Note

Trade and Linkages Using Input-Output Approach: An Empirical Investigation of Bangladesh

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Employing a variant of the open-static Leontief model and a 53-sector input-output table, the paper identifies a variant of the key sectors in the Bangladesh economy in terms of trade linkages. The concepts of gross and net linkages are introduced and the analysis is extended to both current (flow) and capital (stock) accounts. On the gross linkage criterion, only a handful of sectors emerge as key sectors with three or more linkages. These sectors are from within the manufacturing and services categories. This is also the case with sectors having two strong linkages. Agricultural sectors do not feature at all. A transition from gross to net linkages changes the rankings quite significantly. Most agricultural sectors show two strong linkages in the flow account. The findings suggest that Bangladeshi export sector is typically undiversified in that it relies heavily on agriculture and related industries, with jute and jute textiles accounting for over 70 percent of net export earnings. Not surprisingly, most sectors in the industrial complex are net importers and the domestic production of industrial goods is highly import-intensive.

1. INTRODUCTION

The nature and extent of intersectoral linkages and the role of international trade in determining such linkages is an issue of great importance for an economy like Bangladesh. The concept of linkages, first explicitly introduced by Hirschman (1958), indicates the degree of structural interdependence in an economy and the extent to which the growth in one sector stimulates expansion in the others. Since the pioneering study by Rasmussen (1956), a number of studies have measured intersectoral linkages; some of these have employed the concepts of gross and net linkages (the former defined on the basis of the inverse of the Leontief matrix while the latter on the domestic, i.e., net of imports inverse matrix) to identify sectoral potentials to induce development [see for example, Hazari (1970); Hazari and Krishnamurty (1970); Schultz (1976); Acharya and Hazari (1971); Yotopoulos and Nugent (1973); Alauddin (1986)]. The concept of linkages can also be employed to

study some of the interactions of trade and development.[1] The impact of linkages and trade provides insights into the pattern of development in a country, especially on the role of the export sector in providing the necessary stimuli through forward and backward linkages. Such intersectoral stimuli can provide a significant fovourable impact on the expansion of output in other sectors. The issue assumes greater significance in developing countries, including Bangladesh, where the export sector is traditionally dominated by primary commodities.[2] In these countries, it is sometimes contended that the overwhelming dominance of the export sector by traditional commodities may produce "technological fossilisation" without having much impact of trade on domestic production possibilities and technology [Myint (1968); Kindleberger (1965)]. Such interaction between linkages and trade can be conveniently examined using the input-output framework [see, for example, Hazari and Kingma (1976)].

The present paper employs input-output analysis to investigate the existing intersectoral linkages and their implications for the export sector of the Bangladesh economy. For this purpose, the concept of sectoral net foreign exchange earnings has been employed for the first time in the Bangladeshi context. These are computed to identify the net contribution of each sector on the basis of total (direct and indirect) imports. Such net earnings, rather than the gross export value, provide a more realistic measure of the sectoral contribution to export earnings and the import-dependence of a particular sector. We proceed first with the analytical framework. This is followed by a brief discussion of the data sources. Empirical results are presented and discussed in the subsequent section. Some policy issues are raised in the concluding section.

2. ANALYTICAL FRAMEWORK

Within the input-output framework, forward and backward linkages can be measured in terms of the Leontief inverse matrix.

Define

$$B \quad = \quad (I - A)^{-1} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (1)$$

$$\text{and} \quad C \quad = \quad (K)\,(I - A)^{-1} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (2)$$

[1]The classical case for interaction rests on the comparative advantage theory, while dynamic and other considerations have led to a substantial modification of the theory over the years. For a useful survey of the literature, see Meier (1968); Bhagwati (1964, 1968); Greenaway (1987).

[2]According to Hirschman's definition, a key sector is one that has high forward and backward linkages. Thus, a sector with $U_{.j}$, $U_{i.} > 1$ can be taken as a key sector in the Hirschman sense. However, Hirschman does not distinguish between the flow and capital accounts as done in the present paper. See Hirschman (1958).

the elements of which can be used to reveal the structure of the economy and individual sectors. A and K respectively represent an $n \times n$ matrix of technical coefficients and an $n \times n$ diagonal matrix of capital coefficients. The elements of B provide measures of linkages on the "flow account", while those of C can be used to measure interdependence on the "capital account".

