

# Role of Japan in the Technological Development of BIMSTEC

Issues and Opportunities for Cooperation

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# **Role of Japan in the Technological Development of BIMSTEC: Issues and Opportunities for Cooperation**

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Pratip Kumar Datta and Pritam Datta\*

**Abstract:** This paper is a descriptive study of the scope of Japanese investment in BIMSTEC countries. This paper suggests that Japan can play an overwhelmingly crucial role in technological development of BIMSTEC. In order to initiate transfer of technology from Japan to BIMSTEC, countries in the region have to produce good quality skilled labour force. We argue that technological transfer from Japan to BIMSTEC countries only in the industrial field is not sufficient for economic development of these countries. BIMSTEC countries should also take help of Japanese technology in agrarian development for a sustainable development.

## **I. Introduction**

### ***1.1. What is technology?***

Technology is the single most important factor, which has shaped over centuries the relationship between human, nature and the society and the kind of international association among countries in modern period at a much faster pace (North and Thomas, 1973). The level of education, level of development of a particular nation, the quality of governance and R & D as well as geographical phenomena primarily guide the possible scenarios of policy options by a government and the degree of

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acceptance of a specific technology at a local sub-regional level (North, 1990). Apart from these quantitative traits, cultural orientation of a particular country in particular circumstances has also been playing finer role in disseminating the impact of technology on the behavioural nature of the people.

According to J. D. Bernal (1969), “A technique is an individually acquired and socially secured way of doing something; a science is a way of understanding how to do it in order to do it better.” Economists’ concept of technology is an ex post economic characterization of the relationship between capital and labour in their attempt at producing goods with the help of machineries and tools (Ghosh and Neogi, 1993, 1996; Neogi and Ghosh, 1994, 1998).

### ***1.2. Technology and Economic Development***

Before the Industrial Revolution, economic development of a country was never thought to be linked with institutional mechanism and related environment. Modern research particularly by the pioneers like Schumpeter, J. D. Bernal, Douglas North, Nathan Rosenberg and others, have shown that technological development of a country is an integral part of the institutional framework under different socio-economic and geographical set up. Role of technology in economic development is many folds. First, it helps achieve competitive advantage over others to produce commodities at the lowest cost, maintaining the given quality. Secondly, it helps generate employment by developing newer areas of production and distribution. Thirdly, it also develops infrastructure and increases access to global resources by all sections of people.

### ***1.3. Technological Development: Endogenous or Exogenous?***

Endogenous growth theories traced out technological progress as a major force in economic growth. These theories also tried to formulate an equilibrium growth model in which technical progress is generated as an endogenous outcome of an economic system with the impetus from human capital (Grossman and Helpman, 1991, 1994). Where domestic investment is not adequate as in the developing countries to finance technological development, foreign capital plays a significant

role in fostering technological development. Foreign capital may come in these countries as development assistance and/or in the form of private capital. Apart from official development assistance, 'Private Capital' flow is another major source of development finance, which allows these developing countries to import more than what they export and to invest more than what they save. Private Capital flows are of two types: (a) Commercial Bank Lending, and (b) Foreign Direct Investment (FDI).

Commercial bank lending is debt creating capital inflow, whereas FDI are not. And because of this reason developing countries are looking for more FDI. Apart from the employment FDI creates and the exports and foreign exchange earnings it generates, it is the technological spillovers, which are regarded as the major contribution of FDI to economic development of the host country. FDI is a rich source of technological know-how and capital transfer from the developed to the developing countries under the present globalization wave.

#### ***1.4. Globalization and Regional Economic Blocs***

The world has experienced rapid changes in terms of economic relationship across border at the end of the 'Cold War'. Economic integration, popularly known as 'globalization', came into the picture of world economic scenario. Not only commodities but also factors of production and services are becoming more and more mobile internationally. Besides the economic integration of the whole world, groupings of countries with common economic interests have also become widespread. Both developed and developing countries have made several economic and trade blocks to initiate trade and cooperation among member countries. There is a common belief that trade initiates economic growth and is initiated by external sector liberalization. When some countries make a group, their notion is to create a common trade platform from where they can exploit their resources more efficiently by developing bilateral as well as multilateral relationships. This sort of grouping also reduces the transaction cost as well as cost of collaboration and negotiation among member countries.

