The Pakistan Development Review
41:4 Part II (Winter 2002) pp. 761–786

Transfer of Technology: Competition or Cooperation

TOSEEF AZID, MOHAMMAD ASLAM, and MOHAMMAD OMER CHAUDHRY

Looking at an economy as consisting of several layers of techniques gives us a way to spell out the implications of macroeconomic situations to micro levels. For instance, if macroeconomic consideration point to reducing total employment, a map of the layers of techniques of the economy should be able to pinpoint the firms of different regions that are likely to be effected.

In such cases, to be able to delineate the effects of extra final demand of the new investment on the production and employment in the economy, we require best input-output and labour coefficients instead of the average ones that are at present computed worldwide. Similarly, for capacities going out of production either because of the lack of demand, or obsolescence, we want to have the knowledge of the least efficient techniques of production for finding out their economic implications [Azid (2002)].

This will not only would be necessary for predicting the effects of changes in the final demand but will also through a significant light on the international competitiveness. There is a view that one of the reason for the competitive advantage of Japan and West Germany after the war was that while the price structure in the rest of the countries was determined in such a way that the even the least efficient producer may be able to produce without losses, the new industries in these countries were producing with the latest techniques transferred to them by allies, giving them sufficient cost advantage. Similarly, current developing countries are not able to become exporters of manufacturers, as the technological transfer coming their way is of the techniques on the verge of obsolescence in the developed countries. As pointed out above, all these hypothesis depend on the substantial differences in the best practice technology from the least efficient one [Mathur (1989, 1990); Azid and Chaudhry (2003)].

Toseef Azid is Professor of Economics, Bahauddin Zakariya University, Multan. Mohammad Aslam is District Officer, Planning, Bahawalpur. Mohammad Omer Chaudhry is Lecturer, Department of Economics, Bahauddin Zakariya University, Multan.

Whether to go in for the extra costs involved in its preparation depend on the dimensions of the quantities involved. If the best technology is only slightly better than the average one, the whole exercise may not be of much practical value, though it will still be useful for academic purposes. In case the construction of marginal input-output coefficient only at the cost of relevance [Azid (1993)].

To get an idea of size of the problem, a pilot study was undertook of US manufacturing industry for the census year 1982. The aim of the study was to find out the differences between the best and worst technology in each industry. If they are found to be relatively small, the above apprehensions may be largely discounted. In the contrary case, effort must be made to tabulate the necessary information, which will unable us to conduct an economic analysis, which is much more faithful us to reality and so much more useful for decision-makers.

The preliminary results of that study were startling. From that study we found that "vast majority of industries (68 percent) have a coefficient of variation of unit output cost ranging from 0.151 to 0.245". Coefficient of variation is standard deviation divided by the average. Its model value would be about 0.185. We can take the difference of the best and average technology to be about 2*sd. And same that between worst and average technology. Thus in the model case we find that the least efficient technique cost per unit of output 137 percent of the average, while the most efficient one 63 percent. This implies that the cost per unit of the most efficient technique of production is only half of that of the lest efficient ones [Azid (1993, 1995)].

This is the huge difference. And it is incumbent on us to explore the implications of such ranges of the layers of techniques for various aspects of economic analysis. In the economic literature we can find a number of studies discussing the different aspects of transfer of technology. However, none of them discussed this concept in the scenario of layers of techniques, [e.g., Eaton and Kortum (1999); Mayer (2000, 2001); Nelson and Phelps (1966); Aeemoglu (2000); Bartel and Liehtenberg (1987); Bresnahan and Trajtenberg (1995) and De Long and Summers (1993) and many others]. In this study we intend to look at its (Layers of Techniques) implications for the transfer of technologies from one country to another. Section II presents the model of layers of techniques and vintage capital. Section III discusses the impact of transfer of technology. Section IV presents the magnitude of the problems and gives a comparative analysis of developed and developing countries whereas Section V gives a guideline for the developing countries in this scenario. At the end conclusion and solutions are presented.

SECTION II

1. Layers of Techniques and Vintage Capital

An economy having continuous technical advance will be embodying a portion of improving know how in the new investment being undertaken. Investment

of different vintages will work with different efficiencies, and as such may require different amount of various inputs, labour and working stocks to produce a unit of output. At a particular time, we may expect fixed capital equipment of several vintages to be in situ for producing the same commodity. When investment is done in the equipment of the latest technique, the older equipment may also continue production, though by the very nature of things it is likely to be earning lesser returns. The old equipment will go on producing until enough capital of the newer vintages is not accumulated to satisfy total demand for that commodity. In a competitive industry with a free entry, innovators with better techniques would be able to start production units and if the demand does not increase *pari pasu*, they will be able to lower the price there by displacing the requisite number of the most inefficient production units of the commodity from the market. However, a monopolist may delay purposely the introduction of the new process thus giving more time for the older capital equipment to survive economically than would have been otherwise possible.

Thus in a state of technological change we expect to witness a spectrum of technologies of different vintages existing and working simultaneously. We can define the technology associated with 'kth' vintage capacity for the production of the 'jth' commodity as follows.

$C(k_j)$ may denote capacity; $A(k_j)$, and $S(k_j)$ input and working stock per unit of capacity; and $l(k_j)$ labour coefficient.

Further, let $e(k_j) = P_j - wl(k_j) - PA(k_j) - rPS(k_j)$ be the excess left after meeting the prime costs pre unit of output. We may call this excess as 'Residual'. It may be noted that while price (P), wage rate (w), and interest rate can be assumed to be the same for all units irrespective of their vintage or technique of production, the 'residual' is different for each. It is on the value of this residual that the actions of an individual unit depend. When investment is being undertaken in equipment pertaining to a new technology, the expected residual should be large enough to cover not only the interest and depreciation charges, the risk premium etc., but also the profit expectations of the entrepreneurs themselves. It may remembered that this residual is not like a fixed annuity over the physical lifetime of the equipment as will be the case if there is no technological progress and so no obsolescence. In this age advancing technology, the value of this residual should be progressively declining, and an entrepreneur should take this into account while making his investment decision.

However, after installation of fixed capital equipment when it eventually becomes not economically worthwhile to produce with it, it can only fetch its scrap value. Thus its opportunity cost is almost zero. Therefore, in taking decision whether to continue the production process, the unit will not consider whether it can get any returns on the fixed capital by continuing production. It should continue production so long as it can cover the prime cost of production. In other words, a unit will remain in production until its residual is not negative.

Let where $\overline{A}$, $\overline{S}$ and $\overline{L}$ denote the input output, and capital coefficients matrices and labour vector respectively representing the technology of marginal units of each commodity which have their residual zero. For this we should have

$$P = P\overline{A} + w\overline{L} + rP\ \overline{S}$$

Thus given wage rate and interest rate the prices are given by

$$P = w\overline{L}(I - \overline{A} - r\overline{S})^{-1}$$

Let $\overline{X}$ denote the output of these units with marginal techniques, then net output available for final use is $P\left(I - \overline{A}\right)\overline{X}$. $rP\overline{S}\ \overline{X}$ represent interest payments, and $P(I - \overline{A} - r\overline{S})\overline{X}$ the total wage bill of the units with the marginal techniques. Thus given interest rate, the marginal technology determines both price structure as well as the real wage rate in the economy. It can be shown, similarly that given real wage rate the marginal technology will determine the interest rate as well as the price structure. There is one degree of freedom, either wage rate or the interest rate can be independently determined.