Letting $B_{ij}s$ and $C_{ij}s$ denote elements of B and C respectively, the indices on the flow account can then be defined as

$$U_{.j}^{F} = ((1/n) \sum_{i} B_{ij} / ((1/n^2) \sum_{i} \sum_{j} B_{ij}) \qquad \ldots \qquad \ldots \qquad \ldots \qquad (3)$$

and $\quad U_{i.}^{F} = ((1/n) \sum_{j} B_{ij} / ((1/n^2) \sum_{i} \sum_{j} B_{ij}) \qquad \ldots \qquad \ldots \qquad \ldots \qquad (4)$

while those on the capital account are given by

$$U_{.j}^{C} = ((1/n) \sum_{i} C_{ij} / ((1/n^2) \sum_{i} \sum_{j} C_{ij}) \qquad \ldots \qquad \ldots \qquad \ldots \qquad (5)$$

and $\quad U_{j}^{C} .= ((1/n) \sum_{j} C_{ij} / ((1/n^2) \sum_{i} \sum_{j} C_{ij}) \qquad \ldots \qquad \ldots \qquad \ldots \qquad (6)$

The indices given in (3)–(6) are consistent with the measures of backward and forward linkages as defined by Hirschman (1958). Recalling the interpretation of the averages in (7) and (8), $U_{.j} > 1$ implies that sector j draws heavily (relative to the system in general) on the system of sectors, i.e., sector j has relatively strong backward linkages (either on the flow or the capital account). On the other hand, $U_{.j} < 1$ would indicate relatively weak backward linkage. Similarly, $U_{i.} > 1$ implies that sector i would relatively need to increase its output more than the system of sectors in general for a proportionate increase in demand, i.e., an increase distributed according to the prevailing distribution of final demand. A converse interpretation can be given to the case when $U_{i.} < 1$ is true.

The above indices of backward and forward linkages are derived from the total inverse, B, in which the elements of A matrix contain imported inputs and can be called gross linkages [Acharya and Hazari (1971); Alauddin (1986)]. However, in order to get domestic linkages which are net of imports, such indices may be computed on the basis of the domestic technology matrix. However, the input-output tables of many countries (e.g., Bangladesh) do not contain domestic input coefficients, with the imports shown separately, due to data limitations. In the absence of separate information on imported inputs, the following methodology may be applied. The balance equation of the input-output model can be written as

$$X = AX + F - M \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (7)$$

where X and F are vectors of gross output and final demand respectively, and M is

the diagonal matrix of impact coefficients.

In the absence of information regarding the intersectoral distribution of imports, the import coefficient matrix can be derived from the assumption of the existence of a proportionality relationship between imports and gross domestic output [see Alauddin (1986); Acharya and Hazari (1971); Hazari (1967)]. In that case, the elements of M matrix would be given by:

$$M_{ii} = M_{ii} / X_i \qquad\qquad i = 1, ...n \qquad ... \qquad ... \qquad ... \qquad (8)$$

From (8) and (9) one can derive

$$X = (I - A + M)^{-1} F \qquad ... \qquad ... \qquad ... \qquad ... \qquad ... \qquad (9)$$

It is then possible to define

$$B^1 = (I - A + M)^{-1} \qquad ... \qquad ... \qquad ... \qquad ... \qquad ... \qquad (10)$$

$$\text{and } C^1 = (K) (I - A + M)^{-1} \qquad ... \qquad ... \qquad ... \qquad ... \qquad (11)$$

and compute indices $U^{F1}_{.j}$, $U^{F1}_{i.}$, $U^{C1}_{.j}$ and $U^{C1}_{i.}$ as before. The inverse in (10) and (11) now refer to domestic inverse and the resulting linkages may be termed as net linkages.

