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Role of Construction Sector in National Economy - A Study of India and Vietnam

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1. Introduction

Construction sector is an important part of every economy. It is more so of developing countries like India and Vietnam. In this paper we focus on some macro features of construction sector in these two countries. Construction sector includes all types of works that are predominantly of civil engineering nature. It consists of building construction, engineering construction, and industrial construction. *Building construction* covers all buildings - residential, recreational, commercial, and those belonging to education, health etc. *Engineering construction* includes the public utility services such as tunnels, bridges, highways, oil pipelines, railways, irrigation works, thermal and hydroelectric power generation plants, docks and harbours. *Industrial construction* covers the projects associated with processing or manufacture of commercial products and services such as chemical plants, steel mills or plants, fertiliser and atomic reactors[1]. By virtue of its nature, construction sector is very closely interlinked with other sectors of the concerned economy.

Share of construction sector in national income and employment may or may not be very large but the importance of this sector lies in its direct and indirect contribution to income and employment through strong forward and backward linkage effects. In what follows, we examine certain broad effects of construction sectors in India and Vietnam from their respective input-output tables. The linkage effects and the multipliers are calculated their respective input-output tables under Leontief framework. Such an analysis is important for the purpose of investment planning in construction sector vis-à-vis other sectors.

2. Basis Model and the Data

The above mentioned broad features of construction sector are examined in a static framework. The detailed 65 sectors input-output table prepared by the Planning Commission (Government of India) for the year 1996-97, which represents the base year for the Ninth Five Year Plan, is aggregated into one with 14 broad sectors including construction sector. Similarly for Vietnam, the input-output data for 1999 released by the Department of Statistics (Government of Vietnam) in 2000 with 63- sector classification has been aggregated into 12 broad sectors and construction sector is

[1] Harpal Singh (1995) "Construction Management and Accounts" Tata McGraw-Hill Publishing company Ltd., New Delhi, 110002, p.2.

one of these.

The basic identity that we have used for analyzing inter-industry linkages in Indian economy as well as Vietnamese economy is the following

$$X + MX = TX + D \qquad (2.1)$$

Where,

X: represents the vector of domestic output levels with the dimension $n*1$

M: represents the import coefficients matrix of the dimension $n*n$

T: represents total technical coefficients matrix of dimension $n*n$

D: represents the final demand vector with dimension $n*1$. It includes private consumption, public consumption, gross fixed investment, change in stock, net export.

Equation (2.1) can be rewritten as:

$$X + MX - TX = D \qquad (2.2)$$

$$\text{i.e. } (I + M - T)\, X = D \qquad (2.3)$$

Pre-multiplying both side of the above equation by $(I + M - T)^{-1}$ we can get

$$X = (I + M - T)^{-1} D \qquad (2.4)$$

If we denote (T -M) as A, we can rewrite the above equation as follows

$$X = (I - A)^{-1} D \quad (2.5)$$[2]

The element of each column of $(I - A)^{-1}$ indicate the direct and indirect domestic output levels in different sectors required to support a unit increase in the final demand for the product of corresponding sector.

The data results that are processed by Matlab software package are given in the appendices.

3. Measures of inter-industry linkages

[2] Bakul H. Dholakia and Ravindra H. Dholakia (2000), "Impact of Investment in Housing Sector or GDP and Emloyment in Indian Economy ", Indian Intitute of Management Ahmedabad, p.p.5-6.
The total coefficient matrix denoted **T** as well as the import coefficients matrix denoted **M** show input requirement rupee of gross output at factor cost in Indian economy, and per VND. of gross output at factor cost in Vietnamese economy. From these matrices, we can drive the intra-regional or domestic technology matrix. The elements of domestic technology matrix indicate the supply of inputs from within each country per unit level of output of a given sector in each country.
It is necessary to subtract the import transactions from the total transactions and focus mainly on the resulting matrix of domestic transactions especially in analysis of the impact of sectoral investment on the macroeconomic activities such as income, employment etc. in the domestic economies. This is because the imports represent leakages from the incremental inter-sectoral flows generated by the expansion of a given sector. The strength of direct as well as indirect growth impulses originating from a unit increase in the final demand for the product of any sector is increased in proportion to the direct and indirect input requirements to support the expansion of various sectors needed to meet the increased demand. For the purpose of the present analysis, we, therefore, use the input-output coefficients derived from the domestic transactions matrix (T - M) to measure the direct and indirect effects of increased expenditure in given sector.

Based on the definitions of input coefficient matrix (or technical matrix) $A = [a_{ij}]$ and Leontief inverse matrix $C = (I - A)^{-1}$, we can obtain two measures of the inter-industry linkages.

(i) The direct backward linkage (BL_j) represents the direct input demand generated by a unit change in the level of production of a given sector. The measure is known as the coefficient of backward linkage which is created when expansion of a given sector j generates additional demand for the output of its input-supplying sectors. It is measured by:

$$BL_j = a_{1j} + a_{2j} + a_{3j} + \ldots + a_{nj} \quad \text{or} \quad BL_j = \sum_{j=1}^{n} a_{ij} \qquad (3.1)$$

Where, a_{ij} is technical input coefficient, so $\sum_{j=1}^{n} a_{ij}$ is total technical input coefficient which indicates the total amount of involved sectors' outputs required as inputs for producing one unit of the j^{th} sector's output. (Note that $BL_j < 1$)[3].

(ii) The total linkage coefficient or the direct and indirect linkages represents the total impact of an increase in the demand of the output of a given sector on all sectors. This measure accounts for the direct as well as indirect linkages induced via feedback and spillovers of the initial impact to all other sectors in the economy. The total linkage coefficient associated with the expansion of sector j is measured by[4]:

$$Y_j = \frac{\sum_{i=1}^{n} c_{ij}}{\frac{\sum_{i=1}^{n}\sum_{j=1}^{n} c_{ij}}{n}}$$

Direct and indirect requirements of inputs per unit demand of sector j in relation to the corresponding national average (3.2)

Here,

Y_j: Total linkage coefficient of j^{th} sector

$\sum_{i=1}^{n} c_{ij}$: Total direct and indirect requirements of inputs per unit of final demand of sector j

[3] Alpha C. Chiang (1984), "Fundamental Methods of Mathematical Economics" International Edition, Singapore, p.117; and H.L. Ahuja (2001), "Modern Microeconomics – Theory and Application" S. Chand & Company Ltd., New Delhi – 110055, p.647.

[4] Bakul H. Dholakia, Ravindra H. Dholakia (2000) op. cit., p.6.

$\frac{\sum_{i=1}^{n}\sum_{j=1}^{n} c_{ij}}{n}$: Average of direct and indirect requirements of inputs as a result of change of one unit in final demand in the economy as a whole

(Note: the elements of the inverse matrix $(I - A)^{-1}$ stand for by c_{ij}, i = 1, 2, 3,…, n; and j = 1, 2, 3, …, n. The element of j^{th} column (c_{1j}, c_{2j}, c_{3j}, …, c_{jn}) indicates the output from each of n sectors to meet one unit the final demand for the product of j^{th} sector).

The results of our computation on the above mentioned measures for India and Vietnam are given in table 3.1 and table 3.2 respectively. The ***inter-industry analysis*** reveals that linkage effects of construction sector in both the countries are quite strong. The direct backward linkage of Indian construction sector is found to be 0.4870 and ranks 4^{th} among the 14 broad sectors while for Vietnam it is 0.3286 and ranks 3^{rd} among the 12 broad sectors. However, the coefficient of direct backward linkage shows only the immediate impact i.e. the first round effects. We know that mutually interdependence of various sectors result into total linkage coefficient which incorporate not only the first round effects but also the subsequent or indirect effects. Table 3.1 and 3.2 show that total linkage coefficient for the construction sector of India turned out to be 1.2581 ranking 3^{rd} among 14 sectors while for Vietnam also it ranked 3^{rd} among 12 sectors and its value was 1.1174. It implies that the construction sectors of India and Vietnam both exhibit linkage effects that are much stronger than most other sectors.

Table 3.1

Inter-Industry Linkage of Different Sectors in India

SL No	SECTOR	Direct backward Linkage	Sector's rank	Total linkage coefficient	Sector's rank
1	Agriculture	0.2944	6	0.9482	6
2	Forestry and Logging	0.0813	13	0.7199	13
3	Fishing	0.1237	12	0.7743	12
4	Mining	0.2281	10	0.9070	8
5	Construction Related Mfg.	0.6818	1	1.4896	1
6	Other manufacturing	0.6299	2	1.3717	2
7	**Construction**	**0.4870**	**4**	**1.2581**	**3**
8	Electricity, Gas & Water Supply	0.5159	3	1.2188	4
9	Transport	0.4499	5	1.1660	5
10	Trade	0.2481	7	0.8977	9
11	Financial Services	0.1804	11	0.8021	11
12	Social Services	0.2320	9	0.9341	7
13	Public Admn. & Defence	0.0000	14	0.6275	14
14	Other Services	0.2335	8	0.8850	10

Source: Estimates on the basis of data from the Planning Commission Government of India

Table 3.2

Inter-Industry Linkage of Different Sectors in Vietnam

SL No	SECTOR	Direct Backward Linkage	Sector's Rank	Total Linkage Coefficient	Sector's Rank
1	Agriculture	0.1982	7	0.9557	8
2	Forestry	0.0434	11	0.7868	11
3	Fishing	0.0979	10	0.8570	10
4	Mining and Quarrying	0.3581	2	1.1678	2
5	Manufacturing	0.5198	1	1.4165	1
6	**Construction**	**0.3286**	**3**	**1.1174**	**3**
7	Electricity, Gas & Water supply	0.2605	5	1.0329	5
8	Transport	0.2956	4	1.0688	4
9	Trade	0.2411	6	1.0253	6
10	Financial services	0.1185	9	0.8690	9
11	Public Admn. & Defence	0.0000	12	0.7382	12
12	Social services & other services	0.1957	8	0.9645	7

Sources: Estimates on the basic of data from General department of Statistics 2000, 2001 and Ministry of Planning and Investment in Vietnam 2000

4. Impact of Construction Investment on Income Generation

In section 3, we have analyzed the construction sector in terms of inter-industry linkages in Indian and Vietnamese economies, which made us understand the nature of interdependence between the output level in a given sector and the output levels in other sectors. In this section, we make an attempt to examine the overall impact of construction investment on income generation, in relation to similar impact of investment in other sectors, in terms of analysis of income multipliers computed for different sectors of Indian economy and Vietnamese economy. By such an exercise, we can compare the relative strength of construction investment on income generation in the economy of India and Vietnam.