The marginal technology itself will determined in such a way that the total savings in the economy are equal to total investment and other autonomous demand. Short term increases in demand will bring less and less efficient technologies into production, thus increasing employment in the economy. These techniques will be economically viable only if the real wage rate and/or the interest rate decreases. This in its turn will increase the residuals of all the units. The saving rate is likely higher from the transitory residual income than from the wage or interest incomes. This redistribution of income in all the working units will, therefore, increase the total savings. Over and above there will be some savings by the income recipiets from the increased production. Thus bringing more and more marginal techniques into production will increase total savings in the economy. Similarly in the opposite case of taking more and more marginal firms out of production will decrease the total savings.

III. TECHNOLOGICAL TRANSFER WITH EMBODIED TECHNOLOGY

In this section an hypothetical example will be presenting for the understanding of the phenomenon of transfer of technology in the context of layers of techniques.

1. Transfer of Most Efficient Technology

Let the most efficient technology of the country be given by the following input-output, labour and capital coefficients

$$\bar{A} = \begin{vmatrix} 0.15 & 0.25 \\ 0.15 & 0.25 \end{vmatrix}, \quad \bar{L} = \begin{vmatrix} 0.4 & 0.15 \end{vmatrix} \quad \text{and} \quad \bar{S} = \begin{vmatrix} 0.0 & 0.0 \\ 1.0 & 2.0 \end{vmatrix}$$

and the least efficient technology by

$$\underline{A} = \begin{vmatrix} 0.15 & 0.25 \\ 0.20 & 0.30 \end{vmatrix}, \quad \underline{L} = \begin{vmatrix} 0.45 & 0.18 \end{vmatrix} \quad \text{and} \quad \underline{S} = \begin{vmatrix} 0.0 & 0.0 \\ 1.25 & 2.25 \end{vmatrix}$$

The prices in the country will be such that the producers by the least efficient technology do not make loss until the output produced by its means in required for use. As with given interest rates the wage demand will be pushed up so much that the residual for these production firms become zero, the price structure is given by the following two questions

$$0.85p^1 = 0.45w + 0.20p^2 + r*1.25\, p^2$$
$$0.70p_2 = 0.18w + 0.25p_1 + r*2.25\, p_2$$

With both prices being one (an assumption of the construction of input-output table), we find that

$r = 10.86$ percent, and $w = 1.14$

If the best technology is transferred to another country, then its price structure condition will be given by following,

Let p_1' ; p_2' and e_1' ; e_2' be the prices and residuals respectively in the recipient country, and wage and interest rates be w' and r'. Then, price equation become

$$0.85p_1 = 0.4w + 0.15\, p_1 + rp_2 + e_1$$
$$0.75p_2 = 0.15w + 0.25p_1 + 2rp_2 + e_2$$

Putting $r = 10.86$, and $w = 1.14$ in terms of first commodity, we get $p_2 = 0.79$ times p_1' and e_2' is equal to zero. That gives residual in the first equation as 0.19 in terms of the first commodity. (If instead we make residual of the first equation as zero, we do not get non-negative solution.) These results will be much sharper if the lower wage rates prevailing in the countries receiving this technological transfer are also take into account.

It is clear from the above, that this country having technological transfer from the old established country will able to sell commodity one to that country at huge profit. This will be still the case even if the cost of transport and trade is of the order 10 percent of the price of that commodities. This advantage will be enhanced if there is a multinational trade involving a third country from where the second commodity can be imported at still cheaper price. The relative efficiency in manufacturing of Japan and West Germany compared with the rest of the world after the war may have something to do with this phenomenon. Even currently, in some cases Japan seems

to have a discriminating monopoly in some markets where foreign price for the good can be different from its price within the country. This can enable to it sell the output of its latest vintage technology in the foreign markets, while keeping the products of its older vintages for its home consumption.

In case of newly developing countries working like off shore processing centres to the developed countries like Hong Kong, Singapore, Taiwan, Korea, Malaysia, etc., quite a few export industries are the effectively the processing units for multinationals. As such they are transferred the latest technology for that part of processing techniques. The economic advantages of this arrangements are obvious.

2. Technological Transfer to the Developing Countries

Ordinarily developing countries are the exporters of the agricultural and mining products and in return import manufactured goods. However, a limit to their development by this route is quickly reached as the availability of land and minerals start forming the bottleneck for further growth. The way forward is progress industrialisation of their economy. This involves the progressive transfer of the production technique of different commodities. This transfer is accompanied by the sale of the relevant capital equipment at the start of the new capacity creation in the developing country and usually the regular sale of some intermediate inputs forwards.

To meet the extra foreign exchange requirements, the industrialising developing countries would be exporting the output of those manufacturing industries to the developed world. This condition impose certain constraints to the price and wage structure of these countries. We shall investigate that below.

We shall also look into the implications of the existence of several layers of techniques in the developed countries for wage price structure in the countries trying to pay the cost of technology transfer by exports of the goods produced by its instrumentality.

Let the activity 1 of the less efficient technique discussed above may be transferred to the developing country. While the developed country's economy is now using only the more efficient one. It may be recalled that the input-output, labour and capital coefficients relating to that technology are given by the following.

$$\bar{A} = \begin{vmatrix} 0.15 & 0.25 \\ 0.15 & 0.25 \end{vmatrix}, \quad \bar{L} = \begin{vmatrix} 0.4 & 0.75 \end{vmatrix} \quad \text{and} \quad \bar{S} = \begin{vmatrix} 0.0 & 0.0 \\ 1.0 & 2.0 \end{vmatrix}$$

Let the price in developing country be p_1 and p_2 respectively, and wage and interest rates be w and r. Then price equations for the two commodities give,

$$0.85p_1 = 0.4w + 0.15\,p_1 + rp_2$$
$$0.75p_2 = 0.15w + 0.25p_1 + 2rp_2$$

Putting p_1 and p_2 equal to 1, gives us w =1.38 and r = 0.15.

Let the price-wage-interest be denoted by underscore symbols in the developing countries. Then, as first commodity is exported from and second is imported in the developing country.

$\underline{p}_1 \le \underline{p}_1(1-t_1)$; and $\underline{p}_2 \ge \underline{p}_2(1-t_2)$ where t_1 and t_2 are the proportionate transport and trade costs of the two commodities respectively.

However, as first commodity is produced an developing country. Its price there should meet its cost of production. Hence, $0.85\underline{p}_1 \le 0.4\underline{w} + 0.15\underline{p}_2 + \underline{r}\underline{p}_2$. This implies that, $0.4\underline{w} + (0.15 + \underline{r})p_2(1+t_2) \le 0.85p_1(1-t_1)$. Assuming t_1= t_2=0.33; $p_1 = p_2$ = 1, this gives, $0.4\underline{w} + 1.33\underline{r} + 0.20 \le 0.43$. This implies that $\underline{w}$ is less than or equal to 0.31w.

