. It has been the internal and self-sustaining technological dynamism, which has yielded a steady stream of technical improvements to the methods of production, information management and productivity enhancement drive in the countries like the UK, the USA, Japan and South Korea.[1] The emphasis on Research and Development (R & D) activities with more and more resources set aside for this purpose has both strengthened the process of re-skilling the work force and reinforced the competitive edge of the industrialised economies.

On the other hand, the developing economies are caught in the process of a vicious circle of poverty contributing to low investment in technology leading to a low level of technology and finally resulting in low productivity. Further, the developing countries are almost entirely the buyers of technology in the international market in which the sellers enjoy unchallenged dominance. Moreover, present world intellectual property system – of patents, trademarks and copyrights – gives the North's sellers of technology monopolistic rights in the markets of the South. If the South is to benefit from the advances of the world, this state of affairs needs to be changed to its advantage'.[2]

Despite gains achieved in the BIMST-EC region consisting of Bangladesh, India, Myanmar, Sri Lanka and Thailand, especially during the last two decades, mortality rates – infant mortality, under-5 mortality and maternal mortality – remain unacceptably high at least in some countries. Large numbers continue to suffer from malnutrition and illiteracy. Millions of people are still fighting to get

---

1 Rahman, A., Science and Technology in India, Pakistan, Bangladesh and Sri Lanka, (Longman, New York, 1989).

2 Menon , M. G. K. and Sharma, Manju, "Development of Science and Technology in India", in Srivastava, U. S. (ed), *Glimpses of Science in India*, (Malhotra Publishing House, New Delhi, 1991).

a proper livelihood, do not have access to safe drinking water and sanitation. By all indications, these countries in BIMST-EC fall under a category of developing region with vast unexploited potentials for development. The Human Development Index ranking in terms of longevity, knowledge and standard of living also place these countries in the very low echelons. Except Thailand and Sri Lanka, all other countries in BIMST-EC have a very low HDI value. (Table 1) All these are likely to be confounded, as the demographic pressure would continue to be there for at least next few decades. (Table 2)

Table 1

BIMST-EC Countries: Human Development Index Ranking

Country	Rank@	Human Development Index			
		1975	1985	1995	2001
Bangladesh	139	0.336	0.384	0.443	0.502
India	127	0.416	0.481	0.553	0.590
Myanmar	131	..	..	..	0.549
Sri Lanka	99	0.609	0.670	0.715	0.730
Thailand	74	0.612	0.673	0.739	0.768
Norway *	1	0.858	0.887	0.924	0.944

Note : @ These rankings are out of total 175 countries

* Norway has achieved the number 1 position in the HDI Ranking

.. Not available

Source : UNDP, *Human Development Report 2003,* Oxford, New Delhi, pp 241-244

Table 2

Population Size and Rates of Growth in the BIMST-EC Region 1980-2010

		Populatio n in '000				Average annual Growth rate (% age)	
	1980	1990	2000	2010	1980-1990	1990-2000	2000-2010
South Asia	948770	1191360	1468952	1757692	2.28	2.09	1.79
Bangladesh	88221	113684	144265	177491	2.54	2.38	2.07
India	688856	846191	1058267	1189396	2.06	1.86	1.55
Sri Lanka	14819	17217	19438	21592	1.50	1.21	1.05
South East Asia	359966	443306	530103	609828	2.08	1.79	1.40
Myanmmar	33821	41825	51567	61631	2.12	2.09	1.78
Thailand	46718	54677	61202	66738	1.57	1.13	0.87

Source: United Nations, *World Population Prospects, The 1992 Revision*, UN Publications, Sales No. E.93.XIII.7

However, there are ample literature and development experience based on sound scientific and technological interventions. The green and white revolutions turning India into a self-sufficient entity in food production and the highest milk producer in the world are two very burning examples in South Asia.[3] The technological base is, therefore, very critical. This includes the scientific knowledge and institutions, scientific inputs into public policy issues, availability of skilled human resources, the number of scientific and technical articles published, the competitive edge the countries enjoy in high technology exports, sales and purchases of technology through royalties and licenses, and the number of patent and trade mark applications filed.[4] The following tables 3 and 4 give us an idea about the fundamentals of technological base in the BIMST-EC region. Therefore, for the countries in the BIMST-EC region, the development of scientific and technological institutions, and manpower must be an important objective in national and collective planning for the future.

Table 3

Technological Base in BIMST-EC: Some Indicators

Country	Scientists and Engineers in R & D Per million people 1990-2000	Technicians in R & D Per million people 1990-2001	Scientific and Technical Journal Articles 1999	Expenditure for R & D % of GDP 1989-2000	Trademark Applications Filed 2000
Bangladesh	51	32	148	..	..
India	157	115	9217	1.23	66378
Myanmar	..	..	10	..	..
Sri Lanka	191	46	84	0.18	..
Thailand	74	74	470	0.10	27055

Source: The World Bank, *World Development Indicators,* 2003, Washington, pp 302-304.