## **2. The BIMSTEC Perspective**

### ***2.1. The Group***

BIMSTEC is a sub-regional grouping formed by some geographically contiguous South Asian countries situated around the Bay of Bengal. The member countries formed it to exploit the synergies in their capabilities and resource endowments for their development. The idea of setting up a sub-regional co-operation block in the Bay of Bengal basin was first mooted in Bangkok, known as the “Bangkok Declaration”, by Bangladesh, India, Sri Lanka and Thailand. On June 6, 1997, Bangladesh – India - Sri Lanka - Thailand Economic Cooperation (BIST-EC) came in force. These countries were chosen because of their proximity and direct access to the Bay of Bengal. The purpose of this regional grouping was to provide trade and technological cooperation among its members in the areas of trade and investment, tourism, transport and communication, technology, energy and fisheries. Later, at the special Ministerial meeting convened in Bangkok on December 22, 1997, Myanmar was admitted as a member of the grouping and BIST-EC was renamed as BIMSTEC (Bangladesh – India – Myanmar - Sri Lanka – Thailand – Economic Cooperation). Bhutan and Nepal were added as new members in 2004. By signing the Framework Agreement to establish a Free Trade Area (FTA) in February 2004 and through the Summit Declaration on July 31, 2004, BIMSTEC received further momentum in launching the process of deeper integration in the region. The sub-regional grouping is now renamed as “Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)”.

### ***2.2. Major Features***

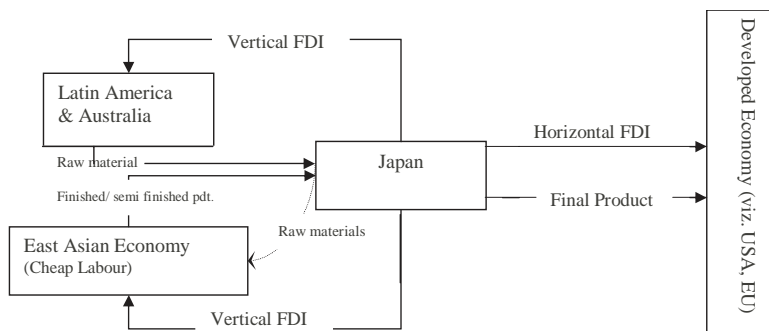
The main feature of BIMSTEC countries is that they all possess a relatively low per capita income level and all of them are characterized by unemployment, low level technology, and thus low level productivity. Today, BIMSTEC shares one fourth of the world poor. On the other hand, it is not easy to think of another region of the world, which can surpass BIMSTEC in terms of resource endowments - natural and otherwise. Notwithstanding its vast advantages of resource endowments, in terms of per capita income, BIMSTEC, as a whole, is still running far behind the middle-income

world in terms of economic wellbeing. Economic disparity across BIMSTEC is very much visible. For instance, people of BIMSTEC earn much less than what a national from the rest of Asia earns. In terms of social development indicators, BIMSTEC's performance happens to be poor and static (HDI 2003 ranking: Thailand 73, India 127, Myanmar 129, Bhutan 134, Nepal 136, Bangladesh 139).

### 2.3. Prospects of BIMSTEC

BIMSTEC's success is likely to come from its vast US\$ 750 billion economy, where all the member countries possess a huge market potentiality with a population size of 1.32 billion. Individually, each of the BIMSTEC countries possesses slower pace of growth but as a whole BIMSTEC economies are growing at a faster pace than that of some other predominant regional economic groupings (See Figure 1).

**Figure 1: Location and type of Japanese FDI**



Under such a backdrop, we intend to make a study on the role of Japan in the technological development of BIMSTEC. This paper deals with (i) the economic geography of Japanese direct investment, and (ii) scope of Japanese technology for agricultural development of BIMSTEC countries.

## 3. How can Japanese Technology Help BIMSTEC Countries?

Although neo-classical growth theory is characterized by a technological change, which is endogenous in nature, it is not easy to

develop indigenous technology by the developing countries under autarky because of their resource crunch. Even Japan, the only Asian OECD country, at her earlier stages of development had to import scientific knowledge from abroad. She had to import technical knowledge from the Netherlands during the Tokugawa era and from America and Europe since Meiji restoration.

Under integrated world economic system, inflows of foreign technologies substitute the indigenous technology development process of underdeveloped economies. The world has witnessed technology driven enormous development of the Japanese economy after the World War II. Although Japan experienced a severe banking-led economic depression during the last decade (with an average per capita growth rate of 1.32 percent only), she has positioned herself in a very strong economic background with highly developed technology, infrastructure, per capita productivity, etc. Japan has set up an example to the rest of the world by achieving a very high level of infrastructure quality with a very limited land area and natural resources (Yamamura, 1967; Patrick and Rosovsky, 1976). It would be naïve to talk about similarities between Japanese economies and those of BIMSTE-EC countries. Our purpose would be to show how both Japan and BIMSTEC countries can be benefited from deeper economic relationship. For quick recovery from cyclical depression in industrial societies, Japanese economy needs to boost up her effective demand, which can be available in BIMSTEC market. Japan may also avail of the resources including human resources at a very lower rate from BIMSTEC countries. BIMSTEC countries may get rid of their unemployment problem and vicious circle of low productivity through technology transfer and supply of financial resources from Japan. In this process, direct technological cooperation or foreign direct investment (FDI) and associated new technology may play an overwhelmingly important role in developing BIMSTEC country's industry and infrastructure facilities.