Thus the wage rate in the developing country has to be less than one third of that in the developed country, if it chooses to develop by means of technical transfer, and paying for its extra foreign exchange requirements by means of the exports of its manufactures produced by means of this transfer.

However, in many cases the technology transferred to the developing countries is of the older vintage, which is on the way out in the developed country itself. Wage implications for that are more drastic. Below we shall see these implication, in case the technology transferred is not the latest but that just preceding it. Which in our case is the activity one of the Technology II. Its specifications are as follows:

Flow coefficients $= \begin{vmatrix} 0.15 \\ 0.20 \end{vmatrix}$, Capital coefficients $= \begin{vmatrix} 0.0 \\ 1.25 \end{vmatrix}$ and Labour coefficients = 0.45.

Price equation in this case will be

$$0.85\underline{p}_1 \le 0.45\underline{w} + (0.20 + 1.25\underline{r})\underline{p}_2$$

Assuming the interest rate the same as in developed countries, as well as $t_1 = t_2$ = 0.33, we get $0.45\underline{w} + 0.5154 \le 0.5659$ or $\underline{w} \le 0.12$. Thus, in this case, if the country has to export goods produced from the imported modern technology, its wage rate should be less than nine percent of that of developed country.

SECTION IV

1. Magnitude of the Problem

These results have far reaching implications. They signify that developing countries that adopt the strategy of industrialisation via technological transfer and which involves a continuous earning of the foreign exchange by export of their produce cannot increase their wage rate beyond a certain proportion of the wage rate

in the developed countries. In other words they will always remain underdeveloped countries until the time these conditions prevail. Above example are artificial created for pedagogical purposes. To get a feel of the dimensions of the problem involved we give below the wage rates of some countries who have adopted this strategy for development.

Twelve developing countries have been designated as exporters of manufacturers by the World Development Report 1987. Below is given their average wage rate for 1985 as culled from their Census of Manufacture by UNIDO [UNIDO (1987)]. We have also given the information of 7 other countries whose manufacturing exports were more than 30 percent of their total exports, though they do not meet the World Bank criteria of exported manufactures not being of agricultural processing industry including textiles.

Table 1

Average Industrial Wage in Developing Countries 1985

Country	Average Wage(US$)	% of US Average Wage
USA	22694.0	100.0
Developing Countries Classified as Exporters of Manufactures		
Brazil	2050.0	9.0
China	–	–
Hong Kong	4643.0	20.5
Hungary	1381.0	6.1
India	1013.0	4.5
Israel	6922.0	30.5
Poland	1611.0	7.1
Portugal	3405.0	15.0
Republic of Korea	3282.0	14.5
Romania	–	–
Singapore	6777.0	29.9
Yugoslavia	1903.0	8.4
Other Developing Countries Having ≥ 30 Percent Manufacturing Exports		
Bangladesh	539.0	2.9
Greece	5940.0	26.2
Pakistan	1182.0	5.2
Philippines	1357.0	6.0
Turkey	3404.0	15.0
Tunisia	3016.0	13.3
Morocco	2883.0	12.7
Uruguay	2201.0	9.7

Of these 18 developing countries, four namely Greece, Israel, Hong Kong, and Singapore having wage rates between 20 to 30 percent of that of USA. These countries can be supposed to have received the techniques at the frontier in transfer. Many of the new establishments there are run by multinational for the purpose of producing export goods for export to other countries and some times for being imported to their own country after taking advantage of the cheep labour there. In quite a few places their production facility are like that of off shore assembly units [UNIDO (1987), p 45]. Little wonder that these multinationals put up the plants embodying latest technology for the purpose.

Of the remaining nine are having their wage rates less than 10 percent of that of the USA. The technological transfer to them have been largely to exploit their protected markets by the multinationals or purchase of the technology by local entrepreneurs private or public. In such cases, more likely than not, a technology on the verge of obsolescence in the developed country is transferred to the developing country. This gives a new market for its capital goods producing capacity as well as a new lease to the intermediate goods industry associated with it. A developing country has to have a really low wage rate for using such a capacity for export promotion.

Four of the countries that have their wage rates around 15 percent of that USA are around EEC having preferential arrangements with it. Their transport costs etc., are also low. One remaining Republic of Korea may be considered as a genuine intermediate case. It also have quite a few plants of "Off Shore Assembly Unit" type, which account for a large part of the exports.

2. Purchasing Power Parity for Consumption Goods

The above formation also requires that the goods required as inputs in the production of the export commodity and which are produced within the country should be cheep if valued in the international prices. Further with so low wages, the goods required for consumption of the wage labour should also be cheep in international currency, otherwise even survival of human beings at the low wage will become difficult.

To illustrate this, we have given in the Table 2 below the purchasing power parity for consumption goods of manufacture exporting developing countries, as determined by the UN Purchasing Power Project. Results of the project are published in World Product and Income—International Comparisons of Real Gross Project by Kravis, Heston, and Summer (1982); The World Bank (1982). Unfortunately, the study does not give the purchasing power of intermediate goods, and so we to confine the table to consumption goods prices only. However, they have collected massive data regarding this phenomenon, from which we can judge whether the hypothesis formulated above holds.

Table 2

Average Price Indices for Groups of Countries (1975)

	Real Income Group					
	I	II	II	IV	V	VI
Real GDP Per Capita (USA = 100)						
Range	<15	15-30	30-45	45-60	60-90	> 100
Mean	9.01	23.1	37.3	52.4	76.0	100
Price Indices (USA = 100)						
Tradables	60.0	70.0	86.6	97.9	118.5	100
Food	49.8	62.9	68.2	82.2	107.2	100
Bread and Cereals	35.3	56.7	55.0	58.1	97.2	100
Meat	44.4	67.3	72.7	93.2	127.2	100
Coffee, Tea, Cocoa	81.8	118.5	167.7	285.1	192.8	100
Tobacco	73.2	66.2	130.4	78.5	147.8	100
Clothing and Footwear	55.7	59.0	79.8	100.5	126.0	100
Furniture Appliances	77.6	91.4	96.3	94.9	93.8	100
Transport Equipment	168.4	163.5	226.2	162.4	149.1	100
Producers Durables	130.1	105.6	135.8	116.4	125.8	100
Fuel and Power	64.4	82.1	81.9	99.1	151.7	100
Liquid Fuel	123.4	118.4	113.7	166.0	166.5	100
Non Tradables	24.9	37.2	46.5	53.4	96.7	100
Construction	46.0	52.2	72.8	78.5	115.8	100
Services	20.7	34.1	41.2	46.3	94.6	100
Education	11.0	17.7	32.2	38.0	100.7	100
Medical Care	27.5	29.7	35.9	33.2	62.0	100
Total Consumption (including government)	40.1	50.1	59.2	69.1	102.8	100
Non-residential Capital Formation	109.0	95.6	118.7	107.4	131.5	100
Average Industrial Wage Rate	8.4	11.0	26.0	36.9	77.5	100
Average Real Consumption of Industrial Worker	20.9	22.0	43.9	53.3	75.4	100

Source: UNIDO (1987).