---

3 Lavakare, P. J. and Lama, Mahendra P., "Technology Missions for South Asia: Cooperation in the High-Tech Domain", in Mehrotra, L. L., Chopra, H. S. and Kueck, Gert W. (eds.), *SAARC 2000 and Beyond,* (Omega Scientific Publishers, Delhi 1995).

4 The World Bank, *World Development Indicators,* 2003, Washington D. C., p.305.

Table 4
Technological Base in BIMST-EC: Some Indicators

Country	High-Technology Exports		Royalty & License Fees		Patent Applications Filed	
	$ Million 2001	% of Manufactured exports 2001	Recei-pts $ Million 2001	Payments $ Million 2001	Residents 2000	Non-Residents 2000
Bangladesh	..	..	0	6	32	184
India	1680	6	83	306	90	60852
Myanmar	..	..	..	..	..	..
Sri Lanka	109	3	..	..	0	58929
Thailand	15286	31	9	823	1117	4548

Source: The World Bank, *World Development Indicators*, 2003, Washington, pp 302-304.

BIST-EC was formally launched with Bangkok Declaration in June 1997 to promote "open regionalism" among Bangladesh, India, Sri Lanka and Thailand. Later Myanmar was included in this sub-regional grouping and the regional grouping was renamed BIMST-EC. Nepal is also likely to be included. It was also agreed that the Group would be open for membership to all states in the region sharing contiguous land or sea boundaries with the present members. In the BIMST-EC (Bangladesh, India, Myanmar, Sri Lanka and Thailand Economic Co-operation) region, no traditions exist in co-operation in S & T as numerous restraints, both internal and external, hinder the complex process of fortifying joint interest and extending co-operation. These are mainly caused by insufficiency in the indigenous development of S & T, lack of reliable information on the resources and capacities of other countries and a deep-rooted attitude that it is only the developed countries that can offer science and modern technology.[5]

As a vehicle of social and economic transformation, S & T requires an adequate investment of capital, creation of qualified

5 Lama, Mahendra P., "Science and Technology Activities of the SAARC: Assessment and Evaluation", in Ghosh, Sankar and Mukherjee, Somen (eds.), *Emerging South Asian Order: Hopes and Concerns*, (Media South Asia, Calcutta, 1995) and Heptullah, Najma, *Science in India: Continuity and Change*, (Vikas Publishing Co., New Delhi, 1986).

skilled human resources and widening material resources, which is beyond the capacity of a single country in BIMST-EC region. In other words, national welfare is vitally inter-linked with the application and utilisation of better technology only. Hence, only if a conscious determination and concerted effort is made to foster mutual co-operation in sharing experience, expertise and knowledge in the regional framework in the BIMST-EC region, the level of collective self-reliance in the arena of S and T could be enriched.

This article is an attempt to deal with some of the issues, challenges and opportunities that characterise the technology co-operation among the BIMST-EC countries. Besides evaluating the wider opportunities that regionalism may create before the BIMST-EC countries, this article makes a cursory attempt to assess the impact of reforms in the five BIMST-EC countries particularly on the technology issues. It also discusses the prospects for co-operation in software and information technology at the regional as well as inter-regional levels and finally deals with the policy options aimed at harnessing these opportunities.

II. Economic Reforms & Technology Issues

The reform measures undertaken by these five regional economies have a distinct slant on the virtual free for all in the import of technology. Despite the known fact that the new-modern technologies could inject a fresh dynamism to the entire spectrum of economic activities in the region, there are some genuine concerns related to accessibility, affordability, adaptability and spatial and class impact of such technologies.

With the onset of economic reforms in South Asia, a whole lot of issues that relate to technology has come up across the sector. The member countries have their own perceptions about technology needs and sources depending upon which each of them has drawn its technology policies. As a result, we find a lot of variation in

technology supply, absorption and transfer across the sector and the region. This variation is going to be more confounded once this region fully opens its doors for the trans-national corporations. Therefore, the monitoring of technology flow both from within and outside the region calls for a vital coordination among the respective organisations dealing with development and transfer of technologies. These organisations are:

India: National Research Development Corporation (NRDC)

Bangladesh: Bangladesh Council of Scientific and Industrial Research (BCSIR)

Sri Lanka: National Engineering Research and Development

It is generally observed that poor farmers are found to be rather slow in adopting new technologies mainly because they cannot insure against risk. On top of this, the scope for 'consumption smoothing' among them is very narrow and limited.[6] With the onset of economic reforms in BIMST-EC region, a whole lot of issues that relate to technology have come up across the sector. Though the technological advances have tended to erode longstanding geographical, ideological and political obstacle for cross-border transactions,[7] the member countries have their own perceptions about technology needs and sources depending upon which each of them has drawn its technology policies.