#### **4. Mode of Technology Transfer**

Technology can be transferred from developed to developing country through FDI made by the developed country. Legal and

policy related hazards very often might make such transfers cumbersome. FDI along with domestic technical efforts create favourable environment for firm level technology development, which develops the competitive efficiency of the firms. For most of the developing countries, along with BIMSTEC countries, the R & D expenditure as percentage of GDP is very insignificant to augment future research potential. So firm level competitiveness depends on FDI. Among BIMSTEC countries, foreign investors are mostly attracted towards Thailand and India. Altogether FDI figures are not at all impressive in BIMSTEC.

Emigration of technical talents is another way of technology transfer. But emigration of technical talents is not encouraged by most countries- developed and developing. It remains a topic of hot debate that whether such emigration leads to economic development through technology transfer or not. Some argue that such 'brain drain' makes it difficult for a country to develop indigenous technology. Taiwanese government recently took a policy to Taiwanese Chinese back to the island. The nationalist Government of P.R. China restricted the movement of its people abroad. Quite reverse is the picture of India.

## **5. Current Trend of Japanese Investment**

### ***5.1. The Economic Geography of Japanese Direct Investment***

The investment of Japan is predominant in the developed countries, with USA the dominant host. But in Latin America and Australia, Japanese FDI is significantly resource based (Caves 1993; Drake & Caves 1992). About one third of output derived from Japanese FDI in these regions is exported back to Japan (See Table 1). Whereas in the wider East Asian economy, Japanese FDI involves relocation of Japanese production to lower wage economies as a base from which it may be possible to supply Japanese market and export to third markets. At a glance the geography of Japanese FDI can be explained by Figure 1.

**Table 1: Japanese Direct Investment Abroad (1994) and Sales by Affiliates (1991) of the Host Area**

Area	Direct Investment (Million US\$)	Share (Percentage)	Affiliate Sales (Million US\$)	Share (Percentage)	Percentage of Affiliate sales, sold in Japan
<b>All countries:</b>	436606	100	498000	100	14.2
<b>Advanced.</b>	316980	68.4	402000	80.7	12.8
USA	194429	41.9	229000	46.0	12.2
<b>European Union 15.</b>	84283	18.2	133000	26.7	9.5
United Kingdom	33830	7.3	61000	12.2	7.4
<b>Australia.</b>	23932	5.2	22000	4.4	37.9
<b>Developing.</b>	31.6	31.6	96000	19.3	20.1
<b>Latin America</b>	55,617	12	9,000	1.8	28.7
Brazil	8,849	1.9	3,000	0.6	41.8
<b>Asia</b>	76,219	16.4	83,000	16.7	18.7
Greater China*	22,610	4.9	26,000	5.2	19.9
Indonesia	16,981	3.7	1,000	0.2	12.5
Singapore	9,535	2.1	29,000	5.8	20
Thailand	7,184	1.5	5,000	1	19.5
Malaysia	6,357	1.4	6,000	1.2	19.7
Africa	7,697	1.7	NA	NA	NA
<b>Middle East</b>	4,736	1	NA	NA	NA
<b>East Europe &amp; Former USSR</b>	769	0.2	NA	NA	NA
Russia	386	0.1	NA	NA	NA
Hungary	383	0.1	NA	NA	NA

\* Note Greater China is China & Hong Kong.

**Sources:** 1. Table 7.2, Shatz H.J. & A.J. Venables "The Geography of International Investment".

From the Figure 1, it is revealed that Japanese direct investment in Latin America and Australia is searching for raw materials whereas in wider East Asia it is looking for cheap labour. Now the obvious question arises here is: is it labour cost that attracts Japanese direct investment? Japanese firms have set up factories in Asia partly because of the relatively low labour costs of this part of the world. Labour quality is another powerful determinant of net FDI inflow in a country. Japanese firms using modern skilled-based production technology also pay special weightage to labour quality. For instance, in India, top sectors attracting FDI inflows (from January 2000 to March 2005)

from Japan are Transportation Industry (62.41%), Electrical Equipments (7.79%), Services Sectors (financial & non-financial, 3.85%), Ceramics (2.38%) and Rubber Goods (2.03%) (See, Tables 2 and 3). At the beginning of this new century, IT sector is becoming

**Table 2: Share of Top Sectors Attracting FDI for Japan**

(from August 1991 to March 2005)

Rank	Sector	No. of FDI approvals	Amount of FDI approved (Million US\$)	% with total FDI approved for Japan
1	Transportation Industries	217	966.5	33.00
2	Telecommunications	21	550.3	14.99
3	Fuels (power & oil refinery)	14	406.5	11.36
4	Chemicals(other than fertilizers)	60	348.4	10.25
5	Electrical equipments(including computer software & electronics)	137	207.5	6.40
<b>Total of above</b>		<b>449</b>	<b>2,479.2</b>	<b>76.00</b>

\* Approval basis.