Group I countries is only 8.4 percent of that of the USA. Their real wage rate comes to be 21 percent. Similarly for Group II and Group III it is 22 percent and 44 percent respectively instead of eleven and twenty six percent. It may be noted that for Group I and Group II the real wage rate is the same, the apparent difference is completely compensated by higher prices. These groups include not only all 'exporters of manufacturers' but also about 90 to 95 percent of all developing countries. Only a few developing countries depending on high commodity prices are in Group III. In the UN sample. It consisted of only four market economies viz. Mexico, Iran, Uruguay and Ireland. Of these, after the collapse of the commodity prices in eighties, the real wage rate of Mexico, Iran and Uruguay came down to Group II level only. See UNIDO (1987) for 1983 wage rate. Table 3 and Table 4 give the deep insight of this problem.

Table 3

Purchasing Power Parities and Agricultural Output at PPP Rates of Some Developing Countries, 1980

	Local Currency per US $		
		Purchasing Power Parities	
Country	Official Exchange Rate	GDP	Agriculture
Afghanistan	44.10	na	53.37
Algeria	3.84	3.82	23.45
Bangladesh	15.48	2.76	12.89
Benin	211.30	95.63	229.57
Burkina Faso	211.30	137.35	277.77
Cameroon	209.20	200.37	256.18
Chad	211.30	120.40	192.13
Egypt	0.72	0.31	0.58
Gambia	1.75	0.76	1.81
Guinea	18.97	20.46	36.99
Guinea Bissau	33.81	19.88	30.46
Indonesia	627.00	329.99	710.79
Iran	71.58	66.52	154.27
Iraq	0.30	0.19	0.46
Jordan	0.30	0.23	0.50
Malaysia	2.18	1.28	2.63
Mali	211.30	116.09	174.65
Mauritania	45.91	43.00	51.71
Morocco	3.94	2.62	7.51
Mozambique	32.40	9.25	25.53
Niger	211.30	202.95	309.07
Nigeria	0..5	0.59	1.76
Pakistan	9.90	3.28	8.71
Saudi Arabia	3.33	3.84	6.91
Senegal	211.30	137.73	160.59
Sierra Leone	1.05	0.41	1.78
Somalia	6.30	7.48	11.60
Sudan	0.50	0.32	0.67
Suriname	1.79	1.26	2.52
Syria	3.93	1.73	4.87
Togo	211.30	169.15	270.08
Tunisia	0.41	0.28	0.50
Turkey	76.04	44.46	98.36
Uganda	0.07	0.57	0.51
USA	1.00	1.00	1.00
Yemen	4.56	1.64	12.56

Source: Karshenas (2000).

Table 4

Prices of the Cereals in the Some Selected Developing Countries and United States(Local Currency)

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Afghanistan										
Rice Long										
Grain 1kg	–	–	–	2000	2650	–	–	–	–	–
Albania										
Rice Long										
Grain 1kg	–	–	–	–	–	–	–	99.0	86.0	–
Wheat Flour										
White 1kg	–	–	–	–	–	–	–	67.0	66.0	–
Spaghetti 500g	–	–	–	–	–	–	–	110.0	104.0	–
Algeria										
Wheat Flour										
White 1kg	–	–	–	–	–	–	5.71	5.71	–	–
Spaghetti 500g	–	–	–	–	–	–	–	38.2	–	–
Azerbaijan										
Rice Long										
Grain 1kg	–	–	–	–	–	–	–	3240	2452	2874
Wheat Flour										
White 1kg	–	–	–	–	–	–	–	2163	1890	2000
Spaghetti 500g	–	–	–	–	–	–	–	1962	1773	1830
Bahrain										
Rice Long										
Grain 1kg	–	–	–	–	–	–	0.330	0.335	0.320	0.330
Wheat Flour										
White 1kg	–	–	–	–	–	–	0.290	0.283	0.283	0.190
Bangladesh										
Rice Long										
Grain 1kg	–	–	13.50	14.58	17.90	16.48	16.35	21.5	–	–
Wheat Flour										
White 1kg	–	–	10.75	12.35	14.00	15.66	14.50	16.00	–	–
Benin										
Rice Long										
Grain 1kg	–	–	–	–	–	–	–	–	350	400
Wheat Flour										
White 1kg	–	–	–	–	–	–	–	–	300	400
Spaghetti 500g	–	–	–	–	–	–	–	–	300	350
Brunai Darussalam										
Rice Long										
Grain 1kg	–	1.25	–	–	–	–	–	–	–	–
Wheat Flour										
White 1kg		1.05	–	–	–	–	–	–	–	–
Burkina Faso										
Rice Long										
Grain 1kg	–	–	–	–	–	–	–	285	285	246
Wheat Flour										
White 1kg	–	–	–	–	–	–	–	371	371	302
Spaghetti 500g	–	–	–	–	–	–	–	766	766	316

Continued—

Table 4—(*Continued*)

Cameroon										
Rice Long										
Grain 1kg	–	–	155	–	–	–	–	–	–	–
Wheat Flour										
White 1kg	–	–	370	–	–	–	–	–	–	–
Spaghetti 500g	–	–	668	–	–	–	–	–	–	–
Chad										
Rice Long										
Grain 1kg	–	–	–	–	–	–	250	333	256	360
Wheat Flour										
White 1kg	–	–	–	–	–	–	585	559	471	680
Spaghetti 500g	–	–	–	–	–	–	795	650	550	304
Comoros										
Rice Long										
Grain 1kg	–	–	–	–	–	–	500	500	500	–
Wheat Flour										
White 1kg	–	–	–	–	–	–	300	300	300	–
Spaghetti 500g	–	–	–	–	–	–	500	600	600	–
Coste d'Ivoire										
Rice Long										
Grain 1kg	–	–	–	–	–	282	302	–	–	–
Wheat Flour										
White 1kg	–	–	–	–	–	380	385	–	–	–
Spaghetti 500g	–	–	–	–	–	648	663	–	–	–
Egypt										
Rice Long										
Grain 1kg	–	–	–	–	–	–	1.40	1.35	1.43	1.20
Wheat Flour										
White 1kg	–	–	–	–	–	–	1.47	1.33	1.25	1.28
	–	–	–	–	–	–	2.00	2.00	2.00	2.00
Gabon										
Rice Long										
Grain 1kg	626	567	–	–	–	–	–	–	–	–
Wheat Flour										
White 1kg	342	345	–	–	–	–	–	–	–	–
Spaghetti 500g	273	288	–	–	–	–	–	–	–	–
Gambia										
Rice Long										
Grain 1kg	–	–	–	4.42	4.64	–	–	–	–	–
Guinea										
Rice Long										
Grain 1kg	–	–	–	–	–	600	600	–	–	–
Wheat Flour										
White 1kg	–	–	–	–	–	1600	1600	–	–	–
Spaghetti 500g	–	–	–	–	–	600	600	–	–	–
Indonesia										
Rice Long										
Grain 1kg	–	–	–	–	–	–	1192.40	3381.50	2835.00	2624.00
Wheat Flour										
White 1kg	–	–	–	–	–	–	1000.00	3546.42	2544.00	2544.00
Iran										
Rice Long										
Grain 1kg	–	–	–	–	–	–	–	4970.38	6376.82	–
Wheat Flour										
White 1kg	–	–	–	–	–	–	–	2058.36	2586.54	–