Within the FDI policies of these countries, a distinct emphasis has been given on the import of "advanced" technology. As a result,

---

6 World Bank, *World Development Report 1998/99,* Oxford, Delhi, p.123.

7 Rowthorn, Robert and Kozul-Wright, Richard, *Globalisation and Economic Convergence: An Assessment*, UNCTAD Discussion Paper No. 131, (February 1998).

we find a lot of variation in technology supply and absorption as well as transfer both across the sector and the region. The increasing abandoning of the closed technology policy is also likely to adversely affect the indigenous R and D.[8] This variation is going to be more confounded once this region fully opens its doors to the trans-national corporations. This induction of varying technologies across BIMST-EC region is likely to change the entire scale of operation, nature of industrial and agricultural output and may have lopsided effects of the economies of scale of some bigger operations on the smaller operations.[9]

The indigenousness, innovativeness and low cost technology of this region will be adversely affected particularly in the context of labour-intensive forms of production, which has been crucial to the generation of employment and to the sustenance of poor people. Since all these tend to unleash forces that undermine the norms implicit in domestic practices, it engenders conflicts within and between nations over domestic norms and the social institutions that embody them.[10]

---

8 Fikkert, Brian, *Reforming India's Technology Policies: The Impacts of Liberalisation on Self-Reliance and Welfare,* IRIS India Working Paper Series 2, (University of Maryland, 1995).

9 *Bangladesh: A New Horizon for Investment,* (Board of Investment, Prime Minster's Office, Dhaka, 1994); *Foreign Investment Policy of the Government of India*, May 1997; *Statement on Industrial Policy, 1991; Monthly Newsletter*, Various Issues and Guidelines for Indian Joint ventures and Wholly Owned Subsidiaries Abroad, (India Investment Centre, New Delhi, 1998); *Sri Lanka Investment Policy and Incentives,* (Board of Investment, Sri Lanka, 1996), pp.16-20

10 Rodrik, Dani, *Has Globalization Gone Too Far?,* (Institute for International Economics, Washington, DC, 1997), pp.4-6 .

III. Regionalism: Wider Opportunities

There has been a distinct acceleration of moves towards the formation or strengthening of *de jure* and/or *de facto* regional economic groupings in Europe, North America and Pacific Asia. BIMST-EC region, therefore, is not an exception. There has also been a recent renewal of strong interest in developing countries to strengthen regional ties among themselves as well as with the leading economies. This represents a significant departure from the 1950s to early 1970s, when many developing countries pursued regional integration among themselves, largely unsuccessfully, as substitute for stronger ties with the North, rather than as a complement as is the case today.[11]

A crucial feature of regionalisation in BIMST-EC based on liberalisation as a policy instrument could be its potential to counter the growth retarding actions of nationally entrenched "distributional cartels". Regionalisation can be a powerful collective policy instrument for states to disrupt, weaken or dilute nationally entrenched oligopolies, rent seekers and special interest groups. It can dilute the rigidifying, growth-retarding powers of such domestically entrenched groups by radically enlarging the domestic and regional market and stimulating competition.[12]

This can usher in a sense of competition within the region and these stronger competitive forces can in turn strengthen growth and the region's competitive dynamism in global market. In other words, so far this region strengthens internal competition by enhancing deep policy integration, it can enhance member states collective policy

---

11 Lama, Mahendra P., *Regional Co-operation in South Asia: A Commodity Approach,* Occasional Paper, (Society for Peace, Security and Development, Allahabad, 1997).

12 Charles, Oman, *Globalisation and Regionalisation: The Challenge for Developing Countries,* (Development Centre Studies, OECD, 1994), p.15.

sovereignty vis-à-vis the market. This in turn will facilitate the effectiveness of their policy measures, while strengthening the region's competitiveness vis-à-vis the rest of the world.[13]

In fact, regionalisation can constitute a vehicle for "deep" policy integration among member states. This will help in realising the international harmonisation of government policies on matters hitherto considered to be essentially of domestic concern, such as labour market or environmental regulations, product standards, competition policy etc. In BIMST-EC region, this has been a cherished goal as the member states share a strong sense of historico-cultural as well as geographic proximity.[14]

On the other hand, all the countries belonging to BIMST-EC have been a major part of the regional co-operation and integration process in their respective regions. Bangladesh, India and Sri Lanka belong to the SAARC group under which they have for long tried to co-operate on science and technology issues. There are technical committees on agriculture, science and technology, meteorology, education and health, which have been primarily set up to promote technological co-operation in the region.[15]

The Technical Committee on Science and Technology initiated under Integrated Programme of Action (IPA) prior to the formal launching of SAARC in 1985 has exchanged information, experiences and data on Science and Technology. A number of Studies/Directories/Guide Books, State-of-the Art Reports and Joint Research Projects have been prepared and discussed over the last decade. Training programmes have also been held for Scientists and

---

13 Oman, *ibid.*, p.17.

14 *Ibid.*, p.15.

15 *South Asian Association for Regional Co-operation: A Profile,* (SAARC Secretariat, Kathmandu, 1998).

Technologists on Tannery Waste Management, Low Cost Housing, Development of Prawn Hatcheries, Electronics and Molecular Biology; and Appropriate Post Harvest Food Technology for Perishable Items. Networking arrangements have been initiated in the fields of Bio-technology and Genetic Engineering; Energy Modelling Techniques; Technologies and National Nodal Points have been identified by Member States.[16]

A number of the State-of-the-Art Reports have been completed. TC8 has made many proposals for regional projects to be considered by South Asian Development Fund (SADF) viz., Utilization of Wind Energy, Connectivity of the Member States through Internet for establishing the Information Processing System and Databases on Technologies.