Note, however, that the above gross and net linkages, both backward and forward, are unweighted averages, and as such may be sensitive to the presence of some extreme values, and need to be supplemented with indices variability [for details, see Alauddin (1986)] defined as:

$$V^F_{.j} = \sqrt{ (\frac{1}{n - 1}) \sum_i (B_{ij} - (1/n)\sum_i B_{ij})^2 / ((1/n) \sum_i B_{ij}) } \qquad ... \qquad ... \qquad (12)$$

and

$$V^F_{.i} = \sqrt{ ((1/n - 1) \sum_j (B_{ij} - (1/n)\sum_j B_{ij})^2) / ((1/n) \sum_j B_{ij}) } \qquad ... \qquad ... \qquad (13)$$

Similar measures, $V^c_{.j}$ and $V^c_{.i}$ for the capital account and for the net linkages can also be constructed. A low $V_{.j}$ (or $V_{.i}$) on either the flow or the capital account would indicate that the jth (or ith sector draws evenly from a large number of sectors, and vice versa.

On the basis of the strength of the linkages as defined above, it is possible to identify the key or leading sectors. However, various combinations of the alternative linkages can be formed, and which particular combination would be chosen to define the leading sectors would rest on the decision-making criteria of the policy-

makers and the socio-economic characteristics of the country concerned. In the present paper, a purely technological approach is taken in defining a key sector.[3] A sector would be identified as a key sector in which, for some specified combination of linkages, the appropriate U-values are greater than unity.

The sectoral contribution to foreign exchange earnings through exports is usually examined in terms of the gross export value of a particular sector. This does not reflect the net earnings of the sector since the total (direct and indirect) imports of the sector are not considered. Within the input-output framework, it is possible to examine net earners and losers of foreign exchange on a sectoral basis. One can derive

$$P = (M) \ (I - A + M)^{-1} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (14)$$

Equation (14) shows the direct and indirect import requirements. Net earnings of foreign exchange through exports of the *j*th sector can be defined as

$$N_j = E_j - \sum_i P_{ij} \ F_j \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (15)$$

Sectors with $N_j > 0$ can be interpreted as net earners of foreign exchange while $N_j < 0$ would imply net losers (net importers).

3. THE DATA

The empirical analysis of the paper uses the *latest available 53-sector input-output table of the Bangladesh economy* [BPC (1990)]. The data contained therein relate to the fiscal year 1981-82. We must emphasise that the data are dated and one might argue that the analysis may not have much relevance to the current situation as some structural change may have taken place since the construction of this input-output table. For instance, during 1981-82, five traditional export items–jute, jute goods, tea, frozen fish, and leather accounted for more than 87 percent of total Bangladeshi exports, of which the share of jute and jute goods was 63 percent. However, in recent years, ready-made garments have emerged as one of the most important export commodities. As of 1989-90, ready-made garments accounted for nearly 40 percent while the share of the above five traditional items was 53 percent of total exports. Furthermore, it is well-known that many conceptual difficulties and statistical pitfalls surround the derivation and use of input-output coefficients and

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[3]According to Hirschman's definition, a key sector is one that has high forward and backward linkages. Thus, a sector with $U_{.j}$, $U_{i.} > 1$ can be taken as a key sector in the Hirschman sense. However, Hirschman does not distinguish between the flow and capital accounts as done in the present paper. See Hirschman (1958).

capital-output ratios [see, for example, Harcourt (1972)]. Nevertheless, given the unavailability of more recent data, we have little choice but to use the currently available input-output matrix, keeping the limitations in mind. The data on sectoral output, final demand, capital coefficients, exports, and imports are presented in Appendix Table 1.

4. EMPIRICAL RESULTS

Gross Linkages

Using the above data and employing Equations (11)–(14), gross linkages for the flow and capital accounts for all the 53 sectors have been calculated. The measures of variability for the corresponding indices are also calculated. Table 1 provides the results, showing sectors with three or more strong gross linkages (U's greater than unity) alongwith their strengths. Chemicals, petroleum products, machinery, other industry, and transport services are the sectors with four strong gross linkages in the economy. Of these, petroleum products seem to have very high gross backward linkages in both the flow and capital accounts, and gross forward linkage in the flow account. None of the agricultural sectors has three or more strong gross linkages. Excepting electricity and transport service, all the sectors having three or more strong gross linkages belong to the industrial sector. Petroleum products and electricity have very strong gross backward linkage; petroleum products and steel and basic metals also have strong gross forward linkage in the flow account.