Continued—

Table 4—(*Continued*)

Spaghetti 500g	–	–	–	–	–	–	–	1171.51	1415.16	–
Kazakhstan										
Rice Long										
Grain 1kg	–	–	–	–	–	–	72.28	68.77	97.99	107.46
Wheat Flour										
White 1kg	–	–	–	–	–	–	34.00	29.74	40.03	38.33
Spaghetti 500g	–	–	–	–	–	–	39.17	38.70	46.73	46.99
Kuwait										
Rice Long										
Grain 1kg	375	120	120	–	–	–	–	–	–	–
Wheat Flour										
White 1kg	105	92	99	–	–	–	–	–	–	–
Spaghetti 500g	210	208	–	–	–	–	–	–	–	–
Kyrgyzstan										
Rice Long										
Grain 1kg	–	–	–	–	–	–	10.96	11.15	23.64	20.78
Wheat Flour										
White 1kg	–	–	–	–	–	–	6.48	6.36	13.28	13.58
Spaghetti 500g	–	–	–	–	–	–	–	–	–	12.76
Lebanon										
Rice Long										
Grain 1kg	–	–	–	–	–	–	900	1000	1083	1083
Wheat Flour										
White 1kg	–	–	–	–	–	–	1000	975	975	975
Spaghetti 500g	–	–	–	–	–	–	1100	1230	1173	1260
Malaysia										
Rice Long										
Grain 1kg	–	–	–	–	–	–	1.54	1.84	1.82	1.81
Wheat Flour										
White 1kg	–	–	–	–	–	–	1.15	1.44	1.47	1.47
Mali										
Rice Long										
Grain 1kg	–	186	–	–	263	–	–	–	–	–
Wheat Flour										
White 1kg	–	250	–	–	295	–	–	–	–	–
Spaghetti 500g	–	281	–	–	–	–	–	–	–	–
Maldives										
Rice Long										
Grain 1kg	–	3.76	4.29	4.25	4.02	–	–	–	4.62	4.43
Wheat Flour										
White 1kg	–	4.26	4.10	4.28	4.04	–	–	–	–	–
Morocco										
Rice Long										
Grain 1kg	–	–	–	–	–	–	16.00	16.00	13.50	12.00
Wheat Flour										
White 1kg	–	–	–	–	–	–	3.00	3.00	3.15	3.15
Spaghetti 500g	–	–	–	–	–	–	12.00	12.00	12.00	12.00
Mozambique										
Rice Long										
Grain 1kg	1250	1585	–	–	–	–	–	–	–	–
Wheat Flour										
White 1kg	900	2250	–	–	–	–	–	–	–	–

Continued—

Table 4—(*Continued*)

Spaghetti 500g	650	1250	–	–	–	–	–	–	–	–
Niger										
Rice Long										
Grain 1kg	–	–	–	–	600	855		–	–	–
Wheat Flour										
Whole 1kg	–	–	–	–	319	355		–	–	–
Nigeria										
Rice Long										
Grain 1kg	8.62	14.69	17.31	26.77	62.99	–	–	–	–	–
Wheat Flour										
Whole 1kg	3.86	9.14	8.79	9.26	22.74	–	–	–	–	–
Oman										
Rice Long										
Grain 1kg	–	–	–	–	–	–	0.350	0.333	0.350	0.300
Wheat Flour										
White 1kg	–	–	–	–	–	–	0.272	0.272	0.256	0.159
Spaghetti 500g	–	–	–	–	–	–	0.357	0.356	0.366	0.361
Pakistan										
Rice Long										
Grain 1kg	–	–	–	–	–	–	24.05	27.35	30.07	29.59
Wheat Flour										
White 1kg	–	–	–	–	–	–	9.76	9.20	10.18	10.99
Qatar										
Rice Long										
Grain 1kg	–	–	–	–	–	2.55	2.23	3.63	2.09	–
Wheat Flour										
White 1kg	–	–	–	–	–	2.47	2.31	2.50	2.48	–
Spaghetti 500g	–	–	–	–	–	2.51	2.53	2.90	2.75	–
Saudi Arabia										
Rice Long										
Grain 1kg	–	–	–	–	–	–	–	3.51	3.00	–
Wheat Flour										
White 1kg	–	–	–	–	–	–	–	1.70	1.79	–
Senegal										
Rice Long										
Grain 1kg	–	295	1500	6680	6680	225	–	–	–	–
Wheat Flour										
White 1kg	–	275	275	360	30	–	–	–	–	–
Sierra Leone										
Rice Long										
Grain 1kg	–	189.99	210.87	180.00	520.00	–	–	–	–	–
Wheat Flour										
White 1kg	–	139.27	198.95	150.00	1467.00	2000	–	–	–	–
Sudan										
Rice Long										
Grain 1kg	50.00	78.19	–	–	–	–	1545.80	–	–	–
Wheat Flour										
White 1kg	30.00	32.47	–	–	–	–	–	–	–	–
Suriname										
Rice Long										
Grain 1kg	–	–	–	–	325.88	263.11	199.96	258.49	–	–
Wheat Flour										
White 1kg	–	–	–	–	339.52	337.40	278.52	303.33	–	–
Syrian Arab Republic										
Rice Long										
Grain 1kg	–	–	–	–	–	–	25.00	25.00	25.00	25.00

Continued—

Table 4—(*Continued*)

Wheat Flour										
White 1kg	–	–	–	–	–	–	25.00	25.00	25.00	25.00
Spaghetti 500g	–	–	–	–	–	–	20.00	20.00	17.50	17.50
Tajikistan										
Rice Long										
Grain 1kg	–	–	–	–	–	336	355	462	607	–
Wheat Flour										
White 1kg	–	–	–	–	–	484	357	652	–	–
Spaghetti 500g	–	–	–	–	–	115	231	225	278	–
Togo										
Rice Long										
Grain 1kg	–	–	–	–	345	–	–	–	–	–
Spaghetti 500g	–	–	–	–	438	–	–	–	–	–
Tunisia										
Rice Long										
Grain 1kg	–	–	–	–	0.650	0.700	0.700	–	–	–
Wheat Flour										
Whole 1kg	–	–	–	–	0.370	0.380	0.440	–	–	–
Spaghetti 500g	–	–	–	–	0.250	0.270	0.290	–	–	–
Turkey										
Rice Long										
Grain 1kg	–	–	–	–	–	–	236760	464948	693697	1010810
Wheat Flour										
White 1kg	–	–	–	–	–	–	109993	168207	243811	361153
Spaghetti 500g	–	–	–	–	–	–	110000	148333	200000	272500
Uganda										
Rice Long										
Grain 1kg	–	–	800	–	–	–	–	–	–	–
Wheat Flour										
White 1kg	–	–	1000	–	–	–	–	–	–	–
Spaghetti 500g	–	–	4667	–	–	–	–	–	–	–
United Arab Emirates										
Rice Long										
Grain 1kg	–	–	–	–	–	–	2.32	2.29	–	–
Wheat Flour										
White 1kg	–	–	–	–	–	–	1.49	1.09	–	–
Spaghetti 500g	–	–	–	–	–	–	1.95	1.91	–	–
Uzbekistan										
Rice Long										
Grain 1kg	–	–	165.68	5.10	26.13	–	–	–	–	–
Wheat Flour										
White 1kg	–	–	60.00	4.18	15.12	–	–	–	–	–
Spaghetti 500g	–	–	–	6.00	21.00	–	–	–	–	–
Yemen										
Rice Long										
Grain 1kg	–	–	–	–	90	90	–	–	–	–
Wheat Flour										
White 1kg	–	–	–	–	70	70	–	–	–	–
Spaghetti 500g	–	–	–	–	70	70	–	–	–	–
USA										
Rice Long										
Grain 1kg	1.20	1.197	1.091	1.177	1.179	1.224	1.252	1.195	1.13	–
Wheat Flour										
White 1kg	0.507	0.531	0.503	0.511	0.560	0.646	0.648	0.664	0.640	0.640
Spaghetti 500g	0.939	0.929	0.901	0.958	0.908	0.937	0.978	0.987	0.940	0.940