It is obvious that a change in the final demand for output of a given sector leads to changes in the output levels of all the sectors of the economy. Furthermore, when the sectoral output levels change due to a given change in final demand, value added by each sector also changes. This, in turn, leads to a change in national income, and consequently in personal income. Since the level of consumption expenditure is subject primarily to the level of personal income, changes in personal income induce changes in aggregate consumption expenditure. This, in turn, implies changes in the final demand for output of various sectors and, hence, it generates another round of changes in sectoral output levels, national income and consumption expenditures.

By the abovementioned reasoning, it is evident that any change in sectoral expenditure has far-reaching implication in the form of a chain of repercussions on the output and income levels in all sectors of the economy. The overall impact of all these changes on income generation in the economy as a whole can be measured by applying the technique of income multiplier analysis developed within the input-output framework[5].

A set of income multiplier associated with increased expenditure in various sectors can be derived from the framework of an input-output model. These multipliers provide a summary measure of total repercussions in terms of changes in output and net income in different sectors. The size of income multiplier indicates the extent of income leverage that is obtained by increasing the final expenditure in a given sector. Thus, given an input-output table, *the income multiplier for j^{th} sector may be defined as the ratio of total direct and indirect, and sometimes also induced, additions to income in response to an initial expenditure of one unit in that sector.*

The income multipliers associated with a given change in final demand are of two types

1 The Type-I multiplier shows the total direct and indirect income generation effect of a unit increase in the final demand of a given sector, assuming that the final demand all other sectors remains constant.

2 The Type-II multiplier indicates the sum total of direct and indirect as well as induced income generated by a unit increase in the final demand of a given sector, derived after considering the further increases in the sectoral output levels resulting from the induced increase in final demand of all sectors.

The direct and indirect effects, and the direct, indirect and induced effects of a unit increase in final demand of a given sector are captured by the corresponding column of the Leontief inverse $(I - A)^{-1}$ (inverted residual domestic technology matrix), $(I - A^{*})^{-1}$ (extended inverse matrix) in open input-output model respectively[6]. The elements in the j^{th} column of the inverse matrix show the direct and indirect output requirements of various sectors to sustain a unit increase in the final demand of the j^{th} sector. Hence the total direct and indirect incomes generated by one unit of final demand can be measured by summation of the elements of the given column multiplied by the corresponding value added proportions. It is given by

$$T_j = c_{1j*}\, v_1 + c_{2j*}\, v_2 + c_{3j*}\, v_3 + \ldots + c_{nj*}\, v_n \qquad (4.1)$$

Here,

T_j : total direct and indirect income generated of j^{th} sector

[5] Bakul H. Dholakia, Ravindra H. Dholakia (2000) op. cit., p.14.

$c_{1j}, c_{2j}, c_{3j},\ldots, c_{nj}$: the elements in the j^{th} column of the inverse matrix

v_i : value added proportion of j^{th} sector

The income multipliers are derived from dividing the total direct and indirect income generated by the corresponding value added proportion for each of the sectors. The formula is as follows

$$M_j = \frac{T_j}{v_j} \qquad (4.2)$$

Here,

M_j : income multiplier of sector j

T_j : total direct and indirect income generated of sector j

v_i : value added proportion of sector j

In terms of type I – income multiplier we use $(I - A)^{-1}$, and in terms of type II – income multiplier we use $(I - A^*)^{-1}$.

The income multiplier acquired by the above method captures the direct and indirect income effects due to a unit increase in the final demand of a given sector based on the assumption that the final demand of all other sectors remains unchanged. In reality, however, there exists a certain degree of inter-independence among the final demands for the products of different sectors. Consequently, the final demand of other sectors may also change in response to any change in the final demand of a given sector.

The interdependence in the final demand of different sectors arises on account of two factors. Firstly, an increase in output of different sectors may lead to an increased demand for investment expenditure, which, in turn, may produce a considerable effect on income. This effect becomes significant when the changes in final demand, and the resulting changes in sectoral output whose impact has to be assessed, are of a sizeable magnitude. For small changes, as is generally postulated in the marginal analysis, the total investment expenditure is not likely to change significantly and the same can, therefore, be treated as constant. The second factor, which introduces a significant element of interdependence in the final demand for different sectors, operates through the induced chain of secondary consumption in response to the initial increase in income. This is the celebrated Keynesian multiplier effect. It states that an initial increase in the output and income levels leads to subsequent increases in final consumption expenditures which, in turn, generates secondary and

[6] In the extended technology matrix A^*, one row and one column are added to represent the household. The additional row represents the value added proportions for the respective sector, while the additional column represents the proportion of total income spent in the form of final consumption expenditure on the products of the respective sectors.

tertiary changes in the output and income level bringing about a series of chain reactions. The chain would continue till the new equilibrium output levels are established.

Based on the input-output tables of India and Vietnam, empirical results about the ***impact of construction investment on income generation*** are presented in table 4.1a and 4.1b. We see that values of type I – income multipliers of construction sector of India as well as of Vietnam are fairly high as 1.9491 and 1.9818 respectively. The construction sector of India ranks 4th out of 14 sectors and is ahead of other key sectors like Transport and Agriculture; Vietnam construction ranks 3rd among 12 broad sectors. In Indian economy, Construction related Manufacturing has the highest value of 3.1431, and the second is other manufacturing as 2.7027, and the third is electricity, gas & water supply as 2.0650. In Vietnamese economy, manufacturing sector attains the highest value of income multiplier as of 3.2790, and Electricity, Gas and Water Supply sector follows closely at 2.0351. The remaining sectors have positions behind construction sector. From the figures of type I – income multiplier, it is evident that increase in expenditure on construction sector can generate fairly high additional income for Indian economy as well as Vietnamese economy.

Next, the estimates of the type II - income multiplier given in table 4.1a for India, and in table 4.1b for Vietnam result in values of 4.7098 and of 4.7151 respectively implying that a unit increase in final expenditure on construction sectors would generate additional income in the economy about 5 times more than the direct income generated within their construction sectors.

In terms of type II - income multiplier, Indian construction sector ranks 4th out of 14 sectors, there are three sectors whose type II - income multiplier exceeds that of construction sector are Construction related Manufacturing, Other manufacturing and Electricity, Gas & Water Supply, the remaining ten sectors rank behind construction sector in the economy of India. The construction sector of Vietnam also ranks high position 3rd among 12 sectors, Manufacturing; Mining and Quarrying whose value of type II income multiplier are greater than that of construction sector.

From above, it can be concluded that the construction sectors of India and Vietnam both have income multipliers that are much stronger than most other sectors of their economies.

Table 4.1a
Income Multipliers of Different Sectors in India

SL No	SECTOR	Income Multiplier Type I	Sector's rank	Income Multiplier Type II	Sector's rank
1	Agriculture	1.4169	6	3.4242	6
2	Forestry and Logging	1.0887	13	2.6301	13
3	Fishing	1.1411	12	2.7527	12
4	Mining	1.2956	8	3.1304	10
5	Construction Related Mfg.	3.1431	1	7.5939	1
6	Other manufacturing	2.7027	2	6.5288	2
7	**Construction**	**1.9491**	**3**	**4.7098**	**4**
8	Electricity, Gas & Water Supply	2.0650	4	4.9907	3
9	Transport	1.8183	5	4.3928	5
10	Trade	0.8977	9	3.2134	7
11	Financial Services	0.8021	11	2.9481	11
12	Social Services	0.9341	7	3.1461	9
13	Public Admn. and Defence	0.6275	14	2.4163	14
14	Other Services	0.8850	10	3.1525	8

Source: Estimates on the basis of data from the Planning Commission Government of India

Table 4.1b
Income Multipliers of Different Sectors in Vietnamese Economy

SL No	SECTOR	Income Multiplier Type I	Sector's Rank	Income Multiplier Type II	Sector's Rank
1	Agriculture	1.4322	7	3.9492	7
2	Forestry	1.1022	11	2.3512	12
3	Fishing	1.2367	9	3.5103	10
4	Mining and Quarrying	1.7554	4	4.9327	2
5	Manufacturing	3.2790	1	6.5950	1
6	**Construction**	**1.9818**	**3**	**4.7151**	**3**
7	Electricity, Gas & Water supply	2.0351	2	4.2812	5
8	Transport	1.6612	5	4.4954	4
9	Trade	1.4798	6	4.1727	6
10	Financial services	1.1885	10	3.5375	9
11	Public Admn. & Defence	1.0000	12	3.1663	11
12	Social services & other services	1.3817	8	3.9369	8

Sources: Estimates on the basic of data from General department of Statistics 2000, 2001 and Ministry of Planning and Investment in Vietnam 2000

Ranking of sectors on basis of the income multiplier is not enough as it only reflect the potential of sectors for income generation, not actually optimal level of investment leading to maximization of income. As a method of fact, the actual contribution of construction sector to income would depend on proportion percent of the final demand that the amount of investment makes to see this, let us

take the example of an investment which 10 percent of total sectoral final demand and examine total impact on national income. First, we examine this issue for construction sector, after then we measure it for the rest of other sector by the same of method in order to rank sectoral position.