Table 2 presents the sectors with two strong gross linkages on the flow and capital accounts alongwith their respective strengths. It can be seen that trade services are the only sector having very strong gross forward linkages on both the flow and capital accounts. Sectors having strong gross backward linkages on both accounts include industrial sectors like mill-made cloth, jute textiles, paper, pharmaceuticals, metal products, and two construction sectors–urban housebuilding and other construction. Sectors like gas, housing service, public administration, and banking and insurance have strong backward and forward linkages on the capital account only. Again, none of the agricultural sectors emerge as having two strong gross linkages.

Net Linkages

However, the results undergo a substantial change if we consider domestic linkages as measured by net linkages. The sectors having three or more net linkages in the Bangladesh economy are presented in Table 3. A comparison of Tables 1 and 3 reveals that all the industrial sectors, except other industry, which showed three or more strong gross linkages, fails to show such net linkages. Most of the service sectors–transport, housing, health, public administration, banking and insurance,

Table 1

Sectors with Three or More Strong Gross Linkages:
Bangladesh Economy, 1981-82

Serial Number and Name of Sector	Strength of Linkage[a]			
	Flow Account		Capital Account	
	Backward	Forward	Backward	Forward
29 Chemical Fertilizer	1.037 (0.680)	--	1.706 (1.120)	1.502 (1.185)
31 Chemicals	1.141 (0.766)	1.452 (0.653)	1.175 (0.975)	1.765 (0.783)
32 Petroleum Products	3.343 (2.434)	11.662 (1.484)	1.967 (1.699)	5.576 (1.115)
33 Cement	--	1.334 (0.675)	1.215 (1.168)	2.413 (0.987)
34 Steel and Basic Metal	1.635 (0.903)	2.228 (0.793)	1.522 (0.752)	--
36 Machinery	1.121 (0.731)	1.316 (0.628)	1.210 (0.852)	1.492 (0.727)
40 Other Industry	1.279 (0.735)	1.504 (0.634)	1.187 (0.662)	1.231 (0.623)
44 Electricity	2.529 (1.600)	--	5.273 (2.832)	6.732 (2.468)
47 Transport Service	1.304 (1.010)	1.161 (0.611)	1.482 (1.316)	2.462 (0.968)

[a]Figures in parentheses represent the estimated indices of variability.

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Table 2

Sectors with Two Strong Gross Linkages:
Bangladesh Economy, 1981-82

Serial Number and Name of Sector	Strength of Linkage[a]			
	Flow Account		Capital Account	
	Backward	Forward	Backward	Forward
A. Two Forward Linkages				
46 Trade Services	–	4.728 (0.386)	–	5.625 (0.457)
B. Two Backward Linkages				
23 Cloth: Mill-made	1.312 (0.700)	–	1.036 (0.531)	–
26 Jute Textiles	1.143 (0.735)	–	1.043 (0.634)	–
27 Paper	2.270 (1.045)	–	1.849 (0.873)	–
30 Pharmaceuticals	1.189 (0.717)	–	1.313 (0.888)	–
35 Metal Products	1.197 (0.735)	–	1.166 (0.700)	–
41 Urban Housebuilding	1.635 (0.676)	–	1.185 (0.509)	–
43 Other Construction	1.529 (0.678)	–	1.101 (0.481)	–
C. One Backward, One Forward Linkage				
45 Gas	–	–	2.761 (2.657)	3.941 (2.234)
48 Housing Service	–	–	3.407 (2.956)	3.250 (3.055)
51 Public Administration	–	–	1.391 (1.539)	1.441 (1.514)
52 Banking and Insurance	–	–	1.513 (1.844)	2.581 (1.403)

[a]Figures in parentheses indicate the estimated indices of variability.