These state-of-the-art reports have been prepared with adequate technical support from all the member countries and hence they represent a well-drawn survey and suggested policy options. Since many of these reports have been prepared for the first time on a regional basis, some of them have tended to become very general, though informative. Therefore, at least a couple of these reports would have to trigger more integrated and detailed study for the identification of cooperative ventures.

Some of these reports should be increasingly used for initiating any regional activity in these areas. For instance, the Report on the Mineral Resource Exploration in SAARC region prepared by the Geological Survey of India outlines the vast prospects for coop-

16 SAARC, Various Reports of the Meeting of the Technical Committee on Science and Technology, 1983-1997, SAARC Secretariat, Kathmandu.

eration that exist in this area.[17] Among its major policy recommendations, some crucial ones are as follows:

i. The national institutions in the mineral exploration field are basically the geological survey organisations, which prepare geological maps in diverse degree of detail and follow up with updating of mineral resources inventory. These institutions are adequately organised in India, Pakistan and Sri Lanka but may need strengthening in Nepal, Bangladesh, Bhutan and Maldives. This involves indexing the base of personnel as well as equipment resources.

ii. The SAARC should play a vital role as facilities for providing resources involving educational and training facilities in geology and allied disciplines.

iii. For the provisioning of capital equipment for mineral exploration, these countries have to depend in certain sectors of instrumentation, on importation from the developed countries. It would be profitable if the member countries collaborate with developed countries as far as the options available and the choice are concerned in the light of past experience.

iv. The methodology of exploration needs to be continuously updated by sharing of professional experience gained in the search and location for mineral resources. This expertise which is essentially problem oriented is available in the member countries of the SAARC in varying degree of magnitude which can be best achieved by promoting active cooperation among the professional Geological Survey and other exploration agencies.

---

17 State-of-Art Report on Mineral Resource Exploration Technology in SAARC Region, prepared by Geological Survey of India, (SAARC Secretariat, Kathmandu, 1987).

v. The member countries should integrate diverse forms of the development in cartography including through remote sensed data output for various types of geological and thematic maps.

An expert group meeting on trends in biotechnology and genetic engineering in the SAARC region held in New Delhi in September 1991 came out with following recommendations:

i. designation of specific R & D centres in the member countries as SAARC centres for biotechnology research;

ii. preparation and circulation of directory of persons working in the field of biotechnology;

iii. establishment of a bio-informatics network with the existing institutions in the areas of agriculture, medicine etc.; and

iv. organisation of manpower training programme and study tours.[18]

ASEAN Committee on Science and Technology (COST) has been set up for the purpose of supporting collaborative efforts in science and technology among the ASEAN countries. ASEAN Science and Technology Week (ASTW) is held every three years on a national basis among the ASEAN member countries with the basic objectives of:

- Making public more aware of the increasing importance of science and technology in the ASEAN;
- Promoting the development of scientific and technological expertise in the ASEAN;

---

18 SAARC, Report of the Ninth Meeting of the Technical Committee on Scientific and Technological Cooperation, New Delhi, October 8-10, 1991, pp.6-7.

- Fostering technology transfer among the ASEAN member countries and from more advanced countries;
- Providing a forum for the promotion of specific aspects of science and technology and for interaction among the engineers and scientists; and
- Strengthening regional and international co-operation in science and technology and promote S & T among young people. [19]

There are a number of areas identified by the BIMST-EC in the arena of S & T. The three projects proposed by ESCAP could also be combined into a project on technology transfer and endogenous capability building making use of existing national and regional institution in Member States.[20] The third sub-sector, information technology products and services, was added in the Second Senior Officials Meeting of the BIMST-EC held in Dhaka in 1998. In its 1998 meeting, the BIMST-EC decided to begin cooperation efforts in six areas allocating each of them to a specific member country, viz., Trade and Investment (Bangladesh), Technology (India), Transport and Communication (Thailand), Energy (Myanmar), Tourism (Sri Lanka) and Fisheries (Sri Lanka).[21] Implementation in each sector is to be overseen by Sectoral Working Group.

The "Action Plan for cooperation in this sector for the period 2001-2005" as decided by the first BIMST-EC Expert's meeting on

---

19 Sasson, Albert, *Biotechnologies in Developing Countries : Present and Future,* Volume 3: *Regional and Sub-regional co-operation, and Joint Ventures,* (UNESCO, Paris, 2000, p. 383).

20 Report of the Special BIST-EC Senior Officials Meeting, 19-20 December 1997, Bangkok, Annex 10 and also the Joint Statement of the BIMST-EC Ministerial Meeting held on 22 December 1997, Bangkok.