**Table 3: Share of Top Sectors Attracting FDI for Japan**

(From January 2000 to March 2005)

Rank	Sector	Amount of FDI Inflows In million US\$	%age with FDI inflows from Japan
1	Transportation Industry	675.9	62.41
2	Electrical Equipments(including computer software and electronics)	85.6	7.79
3	Services Sector(financial & non-financial)	42.0	3.85
4	Ceramics	26.0	2.38
5	<b>Rubber Goods</b>	22.5	2.03
<b>Total of the above</b>		<b>852.0</b>	<b>78.46</b>

**Note:** (i) Amount includes the inflows received through SIA/FIPB route, acquisition of existing shares and RBI's automatic route only.

(ii) The amount of FDI inflows in respect of the Country/Sector/State specific data is not provided by RBI, Mumbai prior to March 2000.

the lead sector for the Indian economy, and India is getting a positive response from Japan in terms of assistance.

### ***5.2. IT Industry: Future Prospect of Indo-Japan Collaboration***

Apart from other historical reasons, Indian education system has evolved during last centuries in such a way that Indians naturally acquire world level English language skills. Added by Government emphasis on higher education this has been successful in creating well-trained software professionals for the world market. But it is beyond her capacity to provide equally attractive salary package and work opportunities to these professionals as is provided by United States and other OECD countries. As a result, the most favourite destinations of these professionals are USA, UK and other OECD countries except Japan. Japan has a strong nationalist culture towards an indigenous development strategy by creating professional opportunities at home (Costa, 2004). Japan absorbed 800,000 IT professionals in 2001. But only 400 Indian engineers were present in the Japanese IT industry (Costa, 2004). Keeping in view the present growth rate of Indian IT professionals (the number of IT admission increased from 73 thousands in 1992 to 342 thousands in 2004 (Costa, 2004)) and emerging world competition (Russia, China and Philippines are potential competitors); India must have to diversify her IT export.

Japan, on the other hand, is going through an extreme phase of demographic transition characterized by very low population growth rate of 0.24%. By 2015, it is estimated to become -0.2%. Labour force (age group 15-64) occupied 67.9% of total population in 2001 but with current growth rate it will decline by over 3% in 2010 (World Bank Development Indicators Database, 2003). So Japan can be a potential future market for Indian IT professionals. On the other hand, world has experienced a huge hardware expansion in Japan. Japanese hardware technology, coupled with Indian software skill, can definitely play a miraculous role in international market.

## 6. Prospect of Japan BIMSTEC Cooperation in Agricultural Sector

### 61. Trade Liberalization and Agricultural Sector of BIMSTEC

As stated earlier, BIMSTEC region is one of the most poverty-ridden regions of the world. To fight against poverty, initiatives that boost national growth rates are therefore likely to be helpful. Trade liberalization policy is one such initiative. But the problem is that the developing countries are not ready to liberalize the agricultural sector even in the post WTO period for reasons which are not unjustifiable.

Interestingly, on the other hand, there is a close relationship between agricultural productivity and economic development. It is

**Table 4 Employment in Different Sectors of BIMST-EC Countries (% of total employment)**

Employment in Service	1990	1995	1996
Bangladesh	16.200		25.000
India	17.300	20.300	
Myanmar	21.100	21.400	21.700
Nepal	13.700	21.000	
Sri Lanka	30.000	33.600	38.800
Thailand	22.000	28.100	29.100
<b>Employment in Industry</b>			
Bangladesh	13.000		9.600
India	13.600	12.900	
Myanmar	9.200	11.200	11.700
Nepal	2.300	5.500	
Sri Lanka	20.600	23.400	22.400
Thailand	14.000	19.800	20.800
<b>Employment in Agriculture</b>			
Bangladesh	66.400		63.200
India	69.100	66.700	
Myanmar	69.700	67.400	66.600
Nepal	83.300	78.500	
Sri Lanka	47.800	37.300	35.100
Thailand	64.000	52.100	50.000

*Source:* India Infrastructure Database 2005, Volume I.

Table 5 Trade Specialization Indices [(X-M)/(X+M)] - 2001

	Agricultural raw materials	Food	Fuel	Manufactures	Ores and metals	Other commercial services	Transport services	Travel services
Bangladesh	No Trade Data	No Trade Data	No Trade Data	No Trade Data	No Trade Data	0.59	-0.43	0.24
India	-0.48	0.46	-0.79	0.23	-0.30	No Import Data	No Import Data	No Trade Data
Nepal	-0.79	-0.12	0.00	0.15	-0.85	0.17	-0.38	0.10
Sri Lanka	0.11	0.20	-1.00	0.02	-0.57	0.19	-0.25	0.06
Thailand	0.04	0.51	-0.66	-0.01	-0.50	-0.20	-0.33	0.46

*Source:* Own calculations.

unfortunate that there is a tremendous dearth of research in this regard in recent period. But in regions like BIMSTEC, where most of the people are engaged in non-formal agricultural sectors, the dream of economic development via industrial development, ignoring the agriculture may be an oversimplification.