Table 3

Sectors with Three or More Strong Net Linkages:
Bangladesh Economy, 1981-82

Serial Number and Name of Sector	Strength of Linkage[a]			
	Flow Account		Capital Account	
	Backward	Forward	Backward	Forward
40 Other Industry	1.078	1.558	–	1.086
	(0.690)	(0.601)		(0.661)
44 Electricity	1.363	1.269	6.923	9.022
	(0.884)	(0.879)	(3.197)	(2.738)
45 Gas	–	1.011	4.499	5.489
		(0.899)	(2.736)	(2.429)
47 Transport Service	1.066	1.689	1.687	3.053
	(0.901)	(0.703)	(1.523)	(1.127)
48 Housing Service	1.065	–	5.543	5.451
	(0.875)		(3.051)	(3.029)
49 Health Service	1.181	–	1.547	1.185
	(0.829)		(1.245)	(1.440)
51 Public Administration	1.035	1.017	2.054	2.236
	(0.895)	(0.906)	(1.654)	(1.574)
52 Banking and Insurance	–	1.170	2.427	3.250
		(0.828)	(1.901)	(1.618)
53 Other Service	–	1.050	1.504	1.865
		(0.882)	(1.544)	(1.381)

[a] Figures in parentheses indicate the estimated indices of variability.

other services–now emerge as having strong net linkages. The energy sector also reveals strong domestic linkages. The sectors with two strong net linkages are given in Table 4. Chemicals and trade services have strong net forward linkages on both the flow and capital accounts. In the case of two net backward linkages, jute textiles, paper, and pharmaceuticals have values exceeding unity. It may be mentioned that these sectors also revealed two strong gross backward linkages (Table 2). In the case of domestic linkages, some of the important agricultural sectors–rice, jute, sugar-cane, livestock, forestry–emerge with strong backward and forward values on the flow account. It is interesting enough to note that two important social sectors–health and education–emerge as the key sectors, revealing the importance of human resource development in the development process of the country. This provides the evidence that the development of human resources in itself can provide important impetus to development efforts in Bangladesh through strong backward and forward linkages.

In general, the transition from gross to net linkages leads to a significant divergence in the rankings of sectors in terms of the measure of strengths. Non-agri-cultural, specially industrial sectors, rank high on gross linkages while service sectors (including a few agricultural and industrial sectors) emerge as key sectors on the net linkage criterion. The output linkages of most of the agricultural sectors are relatively weak for two reasons: First, the bulk of the agricultural products are destined for final consumption, and, secondly, since much of agriculture is still dominated by traditional technology which requires minimum inputs from the other sectors, the intersectoral linkages are weak. However, strong net backward and forward linkages for major agricultural sectors like rice, jute, sugarcane, and for non-crop sectors like livestock and forestry, have become evident due to rapid expansion of modern technology. The industrial sectors, though they have revealed high gross linkages especially due to their high import-intensity, do not feature so prominently in terms of net linkages. One important example is the case of petrole-um products which has very strong gross linkages but weak net linkages due to its high import-intensity. A similar picture emerges in case of most of the other indus-tries, except for several agro-based industries like jute textiles, paper, pharmaceuti-cals, and other industries. On the other hand, the services sectors, including the energy and construction sectors, emerge prominently in terms of both gross and net linkages. It seems that these sectors, providing necessary inputs for production and processing of agricultural and industrial output, have developed important intersec-toral dependency and provide necessary technological stimuli for inducing develop-ment in the Bangladesh economy. However, it is necessary to recognise that while the output of many of these sectors (e.g., electricity, gas, etc.) may appear as impor-tant constraints to the expansion of output in the other sectors, the production of many of the other sectors (e.g., trade and transport services) crucially depends on

Table 4

Sectors with Two Strong Net Linkages:
Bangladesh Economy, 1981-82

Sector Number and Name of Sector	Strength of Linkage[a]			
	Flow Account		Capital Account	
	Backward	Forward	Backward	Forward
A. Two Forward Linkages				
31 Chemicals	–	1.111 (0.557)	–	1.151 (0.723)
46 Trade Service	–	4.341 (0.477)	–	4.403 (0.600)
B. Two Backward Linkages				
26 Jute Textiles	1.485 (0.793)	–	1.303 (0.736)	–
27 Paper	1.857 (0.776)	–	1.486 (0.777)	–
30 Pharmaceuticals	1.197 (0.706)	–	1.247 (0.860)	–
C. One Backward, One Forward Linkage				
01 Rice	1.051 (0.929)	1.183 (0.880)	–	–
04 Jute	1.102 (0.865)	1.198 (0.882)	–	–
05 Sugarcane	1.023 (0.893)	1.177 (0.895)	–	–
15 Livestock	1.078 (0.849)	1.876 (0.687)	–	–
17 Forestry	1.025 (0.949)	2.691 (0.761)	–	–
43 Other Construction	1.331 (0.796)	1.149 (0.842)	–	–
50 Education Service	–	–	1.204 (1.378)	1.154 (1.431)