Source: www.Laborsta.com.

Thus we see that in almost all the developing countries the real wage rate is about one-fifth of that in the USA which may just be sufficient to meet the 'necessities' of life (subsistence wage). The prices of 'necessities' are determined by the nominal wage rate or vice versa. Any extra income of these countries is appropriated by the non-wage earnings of local people or foreigners. These nominal differences depend upon the extent of imported inputs in the production of these 'necessities'. Thus if imported fertilisers and fuel are used in the production of foodgrains, the prices of cereals is about 55 percent that of US, if not it is only 35 percent. Nominal wage rates are adjusted accordingly. Thus we see that even after five decades of continuous 'development', most developing countries have not been able to increase the standard of living of their labour force.

We see that the price of consumption goods in the first group is only 40 percent of that of USA. And that of cereals and bread which is the most basic consumption good, it is only 35 percent in this first group. The sample of the first group in the study consisted of India, Pakistan, Sri Lanka, Thailand, Philippines, Kenya, Zambia, and Malawi. Of these India, Pakistan, Philippines are exporters of manufactures based on their low wages.

Here the only compensation for the worker class is to keep the prices of wage goods as low as the worker class can endure. The wage rate is how much lower than the US wage rate, it is out of fantasy. The above debate also demands that the goods required as inputs in the production of the export commodity and which are produced within the country should be cheap valued in the international prices. Further, with so low wages, the goods required for consumption of the wage labour could also be cheap in international currency, otherwise even endurance of human beings at the low wage will be hard [Kravis, *et al.* (1982)].

Table 4 depicts the prices of the rice and wheat almost in some selected developing countries. The correlation coefficient between the wage rate and the price of cereals is positive and also significant. It tells us that for the enhancement of export earnings there is necessary to depress the wage goods beside the low wage rate, and the subsidy from the government is also a policy tool for the achievement of this goal (see Tables 4 and 5).

Further looking at the price relatives of the producer's durables, which are mainly imported in the poor countries, and of simple manufactures which are exports of some of the newly industrialising poor countries, we can surmise that the prices may be about thirty to fifty percent either way for traded goods. This gives an approximate idea of the involved trading and transport costs.

We saw two types of technology transfers. One where the transferring country transfers the most efficient techniques to the recipients. Such was the case to the defeated countries after the second world war. The recipient countries were Japan and West Germany. That enabled them not only to rebuild their shattered economy after the war but unshackled by the burden of the old technology enabled them to go to the economic forefront of the developed nations. There also have been a partial

Table 5

Wages and Labour Cost per Worker of Some Selected Developing Countries and United States

Countries	Minimum Wage ($ per Year)		Labour Cost per Worker in Manufacturing ($ per Year)	
	1980-84	1995-99	1980-84	1995-99
Algeria	–	1340	5242	–
Bangladesh	–	492	556	671
Burkina Faso	695	585	3282	–
Coste d'Ivoire	1246	871	5132	9995
Egypt	343	415	2210	1863
Indonesia	241	–	898	1008
Iran	–	–	9737	–
Iraq	–	–	4624	13288
Jordan	–	–	4643	2082
Kuwait	–	3903	–	10281
Kyrgyzstan	–	–	2287	687
Libya	–	–	8648	21119
Malaysia	–	–	2519	3429
Mali	321	459	2983	–
Morocco	–	1672	2583	3391
Niger	–	–	4074	–
Nigeria	–	300	4812	–
Oman	–	–	–	3099
Pakistan	–	600	1264	–
Saudi Arabia	–	–	9814	–
Senegal	993	848	2828	7754
Sierra Leone	–	–	–	1624
Syria	–	–	2844	4338
Tunisia	1381	1525	3344	3599
Turkey	594	1254	3582	7958
Uganda	–	–	253	–
United Arab Emirates	–	–	6968	–
United States	6006	8056	19103	28907

Source: World Bank (2000) *World Development Indicators*. New York: Oxford University Press.

transfer of efficient technology to some small countries that could become the processor of some labour intensive part of production for the multinationals. That allowed such countries to go quite forward in the race for development ahead of other developing countries, though they seem to be stuck there.

Another type of technological transfer have been that of near obsolete techniques to the developing countries. The economic necessities that imposed in shape of compulsory exports to pay up for the privilege and the debts incurred in the process, compelled these countries to export at any cost. To make that feasible the

wage rates had to be depressed sufficiently, in turn forcing the prices of wage goods to a low level. This implies that modernisation in such cases will not be able proceed to all the sectors.

Thus we see that the techniques of development through technical transfer is not likely to lead to the graduation of the developing countries into 'developed' world. If the transfer provides an opportunity for the industrialised countries to transfer their technologies becoming obsolete in their countries to the developing countries, the wage rate in those countries is hardly likely to increase more than ten percent to that of the industrialised world.

This seems to be the economic law independent of the local institutional framework. Communist countries like Poland, Hungary, Yugoslavia as well as free market economies, having democratic or dictatorial regimes, all seem to be equally constructed by this restriction to growth through this technique of technological transfer, the economic cost of which is to be paid through consequent export creation.

SECTION V

This section in short discusses the behaviour of the developing countries when different layers of techniques are working simultaneously with the different level of efficiencies in the different developing countries. So in this regard it is necessary to discuss the concept of obsolescence in this scenario.

1. Obsolescence

It is consensus among the economists that exploitation of the resources are not allowed at any stage. The same is true for the obsolescence of economic, physical and financial capital. Specifically for the developing countries where they are already in the lack of capital, the economic obsolescence of the resources is not appreciated. It has been observed from the empirical study of the selected developing countries that transfer of technology is one of the main cause of the economic obsolescence of their capital. As it is mentioned above that the objective of these countries is to increase their foreign exchange resources. For the achievement of this objective they tried to increase their exports at the cost of human resources. Ultimately this has the significant negative effect on their economic activities [Azid and Chaudhry (2003)].