21 *Agreed Conclusions*, BIMST-EC Economic Ministerial Retreat, 7 August 1998, Bangkok.

technology cooperation (Delhi, 2000) proposed to develop S & T cooperation by both pooling the synergy and the private sector. They emphasised on development of interaction between R & D and industry for commercial benefit, facilitation of growth of technology-intensive ventures and efforts to overcome "digital divide'. They also decided to institute a BIMST-EC technology Lecture series. Besides promoting the exchange of trained scientific and technical personnel and resource persons, the Action Plan has identified following regional projects to be promoted in a cooperative framework:

→ Agro-based science and technology including storage and preservation, soil and water management

→ Agricultural technology and agro instrumentation

→ Biotechnology

→ Food technology

→ Medical science and instrumentation

→ Herbal drugs

→ Electronics and information technologies

IV. Software and Information Technology: A Review of opportunities

On the other hand, BIMST-EC region particularly India is emerging to be the hub of global information technology. Table 5 only indicates the fast growing tele-density in some of the BIMST-EC countries and Table 6 gives the status of communications, information, and science and technology in the BIMST-EC Countries

Table 5
Tele-density by Wireline in some BIMST-EC Countries 1990-99

Country	1990	1996	1999	Growth Rate %
Bangladesh	242	316	406	5.31
India	5075	14543	26352	17.91
Sri Lanka	121	254	411	13.01

Source: International Telecommunications Union, *World Telecommunications Development Review, 1999*

Table 6
Communications, Information and Science and Technology Status in BIMST-EC Countries

	Year	Bangla-desh	India	Myanmar	Sri Lanka	Thailand
Daily newspapers (per 1000 people)	2000	53	60	9	29	64
Radios (per 1000 people)	2001	49	120	65	215	235
Television sets (per 1000 people)	2001	17	83	8	117	300
Cable Subscribers per 1000 people	2001	..	38.9	..	0.3	2.5
Telephone mainlines (per 1000 people)	2001	4	38	6	44	99
Mobile telephone (per 1000 people)	2001	4	6	0	36	123
Personal computers (per 1000 people)	2001	1.9	5.8	1.1	9.3	27.8
Internet Users in '000	2001	250	7000	10	150	300
Information & Communicati-on Technology Expenditures % of GDP	2001	..	3.9	..	..	3.7
Information & Communicati-on Technology Expenditures per capita $	2001	..	19	..	..	76

Source: The World Bank, *World Development Indicators*, 2003, Washington, pp. 296-300

i. Indian IT Industry

A large number of incentives have been given to support the IT industry in India. Software development and IT enabled services have emerged as a niche opportunity in India in the global context. The software industry has emerged as one of the fastest growing

sectors in the economy with a compound growth rate of exceeding 50 percent over the last decade and with a turnover of US$8.3 billion. Computer software exports increased from Rs.3700 crore in 1996-97 to Rs.36500 crore in 2001-02. On the other hand, the domestic software industry is likely to go up to Rs.11,634 crore during 2001-02 from Rs.2,600 crore during 1996-97. The IT enabled industry currently employs 70,000 people and accounts for 10.6 percent of the total IT software and services industry revenues. Hardware exports have also grown sharply reaching Rs.5871 crore in 2001-02 as against Rs.2587 crore in 1996-97.[22]

The latest *Economic Survey* of India mentions that the consistent growth in export of software can be largely attributed to the comparative cost advantage enjoyed by India. Indian software companies have a unique distinction of providing efficient software solutions with cost and quality as an advantage by using state-of-the-art technologies. India's success in software has been built on the foundations of public investments in human capital, outward orientation in policies and a highly competitive private sector industry.[23] Similarly, Sri Lanka earned US$50 million in 2002 from the computer and information services i.e. information technology exports.[24]

Indian software professionals have already created 260 of the Fortune 1000 companies i.e. almost one out every four global giants outsource their software requirements to India. It has also been moving up the value-added chain. The industry has evolved

---

22 Ministry of Finance, *Economic Survey, 2002-03*, Government of India, New Delhi.

23 *Ibid.*, p.143.

24 Central Bank of Sri Lanka, *Annual Report 2002*, Colombo, p.214.

manpower provider to software development to integration and IT business consulting.[25]

Some other countries have also set a vision to be an IT-driven nation comprising knowledge-based society in near future. They have provided effective incentives for development of IT sector to both local and foreign entrepreneurs. The private sector has been given the lead role in the IT development and use.

Bangladesh has set up National Council for Information Technology (NCIT), which along with Bangladesh Computer Council (BCC) co-ordinate IT related R and D activities carried out by the public and private sector organisations. It has given importance to all software and hardware industry, e-commerce and e-governance.

IT and communication technologies have been increasingly used to deliver new capabilities for hospitals and healthcare providers, specifically in the areas of electronic, medical and health education. They have also started using IT in rural patient management, distant medical education and health professional training, and to develop mass awareness programs of disease prevention.

Tourism is another crucial area where IT has been used by all these countries to harness the potential of this industry.

ii. Regional Opportunities

The emergence of Digital Era is likely to change the entire spectrum of Infotech leading to a massive upsurge in demand from end users. This is where the BIMST-EC countries can come together to a common platform. Apart from consolidating the "reverse flow of

---

25 Ministry of Finance, *Economic Survey 2001-2002*, Government of India, New Delhi.

technology" from the South to North, the regional partners should also address to issues of:

- utilising these technologies in transforming the development process within the region;
- new opportunities for partnership in niche areas and dialogue towards identifying core competence of the regional enterprises and firms; and
- equity and access posed by these new technologies.