[a]Figures in parentheses indicate the estimated indices of variability.

the level of production in the agricultural and industrial sectors.

The results above seem strikingly similar to those found by Alauddin (1986). For instance, the agricultural sectors did not feature prominently in terms of gross linkages but they did so on the net linkage criterion. However, the perspectives of the Alauddin (1986) and the present paper are different. The former paper identified key output and employment sectors using the 47-sector input-output table of the Bangladesh economy for 1967-77 and did not examine the strength of trade linkages, while the present paper does both, using the input-output table for a later year. In an earlier study, Alauddin and Mules (1980), using a 33-sector input-output table for 1972-73, found very little evidence of any strong structural interdependence between agriculture and the rest of the Bangladesh economy. Significant changes in inter-sectoral linkages, do not seem to have taken place between 1972-73 and 1981-82.

Net Exporting and Importing Sectors

Table 5 shows the results of the sectoral net earnings of foreign exchange in terms of two types of sectors: net exporting sectors and net importing sectors–as derived by using Equation (15). During 1981-82, out of a total of 28 exporting sectors, only 6 sectors emerged as net exporting sectors. This highlights the lack of diversity in the export trade of Bangladesh. In both actual and net exports, jute textiles alone account for more than 53 percent and 61 percent, respectively, of the total. In the net exporting category, all the sectors have strong net backward linkages in the flow account; but other linkages, both in the gross and net cases, are not strong except for jute textiles; jute and leather in a few cases. This reveals some inherent weaknesses of the export sector of the country: concentration on a few commodities, low degree of intersectoral linkages, and high import-content of commodities exported by most of the sectors.

In the case of imports, the input-output table records 31 importing sectors out of 53 sectors during 1981-82. The total number of net importing sectors stands at 29 (except tea and leather). Of the 13 major net importing sectors, only chemicals and other industry have two or more strong net linkages while chemical fertilizer, chemicals, petroleum products, cement, steel and basic metals, metal products, machinery, and other industry have two or more strong gross linkages. The analysis shows that many of the sectors which are exporters yet become net losers of foreign exchange. This is due to the fact that either the final demand of the sectors and/or the import coefficients are very high. It is interesting to note that most of the sectors in the manufacturing industry fall into the category of net importers, revealing their high import-dependence. An examination of the input structure of the manufacturing sectors in the input-output table shows a pattern which is biased towards imports. This is also reflected in the high gross linkages in general for these sectors, but also

Table 5

Major Net Exporting and Net Importing Sectors in Bangladesh, 1981-82

Net Exporting Sectors			Net Importing Sectors		
Serial Number and Name of Sector	Percentage Share in Actual Exports in 1981-82	Percentage Share in Net Exports in 1981-82	Serial Number and Name of Sector	Percentage Share in Actual Imports in 1981-82	Percentage Share in Net Imports in 1981-82
04 Jute	16.13	18.47	02 Wheat	9.29	6.43
13 Tea	6.07	6.94	06 Cotton	3.38	3.21
16 Fish	8.47	9.69	19 Edible Oil	2.76	3.38
26 Jute Textiles	53.39	61.04	23 Mill-made Cloth	1.42	1.96
28 Leather and Leather Products	10.06	11.50	29 Chemical Fertilizer	4.88	3.08
			31 Chemicals	5.32	5.75
			32 Petroleum Products	21.27	19.11
			33 Cement	1.52	2.78
			34 Steel and Basic Metal	12.76	12.36
			35 Metal Products	5.77	5.74
			36 Machinery	11.85	16.60
			37 Transport Equipment	5.19	6.72
			40 Other Industry	5.83	5.21
Number of Sectors Shown in the Table	5		Number of Sectors Shown in the Table	13	
Total Number of Net Exporting Sectors	6		Total Number of Net Importing Sectors	29	