To determine the direct and indirect increase in the gross output levels of various sectors induced by a 10 percent increase in final expenditure in construction sector – type I, also type II, we can use the following formula:

$$\Delta X = (I - A)^{-1}\Delta D \qquad (4.3)$$

Where, ΔX and ΔD are vectors of changes in outputs and demand respectively, because of $X = (I - A)^{-1}D$

And, to estimate increase in GDP based on increase in gross output in each sector at fixed factor cost is given by

$$\Delta GDP_j = \Delta X_j * v_j \qquad (i = 1, 2, 3, \ldots, n) \qquad (4.4)$$

Because the formula (3.3a) is shown $v_j = \frac{V_j}{X_j}$ or $V_j = X_j * v_j$

In terms of type I – income generation we use $(I - A)^{-1}$ or (c_{ij}), and in terms of type II – oncome generation we use $(I - A^*)^{-1}$ or (c^*_{ij}).

The results for India and Vietnam are given in tables 4.2a and 4.2b respectively. It is found that the construction sector of India, in terms of type-I, can generate Rs.140412 million implying an increase of 1.2 % in GDP whereas for Vietnam increase in GDP was estimated as VND. 2175.711 billion implying a GDP growth rate of 0.544%. In terms of type-II, the corresponding figures for India were Rs. 34 thousand crores amounting to an almost 3 % GDP growth rate and 3rd rank among 14 sectors while for Vietnam the figures were VND. 6889.924 billion implying 1.72 % growth in GDP and 6th rank among its 12 sectors.

Table 4.2a

Increase in India's GDP Generated by Ten percent Increase in Sectoral Final Demand

(Rs. Million)

SL No	SECTOR	Type I			Type II		
		Increase in GDP	Additional GDP growth rate (%)	Sector 's Rank	Increase in GDP	Additional GDP growth rate (%)	Sector 's Rank
1	Agriculture	256826	2.13	2	620647	5.38	2
2	Forestry and Logging	6863	0.06	14	16575	0.14	14
3	Fishing	13428	0.11	13	32436	0.28	13
4	Mining	24376	0.20	10	58890	0.51	10
5	Construction Related Mfg.	42691	0.35	9	103136	0.89	9
6	Other manufacturing	388060	3.22	1	937402	8.12	1
7	**Construction**	**140412**	**1.16**	**3**	**339268**	**2.94**	**3**
8	Electricity, Gas & Water Supply	14425	0.12	12	34841	0.30	12
9	Transport	68698	0.57	6	165950	1.44	6
10	Trade	104632	0.87	5	252758	2.19	5
11	Financial Services	16416	0.14	11	39639	0.34	11
12	Social Services	60899	0.51	7	147084	1.27	7
13	Public Admn. & Defence	60277	0.45	8	145612	1.26	8
14	Other Services	116587	0.97	4	281860	2.44	4

Source: Estimates on the basis of data from the Planning Commission Government of India

Table 4.2b

Increase in Vietnam's GDP Generated by Ten percent Increase in Sectoral Final Demand

(VND.billion)

SL No	SECTOR	Type I			Type II		
		Increase in GDP	Additional GDP growth rate (%)	Sector 's Rank	Increase in GDP	Additional GDP growth rate (%)	Sector 's Rank
1	Agriculture	8332.706	2.08	1	26387.912	6.60	1
2	Forestry	573.614	0.14	12	1816.543	0.45	12
3	Fishing	1265.122	0.32	8	4006.129	1.00	8
4	Mining and Quarrying	3370.295	0.84	5	10671.377	2.67	5
5	Manufacturing	7078.195	1.77	3	22411.373	5.60	3
6	**Construction**	**2175.711**	**0.54**	**6**	**6889.924**	**1.72**	**6**
7	Electricity, Gas & Water supply	1172.281	0.29	9	3712.034	0.93	9
8	Transport	1554.825	0.39	7	4922.752	1.23	7
9	Trade	7280.167	1.82	2	23051.939	5.76	2
10	Financial services	737.508	0.18	11	2334.981	0.58	11
11	Public Admn. & Defence	1168.300	0.29	10	3699.185	0.92	10
12	Social services & other services	5274.710	1.32	4	16702.071	4.18	4

Sources: Estimates on the basic of data from General department of Statistics 2000, 2001 and Ministry of Planning and Investment in Vietnam 2000

Like the analysis of income multipliers and the linkage effects, these results also do nothing but reiterate the fact that an increased expenditure in construction sector can create more additional GDP than most other sectors in each country. In addition, as expected type-II income multipliers are higher than type-I. That the performance of Vietnamese construction sector lagged behind that of its Indian counterpart during the period of the study is an observation that needs to be examined further.

Limitations of Multiplier Analysis:

Income multiplier is useful in the study of the extent of economy's potential for additional income to be generated in the economy due to unit increase in expenditure in particular sector, but there are some limitations and, therefore, the results about income multipliers need to be interpreted rather carefully. Firstly, the multiplier effect indicated by the computed values of the income multipliers would operate in actual practice only to the extent in which there is consistency with all input requirements so as to avoid any bottlenecks anywhere in the economy. If the economy suffers from severe shortages of certain critical inputs in the short-run, increased expenditure in a given sector may fail to bring about the corresponding increase in the output levels of related industries. Consequently, the expected repercussions in the form of chain of direct, indirect and induced income generation might fail to become a reality. Secondly, the issue of or income multiplier may become less important in the light of the objectives such as a more efficient and optimal utilization of resources, the need for import substitution or export promotion, and the objectives of reducing income differences or encouraging the production of certain specified industries. Thus, the industries having the highest multiplier effect may actually turn out to be relatively inefficient or less preferred when certain considerations as indicated above are given due weight.

5. Impact of Construction Investment on Employment Generation

Reducing unemployment, generating more jobs is one of the main objectives of socio-economic development strategy in every country. Sectoral investment can be assessed from two angles, first, driving swift growth of economy, second, creating jobs for the persons in working-age group. Keeping these factors in view, it is necessary to examine the impact of construction investment on employment generation. Besides, we evaluate the comparative strength of the employment generating potential of investment in construction sector of India and Vietnam with reference to investment in other sectors of the economy.

Before, we discuss measurement of employment multiplier, it is necessary to understand its concept. Employment multiplier can be measured in terms of changes in final demand for the

product of a given sector that can bring about magnified changes in employment[7].

Given an input-output table, we can define two types of employment multipliers. Employment multiplier-I for given sector is defined as the ratio of total direct and indirect employment generated in the economy to the direct employment in the given sector as a result of an initial expenditure of one unit in that sector. Employment multiplier-II includes not only the direct and indirect employment generation but also induced additions in the overall final demand vector in response to an initial increase in the final demand in a given sector. It can be seen that these two types of employment multipliers represent the counterparts of corresponding concepts of two types of income multipliers discussed in the previous section.

We now briefly mention the steps involved in calculating the employment multipliers. As a first step, we have to calculate labour coefficient that indicate the number of persons employed per unit of gross output, e.g., the direct labour requirement per unit of output in each sector. The labour coefficient is denoted by $l_1, l_2, l_3,\ldots, l_n$ which we can determine as[8]

$$l_i = \frac{L_i}{X_i} \quad (I = 1, 2, 3,\ldots, n) \quad (5.1)$$

Here,

l_i : labour coefficient of i^{th} sector

L_i : total employment of i^{th} sector

X_i : gross output of i^{th} sector

The estimates of direct labour output ratio constitute the labour coefficients vector, $L = (l_1, l_2, l_3,\ldots, l_n)$. It may be called that each column of the Leontief inverse matrix indicates the total direct and indirect output requirements per unit of final demand in the corresponding sector. Thus, the total direct and indirect employment generated per unit of final demand in a given sector can be obtained by multiplying the row vector L with the corresponding column of the inverse matrix $(I - A)^{-1}$ as stand for $c_{1j}, c_{2j}, c_{3j},\ldots, c_{nj}$. So, the total direct and indirect employment generated by one unit increase in the final demand of j^{th} sector is given by the following formula

$$E_j = l_{1*}\, c_{1j} + l_{2*}\, c_{2j} + l_{3*}\, c_{3j} + \ldots + l_{n*}\, c_{nj} \quad (5.2)$$

From this, we can derive the employment multiplier of type-I as the ratio of total employment generated to the direct employment-requirement per unit of output in the given sector. Hence, the employment multiplier of type-I can be given by

$$e_j = \frac{E_j}{l_j} \quad (j = 1, 2, 3,\ldots, n) \quad (5.3)$$

[7] Jae K. Shim and Joel G. Siegel (1995), Dictionary of Economics, Joh Wiley & Son, Inc., USA. p.242.