How prepared are the other BIMST-EC countries in this respect?

The e-ASEAN project also known as ASEAN Information Infrastructure (AII) project is a collaboration of all national information infrastructures of the ASEAN countries. While maintaining a specific regional content, the project intends to link ASEAN countries' National Information Infrastructures and establish one common platform for the Southeast Asian countries. India has a remarkable rural telecommunication network, internet connectivity among all its universities and higher education institutions (ernet.in) and institutions of development, like, the C-DOT, CDAC and several technology parks. The BIMST-EC countries could forge a link with the e-ASEAN for consolidating the activities that are already taking shape.[26]

In fact the first meeting of the economic forum of the BIMST-EC member countries (New Delhi, 2000) wherein private sector also participated identified establishment of an IT training institute for member countries, joint ventures to set up IT parks, improving communication links and setting up of BIMST-EC software quality assurance testing and certifying labs.

A vast number of unexplored areas of co-operation exist. Following is a discussion on a number of crucial ones.

---

26 Concept Paper, Meeting of Experts in the Transport and Communication Sector of BIMST-EC-EC.

Bio-technology

The BIMST-EC region continues to be characterised by the following:

- Large number of people living with food insecurity
- Large number of malnourished people
- Increasing withdrawal of public investment from agriculture
- Water scarcity
- Increasing environmental degradation

Co-operation in the arena of biotechnology could transform the entire production process in the region. The most potential areas are:

- animal health and production;
- bio-pesticides and bio-fertilisers;
- medicinal plants;
- post harvest technologies; and
- tissue culture.

In fact, there has been a distinct shift in the biotechnology investment towards Asian countries mainly triggered by the following factors:[27]

⇒ Rapid expansion of the Asian economies and the potential of biotechnology to diversify business with high value-added products;

⇒ Increasing purchasing power leading to a rising demand for more perishable goods such as vegetables and flowers;

---

27 Chaturvedi, S., "European agro-biotechnology investments trends in Asia", *Biotechnology and Development Monitor,* (Amsterdam, No.29, 1996), pp.20-23 and Sasson, Albert, *Biotechnologies in Developing Countries: Present and Future,* Volume 3*: Regional and Sub-regional co-operation, and Joint Ventures,* UNESCO, Paris, 2000

⇒ Fragmentation of the big Asian market with different liberalisation policies and varying capacities for research and development as well as financial investment;

⇒ Existing barriers to discourage the import of products and, thus, stimulating research and development adaptation coupled with rising transportation costs to Asia;

⇒ Intellectual Property Rights (IPR) regime (many Asian countries had not yet fully endorsed plant breeder's rights, for instance, by not adopting the international Union for the Protection of New Varieties of Plants (UPOV) regulations;

⇒ Low cost skills for research and production (compared to Europe, most Asian countries had lower production costs, mainly because of low wages);

⇒ Incentive Policies of the certain governments;

⇒ Tailor made products: they are developing novel strains targeted toward specific needs of the Asian countries;

⇒ Production costs were high in Europe and there has been an increasing competition for tapping raw materials, such as germ plasma from Asia. On top of this, strict European environmental legislation, such as pesticide use, motivated companies to move to Asia where there were less regulations and/or weak enforcement of the latter.

Pharmaceutical Industry

Pharmaceutical industry has a lot of potential in the BIMST-EC region because of the following reasons:

✔ This region consumes very meagre quantity of world pharmaceutical output;

- ✔ The balance of payment for the national drug bill had been a significant net outflow and the apparent drug industry is still dominated by western multinational companies;

- ✔ In terms of the local drug manufacturing, historically the region had been represented by only a few players, mainly generic drug manufacturers in a highly fragmented environment. Profits were low and competition from multinational corporations intense. Consequently little investment had been ploughed back by these companies into drug development which seemed to be the only sure way to long-term success. Lack of investment, lack of trained scientists and pharmacists of vision as well as lack of funding had all hampered research and development.

All these led many multinational companies to seek joint ventures with Asian corporations.

BIMST-EC has already started initiating actions on these sub-sectors also. The first meeting of the economic forum of the BIMST-EC member countries (New Delhi, 2000) besides intra-regional trade, intra-regional investment and human resources development in the pharmaceutical sub-sector, identified the following areas for more meaningful future cooperation:

- Ayurveda/Traditional medicine systems and its inclusion in to the general category of drugs and pharmaceuticals

- Establishment of mechanisms to safeguard intellectual property rights for traditional remedies

- Establishment of universal standards for prepared traditional medicines

- Exploration of possibilities for joint ventures in manufacture of pharmaceuticals and drugs

- Introduction of a compulsory health insurance scheme
- Exchange of information on companies engaged in counterfeit drug trading and smuggling activities.