Most of the BIMSTEC countries are at a very early stage of economic development. At this stage they have to generate surplus from agriculture for the sake of industrial development. Table 5 shows the trade specialization indices, which is nothing but the ratio of net export to Japan and total trade (export + import) with Japan, i.e.  $(X-M)/(X+M)$ , where X is export to Japan and M stands for import from Japan. The index must lie between -1 to +1. The countries, which import from Japan and do not export a particular commodity, have index -1 and index is +1 for a country, which exports to Japan and does not import from Japan a particular commodity. Table 5 shows that except Nepal, all other BIMSTEC countries have a relative specialization in food product trading over other products, while considering the trade relationship with Japan.

## ***6.2. Agricultural Productivity and Economic Development of BIMSTEC Countries***

The BIMSTEC countries are driven by primary sector. Traditionally these countries are having a low agricultural productivity per worker (see Table 6). Also density of agricultural workers in BIMSTEC countries is too high compared to developed countries. As most of the people living in BIMSTEC countries depend on agriculture, and agricultural sector has no commercial outlook, these countries can not come out from the vicious circle of low productivity and poverty without using improved technology. So for increasing trade related cooperation leading to overall economic development emphasis must be given to the agricultural sector.

Now the question is why BIMSTEC countries suffer from low agricultural productivity problem? Apart from high density of agricultural population, returns to scale appear to be very low in agriculture primarily due to low level of technology. Generally

**Table 6 Agricultural Value Added per Worker (AVAPW) of BIMST-EC Countries and Japan**

AVAPW (constant 1995 US\$)	1991	1995	2000	2001
Bangladesh	257.0	258.8	314.8	322.2
Bhutan	NA	NA	NA	NA
India	338.8	366.3	394.5	411.7
Japan	24897.1	27523.4	31791.0	na
Myanmar	NA	NA	NA	NA
Nepal	195.3	189.0	200.5	204.3
Sri Lanka	701.2	732.4	744.4	717.5
Thailand	819.3	889.5	949.3	855.3

*Source:* India Infrastructure Database 2005, Volume I.

speaking, BIMSTEC countries appear to have high soil fertility. In spite of this, their agricultural productivity per worker rarely exceeds 900 units (measured in terms of 1995US\$) (only Thailand is close to this mark). BIMSTEC countries rarely use one tractor per 100 hectares of agricultural land (India, Sri Lanka and Thailand use approximately one tractor per 100 hectares of arable land (see, Table 7).

World is experiencing widespread and increasing disparity among developed and developing countries in terms of income and agricultural productivity. We have carried out one simple non-parametric test of convergence to observe this disparity. This test is the coefficient of

**Table 7 Use of Agricultural Machinery (AM) by BIMSTEC Countries and Japan**

AM	1991	1995	2000	2001
Bangladesh	0.06	0.07	NA	NA
Bhutan	NA	NA	NA	NA
India	0.65	0.84	NA	NA
Japan	41.48	45.85	NA	NA
Myanmar	0	0	0	0
Nepal	0	0	0	0
Sri Lanka	0.72	0.86	NA	NA
Thailand	0.37	0.88	NA	NA

\* (tractors per 100 hectares of arable land)

*Source:* India Infrastructure Database 2005, Volume I.

variation (CV) of per capita income, PCI (GDP per capita at constant 1995 US\$) and agricultural value added per worker (AVAPW) (constant 1995 US\$) (see, Table 8 and Figures 5 and 6). The value of CV of AVAPW has shown an increasing trend during last three decades. The value of CV of PCI has been rising at very fast rate since 1981. Among other things, technology plays a very vital role in such high degree of disparity. Table 9 shows the linear regression results of PCI

**Table 8 Non-parametric Test on World Disparity**

Years	C.V. of AVAPW	C.V. of PCI
1970	149.87	151.53
1971	140.79	147.58
1972	138.74	147.60
1973	147.34	147.94
1974	147.05	145.66
1975	150.36	144.38
1976	146.78	144.78
1977	145.72	144.73
1978	152.73	144.82
1979	150.70	145.25
1980	156.75	144.38
1981	158.79	143.32
1982	152.80	144.40
1983	149.49	145.56
1984	151.20	146.29
1985	151.07	147.65
1986	152.80	148.00
1987	154.67	148.30
1988	151.90	148.40
1989	152.48	149.08
1990	151.82	149.92
1991	150.47	149.94
1992	152.45	149.50
1993	154.39	148.83
1994	154.73	148.87
1995	154.68	148.69
1996	153.11	148.64
1997	153.71	148.58
1998	155.17	148.88
1999	157.44	149.66
2000	158.70	149.81
2001	193.23	149.55