In the same way, we can measure the employment multiplier of type-II, but, with the matrix of different dimension. As mentioned earlier, the direct and indirect as well as induced impact of change in the final demand of a given sector is captured by the elements of $(I - A^*)^{-1}$, where A^* is the extended technology matrix[9] which includes household sector as an additional sector. Thus, the employment multiplier of type-II can be given by

$$E_j^* = l_{1*}\, c_{1j}^* + l_{2*}\, c_{2j}^* + l_{3*}\, c_{3j}^* + \ldots + l_{n*}\, c_{nj}^* \qquad (5.4)$$

Here, $c_{1j}^*, c_{2j}^*, c_{3j}^*, \ldots, c_{nj}^*$ are elements of column of $(I - A^*)^{-1}$. Therefore, the employment multiplier of type-II is obtained as

$$e_j^* = \frac{E_j^*}{l_j} \qquad (j = 1, 2, 3, \ldots, n) \qquad (5.5)$$

Using the above methodology, we now estimate the employment multipliers for various sectors of Indian economy and Vietnamese economy in terms of input-output data for 1996-97 and 1999 respectively and examine on the basis of these multipliers the relative position of construction vis-à-vis other sectors with regard to employment generation.

The type-I employment multiplier for the construction sector of India was 2.02 times with a rank of 5 among 14 major sectors. The four sectors having a multiplier value higher than that of construction sector are: Electricity, Gas & Water Supply, Construction related Manufacturing, Other Manufacturing, and Transport. As regards Vietnam construction sector, the type-I employment multiplier was 2.00 times with a rank of 4 out of 12 sectors. The three sectors ranked higher than construction sector are Electricity, Gas and Water Supply, Mining and Quarrying, Manufacturing.

Likewise, the type-II employment multiplier for the construction sector of India was 7.76, ranks 7th out of 14 broad sectors whereas for Vietnam it was found to be 11.22 ranking 5th among 12 broad sectors. It is seen that the construction sectors in both countries do not obtain as high positions in rank tables of employment multiplier as income multiplier; however, the results help us evaluate significance of the contribution to overall employment generation of Indian construction sector as well as Vietnam construction sector in comparison with several other sectors of each economy.

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[8] Bakul H. Dholakia, Ravindra H. Dholakia (2000) op. cit., p.p.27-28.

[9] It may be noted that A^* is not a closed system because the additional column represents the proportion of total income spent in the form of final private consumption expenditure on product of respective sectors, not include total final demand.

Table 5.1a

Employment multipliers for different sectors in India

SL No	SECTOR	Employment Multiplier Type I	Sector's Rank	Employment Multiplier Type II	Sector's Rank
1	Agriculture	1.22	13	2.08	14
2	Forestry and Logging	1.50	7	18.47	2
3	Fishing	1.24	12	6.43	10
4	Mining	1.39	9	6.44	9
5	Construction Related Mfg.	3.40	3	14.17	4
6	Other manufacturing	4.32	2	14.53	3
7	**Construction**	**2.02**	**5**	**7.76**	**7**
8	Electricity, Gas & Water Supply	4.74	1	35.45	1
9	Transport	2.09	4	8.25	6
10	Trade	1.27	11	4.75	12
11	Financial Services	1.45	8	11.80	5
12	Social Services	1.36	10	5.22	11
13	Public Admn. and Defence	1.00	14	3.72	13
14	Other Services	1.67	6	6.76	8

Source: Estimates on the basis of data from the Planning Commission Government of India

Table 5.1b

Employment multipliers for different sectors in Vietnam

SL No	SECTOR	Employment Multiplier Type I	Rank's Sector	Employment Multiplier Type II	Rank's Sector
1	Agriculture	1.1114	9	2.0501	12
2	Forestry & Logging	1.0187	11	2.4408	11
3	Fishing	1.1041	10	5.4876	9
4	Mining and Quarrying	3.3308	2	36.6961	2
5	Manufacturing	2.4213	3	15.3548	4
6	**Construction**	**2.0019**	**4**	**11.2154**	**5**
7	Electricity, Gas & Water Supply	5.7821	1	51.1189	1
8	Transport	1.6296	7	6.7586	8
9	Trade	1.5890	8	7.8749	7
10	Financial Services	1.9620	5	27.7187	3
11	Public Admn. & Defence	1.0000	12	3.6657	10
12	Social Services & Other Services	1.6960	6	9.0456	6

Sources: Estimates on the basic of data from General department of Statistics 2000, 2001 and Ministry of Planning and Investment in Vietnam 2000

The estimates of employment multipliers for various sectors constitute the basis for analyzing the relationship between changes in sectoral expenditure and the resulting changed in the total employment generation in various sectors. It would be interesting to examine the impact of a 10

percent increase in the final demand of construction sector on the additional employment generation in different sectors of the economy.

The estimates of the above mentioned of tables are given by

$$\Delta L_j = l_j \,.\, \Delta X_j \quad (5.6)$$

because of $l_j = \frac{L_j}{X_j}$ or $L_j = l_j \,.\, X_j$

Here, ΔL_j: increase in employment of j^{th} sector

L_j: labour coefficient of j^{th} sector

ΔX_j: additional output of jth sector

It may be noted that the elements of column of ratio of additional employment to sectoral employment are estimated by the following formula

$$\%\Delta Ej = \frac{\Delta Ej}{Ej} * 100\% \qquad (5.7)$$

Where,

$\%\Delta E_j$: ratio of additional employment of j^{th} sector

ΔE_j: incremental employment of j^{th} sector

E_j: total employment of j^{th} sector

In terms of type I – employment generation, we use $(I - A)^{-1}$ or (c_{ij}), and in terms of type II – employment generation, we use $(I - A^*)^{-1}$ or (c^*_{ij}) to calculate concerned data.

We measure the estimated increase in employment caused by a ten percent increase in the sectoral final demand. In terms of type I, the construction sector of India, can generate 2,957,049 jobs entailing an increase of 0.66 % in employment leading to rank 3rd among 14 broad sectors while for Vietnam it generates 97,425 jobs, increases employment by 0.25 % and ranks 6th out of 12 sectors. In terms of type-II, Indian construction sector generates employment by 11,333,787 implying 2.52 % growth in employment continuing to rank 3rd among 14 sectors whereas Vietnam construction sector generates 545,803 jobs accounting for 1.52 % employment growth and leading to rank of 5 out of 12 sectors. Once again, we find that the performance of Indian construction sector prevailed on that of Vietnam.

Table 5.2a

Employment Generation Induced by Ten Percent Increase in Sectoral Final Demand of India

SL No	SECTOR	Type I			Type II		
		Employment Generation	Additional Employment (%)	Sector's Rank	Employment Generation	Additional Employment (%)	Sector's Rank
1	Agriculture	21937231	4.88	1	37263106	8.29	1
2	Forestry and Logging	36048	0.01	14	445291	0.10	14
3	Fishing	19200	0.04	11	992900	0.22	13
4	Mining	399413	0.09	10	1853517	0.41	10
5	Construction Related Mfg.	802519	0.18	9	3349108	0.75	9
6	Other manufacturing	9806086	2.18	2	32949379	7.33	2
7	**Construction**	**2957049**	**0.66**	**3**	**11333787**	**2.52**	**3**
8	Electricity, Gas & Water Supply	132718	0.03	13	993093	0.22	12
9	Transport	1390725	0.31	6	5487942	1.22	6
10	Trade	2276251	0.51	5	8516913	1.90	5
11	Financial Services	137338	0.03	12	1116076	0.25	11
12	Social Services	1274787	0.28	8	4906277	1.09	8
13	Public Admn. & Defence	1321586	0.29	7	4917030	1.09	7
14	Other Services	2279257	0.51	4	9234294	2.05	4

Source: Estimates on the basis of data from the Planning Commission Government of India

Table 5.2b

Employment Generation Induced by Ten Percent Increase in Sectoral Final Demand of Vietnam

SL No	SECTOR	Type I			Type II		
		Employment Generation	Additional Employment (%)	Sector's Rank	Employment Generation	Additional Employment (%)	Sector's Rank
1	Agriculture	2033167	5.65	1	3750474	10.42	1
2	Forestry	84680	0.24	8	202896	0.56	10
3	Fishing	65659	0.18	7	326351	0.91	8
4	Mining and Quarrying	69324	0.19	9	763753	2.12	4
5	Manufacturing	273043	0.76	3	1731529	4.81	3
6	**Construction**	**97425**	**0.27**	**6**	**545803**	**1.52**	**5**
7	Electricity, Gas & Water supply	30805	0.09	11	272347	0.76	9
8	Transport	101776	0.28	5	422101	1.17	6
9	Trade	379204	1.05	2	1879279	5.22	2
10	Financial services	11574	0.03	12	163514	0.45	11
11	Public Admn. & Defence	90300	0.25	10	331010	0.92	7
12	Social services & other services	250823	0.70	4	133770	0.37	12

Sources: Estimates on the basic of data from General department of Statistics 2000, 2001 and Ministry of Planning and Investment in Vietnam 2000

These results on employment multiplier that are consistent with our earlier observations about the potentials the two economies under in terms of income-generation and reiterate the fact that an increased expenditure in construction sector can create more additional income and employment than most other sectors in each country. Secondly, the observation that type-II income and employment multipliers are quantitatively much higher than type-I points towards the long-term effectiveness of investment in this sector. Finally, a noticeable result of this analysis is that of a performance gap in the construction sectors of India and Vietnam. That the Vietnamese construction sector lagged behind that of its Indian counterpart during the period of the study.