Bio-Informatics

Bio-informatics is defined as the sum of activities that combined the storage, copy and expression of genetic informational processes with the computerised digital-directed techniques of archiving, interpreting and quantifying of data in artificial systems.[28]There is a strong need and scope for co-operation in such areas. In case of India, Biotechnology Information Network (BTNET) of the Department of Biotechnology, University of Pune has a national informational network comprised of user and distributor centres. These centres collect, manage and store biotechnological data, which speed up research in the improvement of health, food production, livestock quality and environment management. High quality data banks dealing with informational systems on a animal viruses and agricultural pests, protein structure, glycopeptides, physical genetic, nucleic acid structures, genomic analysis etc. have been developed for users far removed from the central node.[29] India and Thailand are already engaged in medical informatics focusing on the use of computers and information technology in health care management and tele-medicine.

Like ASEAN, there is a strong need to have a BIMST-EC Bio-technology database containing a list of companies, institutions and organisations working on biotechnology or biotechnology-related

---

28 DaSilva, E. J., "Review: Biotechnology: Developing Countries and Globalization", *World Journal of Microbiology and Biotechnology,* (Vol 14, no 4, pp 463-86, 1998), quoted by Sasson, *op. cit.*, p.545.

29 DaSilva, *Ibid.*

activities including environment, energy, heath, agricultural and industrial sectors.

The Asia Pacific Information Network on Medicinal and Aromatic Plants (APINMAP) launched by UNESCO includes Australia, China, India, Indonesia, Republic of Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Sri Lanka, Thailand and Vietnam. The APINMAP provides access to scientific research results and information from regional and international sources, assisting in the development of information services and products, establishing links with other regional and international networks in medicinal and aromatic plants and natural product chemistry.

V. Policy Options

The arena of appropriate technology, which maximises social welfare, has not been really explored and identified by the BIMST-EC member countries on a regional basis. The question of appropriate technology, its availability, its identification, applicability and adaptability which have reeled the minds of the technology users and policy makers for long but have failed to evolve any regional mechanism to harness them.[30] These appropriate technologies are relatively less sophisticated, easier to transfer and implement, more labour intensive and suitable for indigenous skills, raw materials and cost effective.[31] There are specifically identified

---

30 A detailed assessment of the functioning of Technical Committees with special reference to S & T activities under the SAARC in the last ten years has been made by this author in "Science and Technology Activities of the SAARC: Assessment and Evaluation", in Ghosh, Sankar and Mukherjee, Somen (eds.), *Emerging South Asian Order: Hopes and Concerns*, (Media South Asia, Calcutta, 1995) and by the same author in "Good, but not enough" in Crosscurrents column in *Down to Earth*, New Delhi, February 28, 1997.

31 Rao R. A., "India's opportunity for regional co-operation in technology transfer among South Asian Countries", in *An anthology of papers read out in various seminars on SARC*, SARC Directorate, (Ministry of Foreign Affairs, Government of Bangladesh, Dhaka, 1985).

technologies of this nature available in various national technology research institutions.

For example, India's National Research Development Corporation (NRDC) has a rich collection of these technologies some of which have been included in a comprehensive document entitled *Technologies Available for Transfer in SAARC Member States* compiled by the SAARC Documentation Centre.[32] This document has identified the technologies available in the member countries with very clear source designation. They include areas like agro-based industries, biotechnology, advanced materials, energy conservation and renewable energy, waste utilisation management. It also provides addresses of contact persons and institutions, list of new inventions and technologies and projects supplied by India.

Bangladesh also has an Institute of Appropriate Technology (IAT), to cater to the need for an institution to support development of national indigenous capability in selection, generation and dissemination of technologies appropriate to the national development objectives of Bangladesh.

An examination of the socio-economic status of the member countries of our region clearly spell out the major development needs which have to be met rapidly. They include increased food production, better communication facilities, improved health care services, enhanced literacy rate and management of natural resources for sustainable development. All these development need can effectively use the inputs from science and technology if carefully formulated Technology Missions are undertaken by BIMST-EC countries in a collaborative manner. The basic objective of BIMST-EC Technology Missions on Agriculture and Dairy Development,

---

32 *Technologies Available for Transfer in SAARC Member States*, SAARC Documentation Centre, Indian National Scientific Documentation Centre, Delhi, 1995.

and for Natural Resources Survey and Satellite Communication should be to collectively use the S & T tools for solving the specific needs defined by each country in a realistic, open and focussed manner.[33]

The operational strategy of the BIMST-EC countries should concentrate in formulating and harmonizing regional S & T policy mainly aimed at strengthening capacities, enhancing local knowledge and skills to upgrade traditional technologies, providing access to the expertise needed to acquire, adopt and apply advanced technologies, improving the management of scientific research and development and technological information system and strengthening the human resource infrastructure and institutions. Harmonisation of technology acquisition policy of the BIMST-EC member countries is crucial in this respect.

The institutional networking among the premier S & T research organisations both at private and public level should be prioritised as a key activity which would facilitate the monitoring and research in emerging technologies and their adaptations, adoption and utilization to complement socio-economic development strategies. This should also include the listing and the sharing of accomplished experiences, which in turn would contribute to the building of linkages and to fruitful collaborative programmes. Further, this collected matrix can reflect where all we complement each other and how can we intermesh to our mutual advantage.