**Source:** India Infrastructure Database 2005, Volume I and own calculations.

Figure 1: Relative Annual GDP growth of Different Grouping

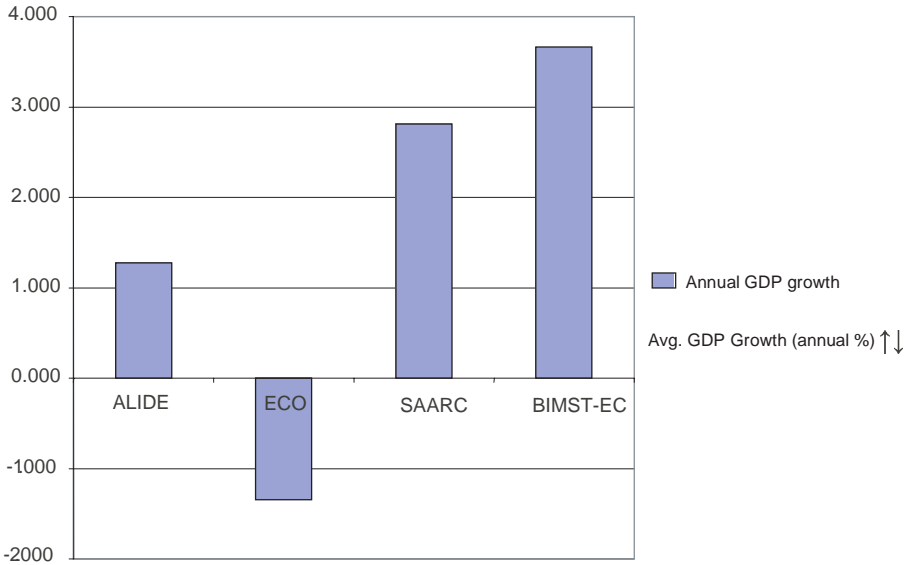
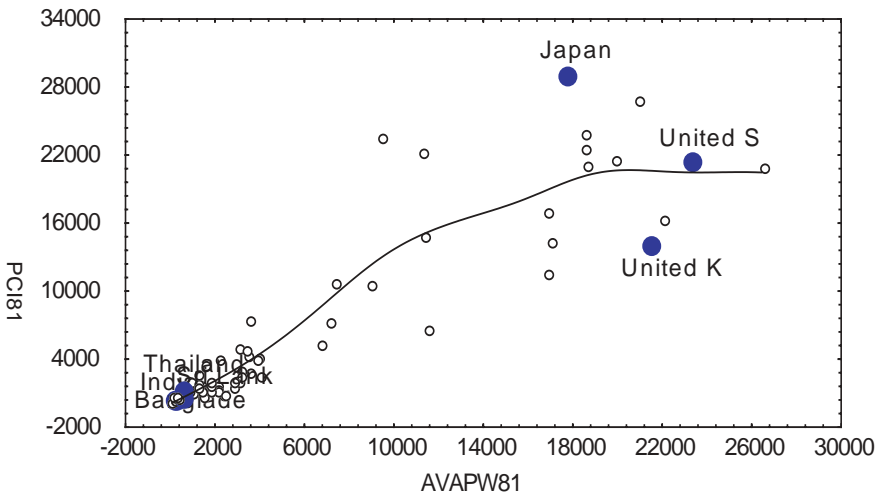
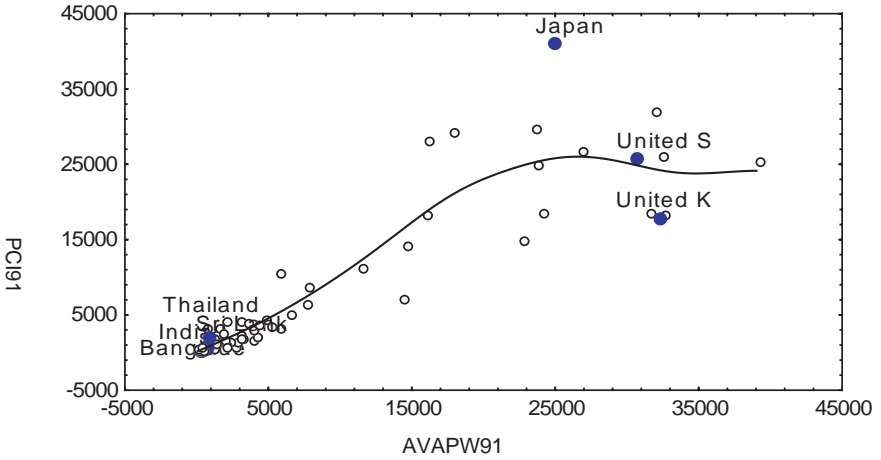