6. Conclusion and suggestion

Main results on macro aspects of construction sector obtained from the inter-industry analysis based on input-output tables of India and Vietnam for years 1996-97 and 1999 respectively are summarized in table 6. All indicators of economic potential of this sector in terms of linkage effects as well as income and employment multipliers lend strong support to our hypothesis that construction is one of the top most industries of India as well as Vietnam. The linkage effects both backward and forward, are strong enough to place it in list of top four sectors. Similarly, the income multipliers of construction sector in India and Vietnam are much stronger than most other sectors of their economies. When we exemplify these income multipliers, the performance of Vietnamese construction sector lagged behind that of its Indian counterpart during the period of the study that manifests more advantage of 5th largest economy in terms of purchasing power parity than Vietnam. As expected in terms of employment multiplier, the position of the construction sector in the both countries is not as good as in the case of income multiplier. This reflects the progress of technology in construction sector in favour of highly capital-intensive and labour-saving techniques. Therefore, final expenditure in construction sector has more potential of increased national income than employment. An important observation that follows from these macro results is that India's construction sector consistently shows an edge over the Vietnamese construction sector.

Table 6
Inter-industry linkages, income multipliers and employment multipliers in construction sector of India and Vietnam

SL No	INDICATOR	INDIA				VIETNAM			
		Type I		Type II		Type I		Type II	
		Value	Rank (on total 14)	Value	Rank (on total 14)	Value	Rank (on total 12)	Value	Rank (on total 12)
1	Linkages	0.4870*	4	1.2581**	3	0.3286*	3	1.1174**	3
2	Income multiplier	1.9491	3	4.7098	4	1.9818	3	4.7151	3
	GDP generated by 10% increase in sectoral final demand	140412(a) (1.16%)	3	339268(a) (2.94%)	3	2175.711(b) (0.54%)	6	6889.924(b) (1.72%)	6
3	Employment multiplier	2.02	5	7.76	7	2.0	4	11.22	5
	Employment generated by 10% increase in sectoral final demand	2957049(c) (0.66%)	3	11333787(c) (2.52%)	3	97425(c) (0.27%)	6	545803(c) (1.52%)	5

*: Direct backward linkage; **: Total linkage coefficient

(a): Rs. Million; (b): VND. Billion; (c): Employment

The general conclusion of our analysis is that an increase in investment (final expenditure) in the construction sectors of India and Vietnam has the potential of making major contribution to overall income and employment generation in these countries. The results reflect on the desirability of assigning priority to the construction sector for resource allocation - a policy prescription that may help in solving one of the most daunting challenges faced by them and other developing countries.

APPENDICES

Appendix Table 1.1a

Sectoral Classification of the Transactions Matrix in India for 1996-97

SL No	SECTOR
S1	Paddy
S2	Wheat
S3	Other Cereals
S4	Pulses
S5	Sugar-cane
S6	Jute
S7	Cotton
S8	Tea and coffee
S9	Rubber
S10	Other Crops
S11	Animal Husbandry
S12	Forestry and Logging
S13	Fishing
S14	Coal and Lignite
S15	Crude Petroleum & Natural Gas
S16	Iron Ore
S17	Other Metallic Minerals
S18	Non Metallic Minor Minerals
S19	Sugar
S20	Khansari
S21	Edible Oils
S22	Other Food & Beverage Industries
S23	Cotton Textiles
S24	Woolen Textiles
S25	Silk Textiles
S26	Artificial Silk and Synthetic Fibers
S27	Jute Hemp Mestas Textiles
S28	Readymade Garment
S29	Other Textiles
S30	Wood and Wood Products
S31	Paper and Paper Products
S32	Leather and Leather Products
S33	Rubber Products
S34	Plastic Products
S35	Petroleum Products

Source: the Planning Commission Government of India

Appendix Table 1.1a *(contd…)*
Sectoral Classification of the Transactions Matrix in India for 1996-97

S36	Fertilizers
S37	Pesticides
S38	Synthetic Fiber and Resin
S39	Paints, Drugs, Cosmetics
S40	Other Chemicals
S41	Cement
S42	Other Non Metallic Mineral Prods
S43	Iron and Steel
S44	Non Ferrous Metals
S45	Tractors and other Agricultural Machinery
S46	Other Non Electrical Machinery
S47	Electrical Machinery
S48	Communication & Electronic Equipment
S49	Rail Equipment
S50	Motor Vehicles
S51	Motorcycle, Scooter and Bicycles
S52	Other Transport Equipment
S53	Other Manufacturing
S54	Construction
S55	Electricity
S56	Gas
S57	Water Supply
S58	Rail Transport Services
S59	Other Transport Services
S60	Communication & Electronic Equipment
S61	Trade
S62	Financial Services
S63	Social Services
S64	Public Administration
S65	Other Services

Source: the Planning Commission Government of India

Appendix Table 1.1b
Sectoral Classification of the Transactions Matrix in Vietnam 1999

SL No	SECTOR
S1	Paddy
S2	Maize
S3	Sweet potatoes and cassava
S4	Vegetable & beans
S5	Cotton
S6	Jute
S7	Rush
S8	Sugar-cane
S9	Peanut & soybean
S10	Tea
S11	Coffee
S12	Rubber
S13	Other industrial crops
S14	Fruit crops
S15	Domestic animal
S16	Poultry
S17	Forestry
S18	Exploited sea products
S19	Breading sea products
S20	Mining of coal
S21	Extraction of crude petroleum and nature gas
S22	Mining of metal areas ores
S23	Quarrying of stone & other mining
S24	Manufacturing of food products and beverages
S25	Manufacturing of tobacco products
S26	Manufacturing of textiles
S27	Manufacturing of wearing apparel
S28	Tanning and dressing leather, manufacturing of leather products
S29	Manufacturing of wood and wood products
S30	Manufacturing of paper and paper products
S31	Publishing, printing and reproduction of recorded media
S32	Manufacturing of coke, refined petroleum products

Source: Statistical yearbook 2000 in Vietnam

Appendix Table 1.1b*(contd…)*
Sectoral Classification of the Transaction Matrix, 1999 in Vietnam

S33	Manufacturing of chemical and chemical products
S34	Manufacturing of rubber and plastic products
S35	Manufacturing of non-metallic mineral products
S36	Manufacturing of basic metal
S37	Manufacturing of fabricated metal products except machinery & equipments
S38	Manufacturing of machinery & equipments
S39	Manufacturing of office, accounting and computing machinery
S40	Manufacturing of electrical machinery and apparatus
S41	Manufacturing of radio and communication equipment & apparatus
S42	Manufacturing of medical, precision & optical instruments, watches & clocks
S43	Assembling and repairing motor vehicle
S44	Manufacturing and repairing of other transport equipments
S45	Manufacturing of furniture
S46	Recycling
S47	Production, collection and distribution of electricity
S48	Manufacturing gas, distribution of gaseous fuels
S49	Collection, purification and distribution of water
S50	Construction
S51	Wholesale and retail trade, repair of motor vehicles, motor cycles and personal & household goods
S52	Hotels and restaurants
S53	Transport, storage and communications
S54	Financial intermediation
S55	Scientific activities and technology
S56	Real state; renting business activities
S57	Public administration and defence; compulsory social security
S58	Education and training
S59	Health and social work
S60	Recreational, cultural and sporting activities
S61	Activities of Party and membership organizations
S62	Community, social and personal service activities
S63	Private households with employed persons

Source: Statistical yearbook,2000 in Vietnam

Appendix Table 1.2a
Scheme of Aggregation for Broad Sectoral Classification in India

Sl No	**Sector**	Specific Sectors Covered
1	Agriculture and Related Products	S1 to S11
2	Forestry & Logging	S12
3	Fishing	S13
4	Mining	S14 to S18
5	Construction related Manufacturing	S30, S34, S39, S41, S42, S43
6	Other Manufacturing	S19 to S29, S31 to S33, S35 to S38, S40, S44 to S53
7	Construction	S54
8	Electricity, Gas& Water supply	S55, S56, S57
9	Transport	S58,S59
10	Trade	S61
11	Financial services	S62
12	Social services	S63
13	Public Administration & Denfence	S64
14	Other Services	S60, S65

Source: the Planning Commission Government of India

Appendix Table 1.2b
Scheme of Aggregation for Broad Sectoral Classification in Vietnam

Sl No	**Sector**	Specific Sectors covered
1	Agriculture	S1 to S16
2	Forestry	S17
3	Fishing	S18 & S19
4	Mining and Quarrying	S20 to S23
5	Manufacturing	S24 to S46
6	Construction	S50
7	Electricity, Gas& Water supply	S47 to S49
8	Transport	S53
9	Trade	S51 & S52
10	Financial services	S54
11	Public Administration & Denfence	S57
12	Social services and other services	S55, S56, S58, S59, S60, S61, S62, S63

Source: Classification on the basis of statistical yearbook 2000, Vietnam

Appendix Table 1.3a
Aggregated Transactions Matrix of India, 1996-97

(Rs. Million)