in relatively low net (domestic) linkages. The existing industrialisation process in Bangladesh remains highly import-dependent. In contrast, the energy and services sectors appear to emerge as major linkage sectors, and this is especially evident in the case of net linkages. This suggests that the present growth process in Bangladesh would lead to relatively greater expansion of the tertiary sectors in the economy. While this is an inevitable consequence of the present development process in an LDC like Bangladesh, where such sectors receive greater impetus for expansion, the relative stagnation of the primary and secondary sectors (especially agriculture and the manufacturing industry) is a cause of concern. The absence of strong intersectoral linkages in a technical sense is one of the reasons for such an emerging pattern of development.

5. CONCLUDING REMARKS

The findings of the paper reveal the extent of sectoral linkages in the Bangladesh economy. The distinction between the gross and the net linkages seems important for an import-dependent economy like Bangladesh, suggesting significant differences in sectoral rankings on the basis of the two criteria. The results also suggest that in most of the primary sectors, especially in agriculture, strong linkages are absent and this reveals a weak technological position of agriculture in the existing development process. Despite the overwhelming importance of agriculture in national output and employment, and its significant contribution to export earnings, the strategies and policies pursued so far have failed to place t e sector in the leading role in a technological sense.

In the case of exports, the contribution of agriculture (including forestry, fishery, and livestock) amounted to about 33 percent during 1981-82. However, of the seventeen agricultural sectors only rice, jute, sugarcane, livestock, and forestry have more than one strong linkages. The results of net exports in the paper suggest that about 35 percent of total net exports originate in the primary sectors (jute, tea, and fish), of which only jute reveals more than one net linkages while others are characterised by low linkage effects. Jute textiles is the single largest contributor to net foreign exchange earnings, with more than 61 percent in 1981-82. While this suggests a lack of diversification of the export trade in the country, it also reveals the weak link between trade and intersectoral linkages prevailing in the country.

The interaction between the traditional pattern of export trade and the existing strong backward and forward linkages is weakly evident in the analysis presented in the paper. Of course, it should be emphasised here that when exports are dominated by a single commodity or by very few commodities, then the potential for such interaction becomes very limited. It becomes evident, therefore, that the realisation of the full potential of trade requires not only a diversification of the export trade, but

also the creation of strong linkages between the export sector and the rest of the domestic economy. In the case of Bangladesh, this requires a policy of generating adequate linkages with the agriculture sector, which dominates the economy. However, the translation into reality of the potential of the agriculture sector involves important issues concerning technological as well as institutional innovations. The persistence of the existing weak linkages in the case of critical sectors in the Bangladesh economy would make it difficult to achieve the output and employment potential needed to generate and sustain an accelerated pace of development.

Finally, we would like to emphasise that the data bases are dated, and so the conclusions may not strictly apply to the 1992 situation. To the extent that any significant structural changes have taken place, these conclusions may need modification. Nevertheless, the study identifies areas where deficiencies obtain and further improvements are warranted in the structural interdependencies in the export sector of Bangladesh.

Appendix Table 1

Sectors, Codes, Gross Output, Total Final Demand, Exports, Imports, and Capital Coefficients in the Bangladesh Economy, 1981-82

(In Million Taka)