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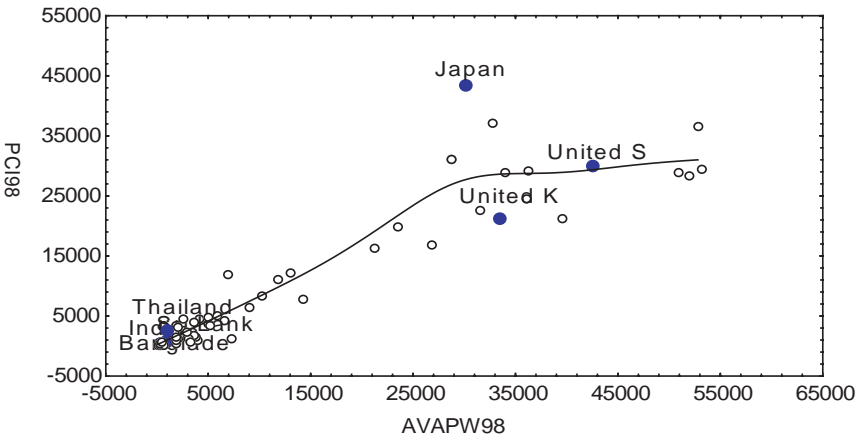
Cross Section relation Between Agricultural Productivity and PCI (1981)



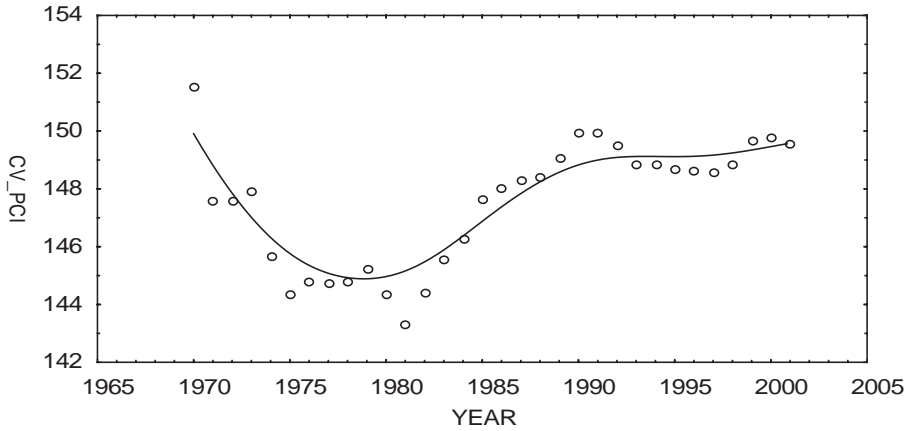
**Figure:3**  
**Cross Section Relation Between Agricultural Productivity and PCI (1991)**



**Figure:4**  
**Cross Section Relation Between Agricultural Productivity and PCI (1998)**



**Figure:5**  
**Non-Parametric Test for Disparity in World PCI**



**Figure:6**  
**Non-Parametric Test for World Disparity In Terms of Agricultural Productivity**

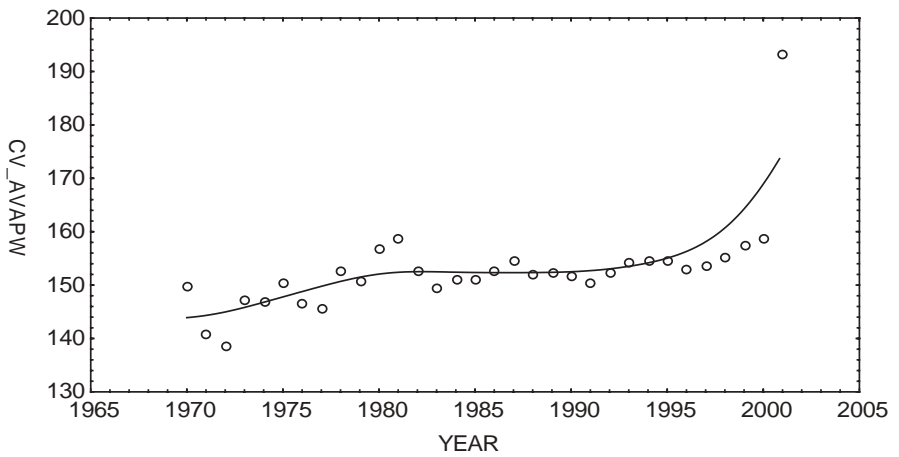


Table 9 Cross section Regression Outputs for PCI

Cases	Year	Independent Variable	Coefficients	t-statistics	R <sup>2</sup>	Adjusted R <sup>2</sup>	F-value
Case 1	1971	Intercept	406.24 (390.92)	1.04	0.763	0.760	283.27
		AVAPW	1.05 (0.06)	16.83			
Case 2	1981	Intercept	299.25351 (385.92)	0.78	0.763	0.760	283.27
		AVAPW	0.9227222 (0.04)	22.46			
Case 3	1991	Intercept	442.23733 (507.66)	0.87	0.831	0.830	434.23
		AVAPW	0.9118611 (0.04)	20.84			
Case 4	1998	Intercept	711.37992 (484.51)	1.47	0.878	0.876	631.50
		AVAPW	0.0281966 (0.03)	25.13			

*Notes:* Numbers in the bracket is the standard error

(dependent variable) and AVAPW (independent variable) at four different time points. The results reveal that there is a high degree of association between economic wellbeing and agricultural productivity per worker. All the BIMSTEC countries appear to be on the same trajectory of economic development. Figures 2, 3 and 4 show the relative positions of BIMSTEC countries in AVAPW and PCI plane. Surprisingly, their relative positions have not changed over last three decades. All of them still possess very low horizontal and vertical coordinates and look like a patch in the pictures.