The above phenomenon compels the developing countries not to compete themselves in the international market especially when they export to developed world. In this respect there is a significant demand for the cooperation among the developing economies.

Keeping above in view it can be concluded that the economic obsolescence of resources does not appreciated for these countries. The only way for these countries is to use the resources in the strict absence of waste, for the achievement of

cooperation in production and consumption and the realisation of balanced economic growth. This is not the demand of the system to discuss the economic obsolescence but the actual requirement and demand of the system are that a model should be developed which will be helpful in the estimation of the productivity of those firms which are in these economies on the verge of obsolescence and allow them to remain themselves in the market until physical obsolescence.

2. A Step Towards Common Market among the Developing Economies

No one can deny the importance of economic cooperation among developing countries in the 21st century; economic cooperation among the developing countries is the basic condition for the development. We can say it is important for the developing countries to respect all people and strive hard to achieve "power". Power, includes a combination of military, economic and political strengths, which cannot be acquired unless the society possesses a lead in science and technology. Although mankind seeks cooperation, the world is generally characterised by confrontation among nations, civilisations, cultures etc. This confrontation is not always harmful. It could be one of the main driving forces for progress, inventions and new discoveries.

This is the urge of the time that the developing nations to strive to become strong nations. As at present, economic power is the most important element of strength, it is the duty upon all developing countries to strive to achieve this power. Being stable economically would not only make them stronger nations but also contribute towards the protection of their economic, social and political culture.

Since the trends anticipated in the 21st century call for closer economic cooperation in all fields, which include trade, aid, technology and production, it is urged the developing countries to look into alternatives and strive to achieve the goal soon. It can be referred to the European Union as an example, it was not an over night effort to consolidate and work as a united power. It takes years for these countries to come to terms and work as an alliance. It is recommended in the academic discussions that the developing countries to start now, as otherwise their vision of achieving this goal would just be buried off, however small efforts maybe now, will finally see the fruit of these efforts in times to come. In many studies the following recommendations proposed for the further enhancement in the economic cooperation among the developing countries;

(i) Stronger political commitment on behalf of the developing countries needs to be established.
(ii) The existing cooperative institutions in the developing countries should be provided with necessary authority and responsibilities, instead of creating unnecessary new regional institutions.

(iii) Serious steps should be taken toward establishing developing Multinational Companies (MNCs) in specific sectors and production of goods and services should be encourage.

(iv) Plan or layout agreements and treaties such as customs union, free trade area and single market realise gradual economic integration.

(v) With the spread of privatisation and the mounting role of the private sector, give businessmen in the developing countries greater roles to play.

(vi) The concept of regionalism should be established. As developing countries are spread over three continents, regional sub-groupings closer relationships and ties should be encouraged between the sub-groupings to facilitate and strengthen economic cooperation within the developing world.

The world is changing very fast distances and time have greatly diminished. Developing countries should match this change. Great causes push nations to heights that would not otherwise be achieved. Closer economic cooperation and integration among developing countries is such a cause, shall they strive to fulfill it.

Choudhury (1998) explained about the conditions of the developing countries and narrated that Trade became an instrument of competition among the these countries to penetrate northern markets for hard currencies, while the developing regional bloc could not develop its own independent transaction numeraire for managing their trade and development matters and valuing their assets.

In this study, we will try to discuss the hypothesis of layers of techniques in the context of economic cooperation among the developing countries. The above hypothesis stated that in growing economy, layers of techniques with different productive efficiency exist and are employed simultaneously. That what is called a phenomenon of layers of techniques. A successful innovation lowers the variable cost per unit of output and an entrepreneur's decision on whether to continue to production or not is dependent on variable cost per unit of output. The introduction of a new and most efficient technology can cause variable cost per unit of output for the existing technologies to increase (in relative term), forcing the least efficient one(s) to become obsolete. The marginal techniques, the techniques which are on the verge of obsolescence, will determine the price. Technological progress mostly comes about the installation of new equipment, embodying more profitable techniques at the current price structure. If demand is not increasing *pari pasu* with increase in the level of production, the technique which works at the highest cost becomes economically obsolete. Because once capital is installed, its opportunity cost becomes equal to zero. In this mutable economic milieu, a flood of techniques enters in the market, so only that technique can survive which has lower variable cost per unit of output than prevailing price structure. The only remedy for the obsolescence is to increase the demand of that product. The solution is suggested by

the above mentioned model is the mutual co-operation, i.e., to formulate the common market, through which the demand level will be increased and economically obsolete technology again will start to work. Most of the developing countries have not the modern technology to compare with the Western Europe, North America and the Far Eastern developed countries. It is difficult rather impossible for them to compete these nations because of their cost advantage. The only way out for them is to formulate a policy of common market with the other developing countries. Hence the formulation of common market is likely to have an affect on the rate of obsolescence of these economies and their capital can economically survive for a longer spell.

3. Mutual Co-operation

As already pointed out, nearly all the developing countries are not employing the advanced technologies. The survival of the old technology is dependent on the volume of demand. With the formulation of economic integration, the overall demand in this bloc can be increased.

The production of the commodities is organised in two ways. One where immediate demand is met from stocks and production is in response to the stock holders demand for replacing their stocks. These has been designated as Fix-Price commodities as the level of demand does not effect the prices directly. The other group consists of those commodities where production decisions are taken in advance of the known demand and are based on the command resources. This will be mostly the case with natural resource based production such as agriculture, plantations and mining. These have been termed as Flex-Price commodities. For them, in the short period, both supply and demand are given and the changes in prices act as equilibrium force.

Changing in autonomous demand will affect the two types of commodities differently. If autonomous demand decreases, the demand curve of Flex-Price commodities will shift downwards reducing the prices in its turn. For Fix-Price commodities it will imply less orders by stockholders. And they in turn will order from the cheapest (least price) supplies. The fixed capital embodies the technology of the time when it was newly installed and this technology remains almost same up to the equipment embodying it is a scraped.

Almost, all the developing countries are the major producers of agricultural and minerals (primary commodities), whereas primary product market follow mainly the Flex-Price system which relies on variations in prices for keeping demand and supply aligned to one another, both in the short-run and long-run. In the short-run price stability depends crucially on the professional traders willingness to absorb stocks or to release them in response to small variations in the market prices. In the long-run it crucially depends on the correct forecast of future demand sufficiently in advance of creating new capacities, which may be quite a while in natural resource based industries. These conditions, by and large, not been satisfied in the present

century in large price fluctuations in their prices. These price fluctuations are in no way conducive to economic development of the producers, even their well-being is in jeopardy. As a result of economic integration, the demand of their industrial product should be increased. This increase in demand will lead to the survival of that technology which is on the verge of obsolescence as these are following the Fix-Price system. Owing to this a positive cycle will be started, which leads to the increase in prices of the industrial product, in return the level of employment and enhance the demand level.