SL No	Sector	1	2	3	4	5	6	7
1	Agriculture	581020	100	67	1	2500	690794	30402
2	Forestry &Logging	13	541	0	0	28901	15460	11594
3	Fishing	0	0	3332	4	55	20232	0
4	Mining	176	0	0	987	56757	237874	18201
5	Construction related Manufacturing	2341	161	899	4361	498781	513625	495239
6	Other Manufacturing	399300	3302	13054	37131	383687	2042811	115689
7	Construction	44987	1910	0	904	5569	3967	5291
8	Electricity, Gas and Water Supply	21834	121	58	10913	106256	251270	5918
9	Transport	25014	1291	571	3077	88259	209583	53338
10	Trade	119024	683	2093	5841	159519	580826	105246
11	Financial Services	29165	127	371	4816	69357	230919	37730
12	Social Services	0	169	0	0	0	0	61
13	Public Administration and Defence	0	0	0	0	0	0	0
14	Other Services	4182	2284	776	4847	30033	194261	14612
	Total	**1227056**	**10689**	**21221**	**72882**	**1429674**	**4991622**	**893321**

Source: the Planning Commission Government of India

Appendix Table 1.3a *(Contd…)*
Aggregated Transactions Matrix of India, 1996-97

(Rs. Million)

SL No	Sector	8	9	10	11	12	13	14	TOTAL
1	Agriculture	644	20328	0	0	8625	0	86064	1420545
2	Forestry &Logging	0	10	0	0	0	0	779	57298
3	Fishing	0	0	0	0	0	0	0	23623
4	Mining	81708	1164	0	0	0	0	1668	398535
5	Construction related Manufacturing	363	14656	17398	256	96330	0	4038	1648448
6	Other Manufacturing	39007	382427	60733	13174	15580	0	86083	3591978
7	Construction	26721	21687	17155	4935	2983	0	88495	224604
8	Electricity, Gas and Water Supply	237190	22928	30429	12145	2490	0	20566	722118
9	Transport	46632	51596	234575	20196	8097	0	12999	755228
10	Trade	49063	57751	9503	1867	18462	0	26824	1136702
11	Financial Services	38808	62887	65159	63860	33	0	47487	650719
12	Social Services	1	2302	0	0	1261	0	1008	4802
13	Public Administration and Defence	0	0	0	0	0	0	0	0
14	Other Services	10131	51780	127668	32270	3966	0	26769	503579
	Total	**530268**	**689516**	**562620**	**148703**	**157827**	**0**	402780	11138179

Source: the Planning Commission Government of India

Appendix Table 1.3a *(Contd…)*
Aggregated Transactions Matrix of India, 1996-97

(Rs. Million)

SL No	Sector	Private Consu.	Public Consu.	G.F Investment	Change in Stock	Exports	Imports	T.F.Use	TOTAL
1	Agriculture	2492346	3267	17219	29872	93531	105567	2530668	3951213
2	Forestry &Logging	59852	299	0	547	8894	1828	67764	125062
3	Fishing	104506	6	0	6	30473	877	134114	157737
4	Mining	2696	183	0	3384	237460	349419	-105696	292839
5	Construction related Manufacturing	209419	4276	46440	22674	171599	251257	203151	1851599
6	Other Manufacturing	2019842	139370	1435016	118606	572201	826612	3458423	7050401
7	Construction	0	91230	1312874	0	0	0	1404104	1628708
8	Electricity, Gas and Water Supply	109720	34157	0	0	316	0	144193	866311
9	Transport	535044	33712	30221	0	109835	47126	661686	1416914
10	Trade	754120	14381	165464	0	112107	0	1046072	2182774
11	Financial Services	131931	20615	0	0	12866	6926	158486	809205
12	Social Services	279056	329674	0	0	0	0	608730	613532
13	Public Administration and Defence	0	602635	0	0	0	0	602635	602635
14	Other Services	1005627	57551	0	0	132220	42567	1152831	1656410
	Total	**7704159**	**1331356**	**3007234**	**175089**	**1481502**	**1632179**	**12067161**	**23205340**

Source: the Planning Commission Government of India

Appendix table 1.3b
Aggregated Transaction Matrix of Vietnam in 1999

(Dongs. Billion)

Sl No	**Sector**	1	2	3	4	5	6
1	Agriculture	9496	0	38	0	1013	1808
2	Forestry	32	47	4	0	90	30
3	Fishing	248	0	165	0	952	0
4	Mining and Quarrying	0	0	0	145	459	1432
5	Manufacturing	6855	1721	2388	7433	75087	4976
6	Construction	1905	51	27	386	544	4568
7	Electricity, Gas& Water supply	424	6	6	2578	967	160
8	Transport	615	34	88	637	1118	243
9	Trade	3000	13	137	1872	14028	944
10	Financial services	150	13	16	120	151	217
11	Public Administration & Denfence	0	0	0	0	0	0
12	Social services and other services	1523	12	141	1455	8284	697
	Total	**24248**	**1897**	**3010**	**14626**	**102693**	**15075**

Sources: General Department of statistics, Ministry of Planning and Investment, 2000.

Appendix table 1.3b *(contd…)*
Aggregated Transaction Matrix of Vietnam in 1999

(Dongs. Billion)

Sl No	Sector	7	8	9	10	11	12	Total
1	Agriculture	1002	1300	4146	161	0	3674	22638
2	Forestry	6	13	37	0	0	0	259
3	Fishing	0	0	0	7	0	0	1372
4	Mining and Quarrying	391	3	0	140	0	0	2570
5	Manufacturing	2784	3028	10681	2166	0	5944	123063
6	Construction	576	1693	6323	14	0	2774	18861
7	Electricity, Gas& Water supply	791	20	194	1	0	580	5727
8	Transport	368	394	3028	6	0	174	6705
9	Trade	325	1755	971	64	0	1123	24232
10	Financial services	70	84	150	14	0	19	1004
11	Public Administration & Denfence	0	0	0	0	0	0	0
12	Social services and other services	67	55	336	70	0	199	12839
	Total	**6380**	**8345**	**25866**	**2643**	**0**	**14487**	**219270**

Sources: General Department of statistics, Ministry of Planning and Investment, 2000.

Appendix table 1.3b *(contd…)*
Aggregated Transaction Matrix of Vietnam in 1999

(Dongs. Billion)

Sl No	Sector	Private Consum.	Public Consum.	Gross fix Inv.	Change in Stock	Export	Import	Final Demand	Gross Output
1	Agriculture	70525	2519	4611	877	25670	20867	83335	105973
2	Forestry	3560	1635	512	75	4146	4191	5737	5996
3	Fishing	6255	901	891	49	17621	13066	12651	14023
4	Mining and Quarrying	25825	1579	2418	314	33450	29883	33703	36273
5	Manufacturing	57486	677	13295	3088	30940	34719	70767	193830
6	Construction	17918	1114	2992	1510	12592	14362	21764	40625
7	Electricity, Gas& Water supply	7991	1070	11333	66	7271	16006	11725	17452
8	Transport	6621	240	18424	73	9030	18842	15546	22251
9	Trade	62612	3557	6559	1542	16873	18347	72796	97028
10	Financial services	6086	1141	1602	43	4124	5508	7488	8492
11	Public Administration & Denfence	0	11683	0	0	0	0	11683	11683
12	Social services and other services	8841	1021	46162	70	10125	13472	52747	65586
	Total	**273720**	**27137**	**108799**	**7707**	**171842**	189263	399942	619212

Sources: General Department of statistics, Ministry of Planning and Investment, 2000.

Appendix table 1.4a
Aggregated Domestic Transactions Matrix of India, 1996-97

(Rs. Million)

SL No	Sector	1	2	3	4	5	6	7
1	Agriculture	565497	97	65	1	2433	672338	29590
2	Forestry &Logging	13	533	0	0	28479	15234	11425
3	Fishing	0	0	3313	4	55	20120	0
4	Mining	22	0	0	122	6995	29318	2243
5	Construction related Manufacturing	2023	139	777	3769	431098	443927	428036
6	Other Manufacturing	352485	2915	11524	32778	338702	1803305	102125
7	Construction	44987	1910	0	904	5569	3967	5291
8	Electricity, Gas and Water Supply	21834	121	58	10913	106256	251270	5918
9	Transport	24182	1248	552	2975	85324	202612	51564
10	Trade	119024	683	2093	5841	159519	580826	105246
11	Financial Services	28914	126	368	4775	68760	228930	37405
12	Social Services	0	169	0	0	0	0	61
13	Public Administration and Defence	0	0	0	0	0	0	0
14	Other Services	4075	2225	756	4722	29261	189269	14236
	Total	**1163056**	**10166**	**19506**	**66804**	**1262451**	**4441116**	**793140**

Source: the Planning Commission Government of India

Appendix table 1.4a *(Contd…)*
Aggregated Domestic Transactions Matrix of India, 1996-97

(Rs. Billion)