Sector Classification	Code	Gross Output	Final Demand	Exports	Imports	Capital Coefficient
01 Rice	RICE	79145.53	72670.52	117.84	921.84	1.0042
02 Wheat	WHEAT	4088.52	8286.67	–	4789.56	1.0090
03 Coarse Grains	CGRAIN	154.10	90.25	–	13.57	0.7975
04 Jute	JUTE	4297.67	1229.20	2024.04	–	0.4614
05 Sugarcane	SCANE	3439.23	553.93	–	–	0.2249
06 Cotton	COTTON	24.61	208.78	8.58	1703.40	0.4185
07 Tobacco	TOBACCO	669.53	65.89	21.06	53.99	0.3403
08 Potato	POTATO	1575.14	1469.49	–	–	0.2892
09 Other Vegetables	OVEGE	1129.63	1504.36	16.83	223.75	0.2418
10 Pulses	PULSES	1847.39	1812.88	–	–	0.5552
11 Oilseeds	OLSEED	1502.99	0.84	–	100.20	0.2939
12 Fruit	FRUIT	7602.72	8056.78	1.58	212.22	0.2097
13 Tea	TEA	1618.68	1607.42	761.52	0.87	1.0775
14 Other Crops	OCROPS	3923.14	4239.98	25.43	154.24	0.1754
15 Livestock	LSTOCK	20756.14	11500.61	100.82	988.17	0.1279
16 Fish	FISH	10573.66	10393.15	1062.12	–	0.9299
17 Forestry	FOREST	8883.08	980.72	0.91	–	0.2451
18 Other Food	OFOOD	9710.48	9654.86	0.32	87.29	0.1588
19 Edible Oil	EOIL	2774.70	5475.35	31.54	1422.84	0.1727
20 Sugar and Gur	SUGAR	6516.06	7033.13	2.55	441.29	0.2252
21 Salt	SALT	1490.72	1011.11	–	–	0.0314
22 Yarn	YARN	2891.60	216.38	4.25	541.08	0.7497
23 Cloth: Mill-made	CMLMDE	744.25	2073.87	7.40	729.60	0.6786
24 Cloth: Handloom	CHAND	6643.98	6319.67	–	–	0.2795
25 Readymade Garments	RGARM	171.03	689.14	140.14	246.91	0.3961

Continued–

Appendix Table 1–(*Continued*)

26 Jute Textiles	JTEXT	7655.20	7008.69	5851.68	–	0.9731
27 Paper	PAPER	1985.74	1490.68	120.44	623.03	1.3300
28 Leather and Leather Products	LEATHER	2035.02	1746.41	1262.52	1.65	0.2541
29 Chemical Fertilizer	FERT	1445.31	0.64	–	2104.20	2.4311
30 Pharmaceuticals	PHARM	2450.85	3467.17	11.38	734.50	1.4758
31 Chemicals	CHEMS	3773.76	4355.93	9.60	2744.49	1.4370
32 Petroleum Products	PETRO	7091.91	4953.10	849.90	10961.88	0.5653
33 Cement	CEMENT	580.77	–153.70	–	781.56	2.1392
34 Steel and Basic Metals	STEEL	4202.00	716.19	–	6578.12	0.4690
35 Metal Products	METALP	2207.10	4462.35	3.20	2973.38	1.0456
36 Machinery	MACHIN	1892.38	11662.10	41.62	5697.06	1.3399
37 Transport Equipment	TREQP	1074.21	4676.86	27.83	2675.22	1.1460
38 Wood and Wood Products	WOOD	1909.05	860.86	–	27.91	0.1765
39 Tobacco Products	TPROD	3603.00	3611.01	0.01	3.85	0.1689
40 Other Industry	OINDS	8166.12	5536.69	49.93	3005.21	0.9673
41 Urban Housebuilding	URBHSE	8845.40	7306.71	–	–	0.0819
42 Rural Housebuilding	RURHSE	10616.84	6809.41	–	–	0.0316
43 Other Construction	OCONS	12055.32	9430.16	–	–	0.0503
44 Electricity	ELEC	2273.96	404.61	–	–	9.8639
45 Gas	GAS	846.65	146.97	–	–	7.5283
46 Trade	TRADE	32848.30	–	–	–	1.4066
47 Transport	TRANS	34045.87	24752.88	–	–	2.5073
48 Housing Service	HSERV	32769.79	32769.79	–	–	9.3332
49 Health Service	HELSRV	2906.91	2882.17	–	–	2.0180
50 Education Service	EDU	6469.53	6469.53	–	–	1.9763
51 Public Administration	PUBAD	13069.99	11803.58	–	–	3.0474
52 Banking and Insurance	BANK	4995.32	2639.53	–	–	3.8533
53 Professional and Other Service	OTHSERV	15618.43	13929.90	–	–	2.4626

Source: [BPC (1990), pp. 7, 16–26.]

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