Now let us turn to the question of policy. Vicious circle of low level productivity and hence underdevelopment can be broken through institutional development, and if trade can be liberalized gradually, then most of the economic welfare will come from the agricultural sector as a larger share of the total work force is involved in agriculture (see Table 4). Institutional development definitely is important. But in BIMSTEC countries, many historical evidences are there to prove that popular agrarian policies frequently make the agrarian sector incompetent to face world competition. This is largely due to the fact that constitutionally agriculture is a state affair in almost all these countries and in a sense no integrated national agriculture policy has been implemented for trade liberalization in these economies. It is therefore difficult to discuss the impact of trade liberalization in agriculture sector of the BIMSTEC countries without inviting broader institutional issues. There is no doubt that all the BIMSTEC countries have a comparative advantage in exporting agricultural raw materials. So BIMSTEC countries must turn to agricultural mechanization to develop agricultural productivity. Let us look at Table 10, where we compute the results of another non-parametric test, Spearman Rank Correlations, over 91 countries between AVAPW and agricultural machinery (AM), measured in terms of tractors used per 100 hectares of arable land for 91 countries. Here also very high values of  $R^2$  and  $t$  suggest what miracle mechanization can do in agriculture.

Probably one real life example of this result is Japan. BIMSTEC countries are nowhere at a comparable position with Japan with respect to productivity per worker and technology used in agriculture. Japan

**Table 10 Non-Parametric Test for Relationship between AVAPW and AM**

Years	Spearman's rank correlation (R)	t- value
1971	0.8342429	13.62
1981	0.8373148	14.45
1991	0.858624	15.80
1998	0.8237777	13.71

has a tremendous scarcity in agricultural land and other agricultural raw inputs like agricultural worker etc. In spite she has set productivity per worker in such a high level by mere use of technology.

### ***6.3. Can BIMSTEC Countries Use Japanese Technology?***

It is very difficult to answer this question in a single word. The problems are plenty. First, still today we cannot even think of direct foreign investment in agrarian sector and so Japanese investment in this sector in BIMSTEC countries is nil. Only China has got some Japanese investment (almost 1% of GDP) in this sector. Secondly, this sector of BIMSTEC is non-profit making. So it is obvious that Japanese investors will not be interested to invest in this sector. Thirdly, many may argue that our existing agrarian institutions are not fit for adopting such high graded technology. It is true that without full trade liberalization it is not possible for the Japanese investors to invest in the agricultural sector of BIMSTEC countries. Of late, Japan has started viewing the South Asian countries as possible destination for future investments. This might have made India as the largest recipient of Japanese ODA for the current year. So in order to develop the economic potentialities as future investment destination, Japan may provide technological assistance to this sector in BIMSTEC.

## **7. Conclusion**

There is hardly any doubt that BIMSTEC countries have large economic potentialities. However, except Thailand, rest countries are at a very early stage of development trajectory, which is characterized by low level productivity and per capita income. Technical development

is necessary in order to move these countries to the forward direction from their stagnant position. Technical development is an exogenous process for the developing countries and most of the technology transfer from developed to developing world have occurred through FDI. Due to locational advantage and cultural positioning, Japan could be the geographic position and cultural orientation potential investor in BIMSTEC countries.

However, still now Japanese investment in this region is not adequate. Japanese investment is guided largely by labour quality. That is why the future of India–Japan collaboration in IT industry is very prospective, as Indian education system has produced a large number of skilled professionals in this field.

The sector which is most crucial for real development of BIMSTEC countries is agricultural sector. In order to provide necessary boost to the industry, developing countries have to generate surplus from the agricultural sector. Not only that, as a larger share of the labour force of these countries is engaged in agriculture, so to achieve sustainable development, this sector must have to be improved. Interestingly, in spite of having low agricultural productivity, BIMSTEC countries are relatively specialized in trading food product with Japan.

We have observed a close relation between economic development and agricultural productivity. BIMSTEC countries must improve their agricultural productivity. World has experienced a varied disparity among developed and developing countries in terms of agricultural productivity and per capita income. This disparity is largely due to choice of inappropriate technology. Japan has shown an enormous development in agricultural productivity with mere use of technology. So, Japanese technology may be used to develop agriculture sector of BIMSTEC countries. However, at the present stage, direct Japanese investment in agriculture sector in BIMSTEC countries is not possible. At best, Japan may provide technical assistance to this sector.

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