SL No	Sector	8	9	10	11	12	13	14	TOTAL
1	Agriculture	627	19785	0	0	8395	0	83765	1270021
2	Forestry &Logging	0	10	0	0	0	0	768	55684
3	Fishing	0	0	0	0	0	0	0	23492
4	Mining	10071	143	0	0	0	0	206	38700
5	Construction related Manufacturing	314	12667	15037	221	83258	0	3490	1309769
6	Other Manufacturing	34434	337590	53612	11629	13753	0	75990	2643834
7	Construction	26721	21687	17155	4935	2983	0	88495	62628
8	Electricity, Gas and Water Supply	237190	22928	30429	12145	2490	0	20566	396370
9	Transport	45081	49880	226773	19524	7828	0	12567	368457
10	Trade	49063	57751	9503	1867	18462	0	26824	973232
11	Financial Services	33517	62345	64598	63310	33	0	47078	369278
12	Social Services	1	2302	0	0	1261	0	1008	230
13	Public Administration and Defence	0	0	0	0	0	0	0	0
14	Other Services	9871	50449	124387	31441	3864	0	26081	244544
	Total	**446890**	**637537**	**541494**	**145072**	**142327**	**0**	**386838**	**7756239**

Source: the Planning Commission Government of India

Appendix table 1.4b
Aggregated Domestic Transaction Matrix of Vietnam in 1999

(Dongs.Billion)

Sl No	Sector	1	2	3	4	5	6
1	Agriculture	8296	0	38	0	1013	1808
2	Forestry	32	47	4	0	90	30
3	Fishing	248	0	165	0	952	0
4	Mining and Quarrying	0	0	0	145	422	1402
5	Manufacturing	5221	84	751	5796	73450	3339
6	Construction	1809	51	27	386	544	4508
7	Electricity, Gas& Water supply	424	6	6	2578	967	160
8	Transport	615	34	88	637	1118	243
9	Trade	2892	13	137	1872	14028	944
10	Financial services	125	13	16	120	151	217
11	Public Administration & Denfence	0	0	0	0	0	0
12	Social services and other services	1339	12	141	1455	8024	697
	Total	**21001**	**260**	**1373**	**12989**	**100759**	**13348**

Sources: General Department of statistics, Ministry of Planning and Investment, 2000.

Appendix table 1.4b *(contd…)*
Aggregated Domestic Transaction Matrix of Vietnam in 1999

(Dongs.Billion)

Sl No	Sector	7	8	9	10	11	12	Total
1	Agriculture	983	1294	4146	161	0	3674	21413
2	Forestry	6	13	37	0	0	0	259
3	Fishing	0	0	0	7	0	0	1372
4	Mining and Quarrying	360	3	0	140	0	0	2472
5	Manufacturing	1147	1391	9044	529	0	4305	105057
6	Construction	520	1693	6022	14	0	2772	18346
7	Electricity, Gas& Water supply	701	20	194	1	0	578	5635
8	Transport	368	394	2500	6	0	171	6174
9	Trade	325	1630	971	64	0	1120	23996
10	Financial services	70	84	145	14	0	19	974
11	Public Administration & Denfence	0	0	0	0	0	0	0
12	Social services and other services	67	55	336	70	0	199	12395
	Total	**4547**	**6577**	**23395**	**1006**	**0**	**12838**	**198093**

Sources: General Department of statistics, Ministry of Planning and Investment, 2000.

Appendix Table 1.5a
Domestic Technology Matrix of India, 1996- 97
(Domestic Input-Output Coefficient)

Sl No	Sector	1	2	3	4	5	6	7
1	Agriculture	0.1431	0.0008	0.0004	0.0000	0.0013	0.0954	0.0182
2	Forestry & logging	0.0000	0.0043	0.0000	0.0000	0.0154	0.0022	0.0070
3	Fishing	0.0000	0.0000	0.0210	0.0000	0.0000	0.0029	0.0000
4	Mining	0.0000	0.0000	0.0000	0.0004	0.0038	0.0042	0.0014
5	Construction related Mfg.	0.0005	0.0011	0.0049	0.0129	0.2328	0.0630	0.2628
6	Other manufacturing	0.0892	0.0233	0.0731	0.1119	0.1829	0.2558	0.0627
7	Construction	0.0114	0.0153	0.0000	0.0031	0.0030	0.0006	0.0032
8	Electricity, Gas, Water Supply	0.0055	0.0010	0.0004	0.0373	0.0574	0.0356	0.0036
9	Transport	0.0061	0.0100	0.0035	0.0102	0.0461	0.0287	0.0317
10	Trade	0.0301	0.0055	0.0133	0.0199	0.0862	0.0824	0.0646
11	Financial services	0.0073	0.0010	0.0023	0.0163	0.0371	0.0325	0.0230
12	Social Services	0.0000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
13	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	Other services	0.0010	0.0178	0.0048	0.0161	0.0158	0.0268	0.0087
	Total	**0.2942**	**0.0815**	**0.1237**	**0.2281**	**0.6818**	**0.6301**	**0.4869**

Appendix Table 1.5a *(contd...)*
Domestic Technology Matrix of India, 1996- 97
(Domestic Input-Output Coefficient)

Sl No	Sector	8	9	10	11	12	13	14
1	Agriculture	0.0007	0.0140	0.0000	0.0000	0.0137	0.0000	0.0506
2	Forestry & logging	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005
3	Fishing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	Mining	0.0116	0.0001	0.0000	0.0000	0.0000	0.0000	0.0001
5	Construction related Mfg.	0.0004	0.0089	0.0069	0.0003	0.1357	0.0000	0.0021
6	Other manufacturing	0.0397	0.2383	0.0246	0.0145	0.0224	0.0000	0.0459
7	Construction	0.0308	0.0153	0.0079	0.0061	0.0049	0.0000	0.0534
8	Electricity, Gas, Water Supply	0.2738	0.0162	0.0139	0.0151	0.0041	0.0000	0.0124
9	Transport	0.0520	0.0352	0.1039	0.0243	0.0128	0.0000	0.0076
10	Trade	0.0566	0.0408	0.0044	0.0023	0.0301	0.0000	0.0162
11	Financial services	0.0387	0.0440	0.0296	0.0787	0.0001	0.0000	0.0284
12	Social Services	0.0000	0.0016	0.0000	0.0000	0.0021	0.0000	0.0006
13	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	Other services	0.0114	0.0356	0.0570	0.0391	0.0063	0.0000	0.0157
	Total	**0.5157**	**0.4500**	**0.2482**	**0.1804**	**0.2322**	**0.0000**	**0.2335**

Appendix table 1.5b
Domestic technology matrix in Vietnam Economy

Sl No	**Sector**	1	2	3	4	5	6
1	Agriculture	0.0783	0.0000	0.0027	0.0000	0.0052	0.0445
2	Forestry	0.0003	0.0078	0.0003	0.0000	0.0005	0.0007
3	Fishing	0.0023	0.0000	0.0118	0.0000	0.0049	0.0000
4	Mining and Quarrying	0.0000	0.0000	0.0000	0.0040	0.0022	0.0345
5	Manufacturing	0.0493	0.0140	0.0536	0.1598	0.3789	0.0822
6	Construction	0.0171	0.0085	0.0019	0.0106	0.0028	0.1110
7	Electricity, Gas& Water supply	0.0040	0.0010	0.0004	0.0711	0.0050	0.0039
8	Transport	0.0058	0.0057	0.0063	0.0176	0.0058	0.0060
9	Trade	0.0273	0.0022	0.0098	0.0516	0.0724	0.0232
10	Financial services	0.0012	0.0022	0.0011	0.0033	0.0008	0.0053
11	Public Administration & Denfence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	Social services and other services	0.0126	0.0020	0.0101	0.0401	0.0414	0.0172
	Total	**0.1982**	**0.0434**	**0.0980**	**0.3581**	**0.5199**	**0.3285**

Appendix table 1.5b *(continued)*
Domestic technology matrix in Vietnam Economy

Sl No	Sector	7	8	9	10	11	12
1	Agriculture	0.0563	0.0582	0.0427	0.0190	0.0000	0.0560
2	Forestry	0.0003	0.0006	0.0004	0.0000	0.0000	0.0000
3	Fishing	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000
4	Mining and Quarrying	0.0206	0.0001	0.0932	0.0165	0.0000	0.0000
5	Manufacturing	0.0657	0.0625	0.0621	0.0623	0.0000	0.0656
6	Construction	0.0298	0.0761	0.0020	0.0016	0.0000	0.0423
7	Electricity, Gas& Water supply	0.0402	0.0009	0.0258	0.0001	0.0000	0.0088
8	Transport	0.0211	0.0177	0.0100	0.0007	0.0000	0.0026
9	Trade	0.0186	0.0733	0.0015	0.0075	0.0000	0.0171
10	Financial services	0.0040	0.0038	0.0000	0.0016	0.0000	0.0003
11	Public Administration & Denfence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	Social services and other services	0.0038	0.0025	0.0035	0.0082	0.0000	0.0030
	Total	**0.2604**	**0.2957**	**0.2412**	**0.1183**	**0.0000**	**0.1957**

Appendix Table 1.6a
Inverted Residual Domestic Technology Matrix in India, 1996- 97