---

33 A detailed modalities and need for these Technology Missions are outlined in an article of Lama, Mahendra P. and Lavakare, P. J., "Technology Missions for South Asia: Co-operation in the High-Tech Domain", in Mehrotra L. L. *et al*, (eds.), *SAARC - 2000 and Beyond*, (Omega, Delhi, 1995).

India

There is a range of technology related institutes run by the Union Government in various parts of India. They give the list of both major technologies, which have already been transferred to industry and technologies ready for transfer. They also give the list of major R and D programmes, significant achievements, future programmes, services offered and training courses. These institutes include:

Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow.

Central Fuel Research Institute (CFRI), Dhanbad

Central Road Research Institute (CRRI), New Delhi

Central Mechanical Engineering Research Institute (CMERI), Durgapur

Central Salt and Marine Chemicals Research Institute (CSMCRI), Bahavnagar

Central Mining Research Station (CMRS), Dhanbad

Central Leather Research Institute (CLRI), Madras

Central Glass and Ceramic Research Institute (CGCRI), Calcutta

Central Food Technological Research Institute (CFTRI), Mysore

Central Electrochemical Research Institute, Karaikudi

Central Electronics Engineering Research Institute (CEERI), Pilani

Central Drug Research Institute, (CDRI) Lucknow

Central Building Research Institute (CBRI), Roorkee

Thailand

The National Science and Technology Development Agency (NSTDA)

Has four units in it, viz.,

National Centre for Genetic Engineering and Biotechnology (BIOTEC),

National Metal and Materials Technology Centre (MTEC), and

National Electronics and Computer Technology Centre (NECTEC)

Bangladesh

National Committee on Science and Technology (NCST) was set up in 1983 mainly to recommend measures for technology assessment, development adaptation, adoption and diffusion in the country. Bangladesh Council for Scientific and Industrial Research is the premier focal point for all the technology development activities.

The S & T activities should be oriented towards creating more regional complementarities and interdependence so as to ensure more tangible benefits to the people of the region in terms of harnessing the resources in the most cost effective manner and redistribution of the same through regional trade and investment.

In the past, technology transfer has frequently been supply-led, often taking little account of local technologies and knowledge. The emphasis should now be on co-operation by means of which externally developed technologies can be adapted to local conditions and needs and integrated with traditional technologies and experiences.[34] This aspect of technological co-operation needs to be

---

34 *Facing the Challenge: Responses to the Report of the South Commission,* (The South Centre, Zed Books, London, 1993), p.13.

considered by the BIMST-EC countries as imperatively and as seriously as possible.

Easy access to technology information is an important prerequisite for technology transfer. For this, efficient national information services and networks are essential. Another important issue for the entrepreneurs who want to import technology is techno-economic details of specific technologies available for transfer.

For the proper absorption of the information, it is necessary to enhance the national capabilities and institutional mechanisms. Asia and Pacific Centre for Transfer of Technology (APCTT) of the UNESCAP is implementing the Mechanism for Exchange of technology Information (METI). APCTT publishes Value Added technology Information service (VATIS) and also organizes "Techmarts" to bring together buyers and sellers of technology in specialized and high tech areas.[35]

There is also a definite need to enhance national capacities in the evaluation and assessment of new and clean technologies. Further the ability to receive, transfer, adopt and develop new technologies and to a large extent manage them successfully depends on the development of endogenous technological capacity.

In all the BIMST-EC countries the share of the private sector in national R and D investment over the past decades has been very small (less than 10 percent). Thailand has launched a project on effective mechanism for supporting private sector technology development and needs for establishing Technology Development Financing Corporation. Board of Investment has offered since 1989

---

35 Bischoff, Jurgen, "APCTT's Experiences in Strengthening Regional Co-operation in technological, Capacity-Building with emphasis on Small and Medium sized Enterprises and Transfer of Environment Friendly Technologies".

various tax incentives associated with setting up R and D laboratories and the related imports of machinery and equipment for use in R and D activities.[36] The possibility of extending incentives to the private businesses investing in R and D could be seriously coordinated among the member countries.

Thailand also launched a number of projects to explore the trend and process of technological change in key industries such as textile and garment, electronics assembly, automobile and food with emphasis on automation technologies. These projects have examined the factors affecting the diffusion of these technologies and the effects on productivity, employment and technical skills; and suggested policies and programmes to help industries benefit from technological changes and minimize negative effects. A major finding is that the industries covered in the study have to adopt increased automation and invest in more technology-intensive processes in order to survive or become more competitive in the international markets. Otherwise, they may face the possibility of factory close down, of which the loss of jobs will be far greater than the probable effects of labour substitution caused by the adoption of the automated and new technologies. Indeed, businesses in many companies have grown rapidly due to their increased use of automation and advanced technologies which leads to substantial productivity and quality gains, to an extent that they end up employing more rather than less people.

---

36 Thailand Development Research Institute, *Annual Report 1996, Bangkok.*