It can be concluded from the above discussion that one should be interested in both types of firms, i.e., best practice and least efficient. Because, in translating the extra final demand of macro models, the best-practice coefficients will be more useful than the average ones while on the other side the coefficients of least efficient techniques are best for the assessment of the incidence of obsolescence and unemployment, etc.

The preceding analysis points out that the knowledge of both best practice and least efficient coefficient is more essential than the knowledge of average coefficients for disaggregating planning and forecasting as well as for exercising a suitable economic policy. Therefore, the analysis underlines the need for compiling marginal input-output tables referring to the best practice and the least efficient techniques, rather than to the average technique, in order to improve the reliability of input-output estimates.

The data required for the construction of best practice and least efficient matrices are available in the files of the Census of Manufacture, but to analyse them is extremely time and resource consuming. Consequently, before embarking on that, it is possible to have a summary analysis which may go a long way in meeting the need and also indicate whether the detailed analysis will be justified.

On the basis of summary file, the Statistical office may calculate the production cost per unit of output and arrange the establishments in each industry should be divided into as many groups as possible. The groups are to be formed in such a way that the unit cost in each establishment of a group be less than that in any subsequent group.

Moreover, the important characteristics for each group, such as output, total cost, employment, material cost, fuel cost etc., should be tabulated. The tabulation may be further analysed for technological variation, continuity or discontinuity, and the feasibility of fitting algebraic function. Finally, the effect of macro-economic conditions on capacity utilisation, employment, fuel requirements etc., may be elaborated industry and technique wise. For the establishment of the common market a marginal input-output table should be constructed. From this table the technological change can be measured, this table will also depict the coefficients of every region/country of the Muslim bloc and every existing technique, on the bases a policy for autonomous demand can be formulated.

4. Recapitulations

The above analysis presents the policy of the developing world including developing countries for export promotion, ultimately propelling these countries towards adversity and poverty and this is becoming the indispensable predicament of the export promotion. This is because of technological transfer have been that of near obsolete techniques to the developing world. The economic necessities that imposed in shape of compulsory exports to pay up for the privilege and the debts incurred in the process, compelled these countries to export at any cost. To make that feasible the wage rates had to be depressed sufficiently, in turn forcing the prices of wage goods to a low level. This implies that modernisation in such cases will not be able to go on in all the sectors.

From the above thesis one can recapitulate that the developing world should consider the problem of economic obsolescence seriously. A new institutional framework, which is capable of enhancing the efficient economic activities in modern society of these countries, to ensure a better and durable management of the continuous flow of techniques should be established. It is the requirement of the time to construct the table of marginal input-output coefficients for the whole developing world, which depict the different layers of techniques exists in these economies. So this will enable the whole developing block for the further policy formation.

REFERENCES

Aeemoglu, D. (2000) Technical Change, Inequality and Labour Market. Cambridge MA, National Bureau of Economic Research, July. (NBER Working Paper No. 7800.)

Azid, T. (1993) Layers of Techniques, Cost Variability, Obsolescence and Marginal Input-Output Coefficients. Unpublished Ph.D. Thesis, University of Wales, U.K.

Azid, T. (1995) Transfer of Technology: A Mathurian Approach. *Journal of Rural Development and Administration* 27:3, 88–97.

Azid, T. (2002) Layers of Techniques, Marginal Input-Output Coefficients and Phillips Curve. Paper presented in the 14th International Conference on Input-Output Techniques held in Quebec University, Montreal, Canada.

Azid, T. (2001) Moving Equilibrium Model for an Islamic Economy and its Implications on Islamic Common Market. Paper presented at the International Conference on Economic Transition and Change, School of Economics, University Utara Malaysia, Sintok, Malaysia.

Azid, T., and M. Omer Chaudhry (2002) The Role of Subsidies and Controls in the Islamic Republic of Iran. Paper presented at the First International Congress on Iranian Studies, Iranology Foundation, Tehran, Iran.

Azid, T., and M. Omer Chaudhry (2003) International Economic Framework and Its Deleterious Effects on the Development of Muslim Countries. Paper will be

presented in the International Conference on Finance and Development, (Islamic Development Bank), Bahrain.

Bartel, A., and F. Liehtenberg (1987) The Comparative Advantage of Educated Workers in Implementing New Technology. *The Review of Economic and Statistics* 59:1, 1–11.

Bresnahan, T., and M. Trajtenberg (1995) General Purpose Technologies: Engines of Growth. *Journal of Econometrics* 65:1, 83–108.

Carter, A. P. (1970) A Linear Programming System Analysing Embodied Technological Change. In A. P. Carter and A Brody (eds.) *Contributions to Input-Output Analysis*. North Holland Publishing Company.

Choudhury, M. A. (1998) *Reforming in Muslim World*. Kegan Paul International.

De Long, J. B., and L. H. Summers (1993) How Strongly do Developing Countries Benefit from Equipment Investment? *Journal of Monetary Economics* 32, 395–415.

Eaton, and S. Kortum (1999) International Technology Diffusion: Theory and Measurement. *International Economic Review* 40, 537–570.

Galbraith, J. K. (1952) *American Capitalism: The Concept of Countervailing Power*. Boston: Hougton Mifflin.

Hicks, J. R. (1965) *Capital and Growth*. Oxford University Press.

Karshenas, M. (2000) Relative Prices and the International Comparison of Real Agricultural Output and Productivity. *The Journal of Peasant Studies* 27:4, 135–136.

Kravis, I. B., A. Hetson, and R. Summer (1982) *World Product and Income: International Comparisons of Real Gross Product*. John Hopkins University Press.

Kravis, I. B., A. Hetson, and R. Summer (1978) *International Comparisons of Real Produce and Purchasing Power*. John Hopkins University Press.

Kravis, I. B., Z. Kenessey, A. Hetson, and R. Summer (1975) *A System of International Comparisons of Gross Product and Purchasing Power*. John Hopkins University Press.

Leontief, W. W. (1970) The Dynamic Inverse. In A. P. Carter and A Brody (eds.) *Contributions to Input-Output Analysis*. North Holland Publishing Company.

Mathur, P. N. (1977) A Study of Sectoral Prices and Their Movements in British Economy in an Input-Output Framework. In W. Leontief (ed.) *Structure, System and Economic Policy.* Cambridge University Press.

Mathur, P. N. (1989) Price Behaviour with Vintage Capital. Economics Department, University of London, London. (Discussion Paper No. 20.)

Mathur, P. N. (1990) *Why Developing Countries Fail to Develop*. Macmillan.

Mayer, J. (2000) Globalisation, Technology Transfer, and Skill Accumulation in Low-income Countries. Geneva, UNCTAD, August. (Discussion Paper No. 150.)

Mayer, J. (2001) Technology Diffusion, Human Capital and Economic Growth in Developing Countries. UNCTAD. (Discussion Paper No. 154.)

Nelson, R., and E. Phelps (1966) Investment in Humans, Technological Diffusion, and Economic Growth. *American Economic Review* 56, 69–75.

UNCTAD (2000) *The Least Developed Countries 2000 Report*. United Nations.

UNDP (2001) *Human Development Report 2001: Making New Technologies Work for Human Development.* Oxford University Press.

UNIDO (1987) *UNIDO Global Report 1987*.