Sl No	Sector	1	2	3	4	5	6	7
1	Agriculture	1.1861	0.0077	0.0139	0.0223	0.0507	0.1647	0.0494
2	Forestry & logging	0.0008	1.0047	0.0005	0.0010	0.0218	0.0052	0.0133
3	Fishing	0.0005	0.0001	1.0218	0.0005	0.0012	0.0042	0.0006
4	Mining	0.0010	0.0003	0.0006	1.0021	0.0083	0.0076	0.0043
5	Construction related Mfg.	0.0201	0.0116	0.0167	0.0352	1.3440	0.1245	0.3664
6	Other Manufacturing	0.1594	0.0437	0.1123	0.1788	0.3907	1.4344	0.2165
7	Construction	0.0158	0.0173	0.0016	0.0081	0.0156	0.0117	1.0111
8	Electricity, Gas, Water Supply	0.0206	0.0057	0.0087	0.0658	0.1345	0.0887	0.0511
9	Transport	0.0213	0.0149	0.0116	0.0274	0.1045	0.0728	0.0755
10	Trade	0.0541	0.0129	0.0261	0.0445	0.1645	0.1446	0.1236
11	Financial services	0.0202	0.0056	0.0094	0.0322	0.0864	0.0709	0.0589
12	Social Services	0.0000	0.0014	0.0000	0.0001	0.0002	0.0002	0.0002
13	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	Other services	0.0110	0.0213	0.0108	0.0275	0.0512	0.0564	0.0339
	Total	**1.5109**	**1.1472**	**1.2340**	**1.4455**	**2.3736**	**2.1859**	**2.0048**

Appendix Table 1.6a *(contd…)*
Inverted Residual Domestic Technology Matrix in India, 1996- 97

Sl No	Sector	8	9	10	11	12	13	14
1	Agriculture	0.0200	0.0633	0.0161	0.0081	0.0290	0.0000	0.0727
2	Forestry & logging	0.0011	0.0018	0.0007	0.0003	0.0032	0.0000	0.0016
3	Fishing	0.0004	0.0011	0.0003	0.0001	0.0003	0.0000	0.0003
4	Mining	0.0169	0.0025	0.0009	0.0005	0.0015	0.0000	0.0010
5	Construction related Mfg.	0.0302	0.0526	0.0232	0.0081	0.1893	0.0000	0.0311
6	Other Manufacturing	0.1281	0.3750	0.0874	0.0404	0.0972	0.0000	0.0949
7	Construction	0.0480	0.0234	0.0151	0.0108	0.0089	0.0000	0.0576
8	Electricity, Gas, Water Supply	1.3931	0.0513	0.0307	0.0272	0.0283	0.0000	0.0275
9	Transport	0.0953	1.0658	0.1179	0.0325	0.0343	0.0000	0.0211
10	Trade	0.1011	0.0869	1.0230	0.0112	0.0596	0.0000	0.0357
11	Financial services	0.0747	0.0741	0.0464	1.0920	0.0169	0.0000	0.0415
12	Social Services	0.0002	0.0017	0.0002	0.0001	1.0022	0.0000	0.0007
13	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	Other services	0.0331	0.0585	0.0686	0.0469	0.0180	1.0000	1.0245
	Total	**1.9422**	**1.8580**	**1.4305**	**1.2782**	**1.4887**	**1.0000**	**1.4102**

Appendix Table 1.6b
Inverted Residual Domestic Technology Matrix of Vietnam, 1999

Sl No	Sector	1	2	3	4	5	6
1	Agriculture	1.0906	0.0016	0.0060	0.0162	0.0217	0.0609
2	Forestry	0.0004	1.0079	0.0004	0.0002	0.0009	0.0009
3	Fishing	0.0030	0.0001	1.0124	0.0015	0.0082	0.0010
4	Mining and Quarrying	0.0013	0.0005	0.0004	1.0072	0.0045	0.0399
5	Manufacturing	0.1000	0.0265	0.0939	0.2925	1.6448	0.1777
6	Construction	0.0258	0.0109	0.0052	0.0260	0.0192	1.1328
7	Electricity, Gas& Water supply	0.0055	0.0013	0.0012	0.0770	0.0100	0.0091
8	Transport	0.0084	0.0063	0.0077	0.0239	0.0138	0.0105
9	Trade	0.0391	0.0050	0.0180	0.0791	0.1241	0.0447
10	Financial services	0.0017	0.0023	0.0013	0.0043	0.0018	0.0065
11	Public Administration & Denfence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	Social services and other services	0.0187	0.0034	0.0144	0.0540	0.0697	0.0296
	Total	**1.2945**	**1.0658**	**1.1609**	**1.5819**	**1.9187**	**1.5136**

Appendix Table 1.6b *(contd…)*
Inverted Residual Domestic Technology Matrix of Vietnam, 1999

Sl No	Sector	7	8	9	10	11	12
1	Agriculture	0.0708	0.0752	0.0553	0.0227	0.0000	0.0670
2	Forestry	0.0005	0.0008	0.0006	0.0001	0.0000	0.0001
3	Fishing	0.0009	0.0009	0.0010	0.0014	0.0000	0.0008
4	Mining and Quarrying	0.0235	0.0039	0.0032	0.0170	0.0000	0.0023
5	Manufacturing	0.1376	0.1383	0.1748	0.1096	0.0000	0.1260
6	Construction	0.0424	0.0964	0.0768	0.0039	0.0000	0.0527
7	Electricity, Gas& Water supply	1.0450	0.0030	0.0040	0.0022	0.0000	0.0107
8	Transport	0.0253	1.0224	0.0290	0.0020	0.0000	0.0052
9	Trade	0.0359	0.0906	1.0288	0.0025	0.0000	0.0305
10	Financial services	0.0048	0.0048	0.0023	1.0018	0.0000	0.0009
11	Public Administration & Denfence	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
12	Social services and other services	0.0125	0.0115	0.0131	0.0139	0.0000	1.0103
	Total	**1.3992**	**1.4478**	**1.3889**	**1.1771**	**1.0000**	**1.3065**

Appendix Table 1.7a
Value Added and Consumption Proportions in India, 1996-97

SL No	**Sector**	Value Added Proportion	Proportion of Income Spent on the Final Consumption Sectoral Output
1	Agriculture	0.70565	0.18962
2	Forestry &Logging	0.91871	0.00455
3	Fishing	0.87633	0.00795
4	Mining	0.77188	0.00021
5	Construction related Manufacturing	0.31818	0.01593
6	Other Manufacturing	0.37009	0.15367
7	Construction	0.51302	0.00000
8	Electricity, Gas and Water Supply	0.48415	0.00835
9	Transport	0.55005	0.04071
10	Trade	0.75192	0.05737
11	Financial Services	0.81961	0.01004
12	Social Services	0.76802	0.02123
13	Public Administration and Defence	1.00000	0.00000
14	Other Services	0.76646	0.07651

Appendix Table 1.7b
Value Added and Consumptions, 1999 - Vietnam

SL No	**Sector**	Value Added Proportion	Proportion of Income spent on the Final Consumption of Sectoral Output
1	Agriculture	0.8018	0.1982
2	Forestry	0.9566	0.0434
3	Fishing	0.9021	0.0979
4	Mining and Quarrying	0.6419	0.3581
5	Manufacturing	0.4802	0.5198
6	Construction	0.6714	0.3286
7	Electricity, Gas& Water supply	0.7395	0.2605
8	Transport	0.7044	0.2956
9	Trade	0.7589	0.2411
10	Financial services	0.8815	0.1185
11	Public Administration & Denfence	1.0000	0.0000
12	Social services and other services	0.8043	0.1957

Appendix Table 1.8a
Elements of the Extended Inverse Matrix Indicating the Direct, Indirect and Induced Output Effects of Changes in Sectoral Final Demand

Sl No	Sector	1	2	3	4	5	6	7
1	Agriculture	1.8170	0.6386	0.6448	0.6531	0.6816	0.7955	0.6803
2	Forestry & logging	0.0157	1.0196	0.0154	0.0159	0.0367	0.0201	0.0282
3	Fishing	0.0221	0.0218	1.0434	0.0222	0.0228	0.0258	0.0223
4	Mining	0.0061	0.0054	0.0057	1.0071	0.0134	0.0126	0.0094
5	Construction related Mfg.	0.1524	0.1438	0.1490	0.1674	1.4763	0.2566	0.4987
6	Other Manufacturing	0.8580	0.7422	0.8107	0.8773	1.0892	2.1328	0.9150
7	Construction	0.0450	0.0464	0.0307	0.0372	0.0447	0.0408	1.0403
8	Electricity, Gas, Water Supply	0.1132	0.0981	0.1011	0.1583	0.2270	0.1812	0.1436
9	Transport	0.1921	0.1856	0.1824	0.1981	0.2753	0.2436	0.2462
10	Trade	0.3019	0.2606	0.2738	0.2923	0.4122	0.3923	0.3714
11	Financial services	0.1097	0.0951	0.0989	0.1216	0.1759	0.1604	0.1483
12	Social Services	0.0519	0.0532	0.0519	0.0519	0.0521	0.0520	0.0520
13	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	Other services	0.2469	0.2571	0.2466	0.2634	0.2871	0.2923	0.2698
15	Household	2.4163	2.4163	2.4163	2.4163	2.4163	2.4163	2.4163

Appendix Table 1.8a *(contd…)*
Elements of the Extended Inverse Matrix Indicating the Direct, Indirect and Induced Output Effects of Changes in Sectoral Final Demand

Sl No	Sector	8	9	10	11	12	13	14	15
1	Agriculture	0.6509	0.6941	0.6470	0.6389	0.6598	0.6309	0.7035	0.6309
2	Forestry & logging	0.0160	0.0168	0.0156	0.0152	0.0181	0.0149	0.0165	0.0149
3	Fishing	0.0220	0.0228	0.0219	0.0218	0.0220	0.0217	0.0219	0.0217
4	Mining	0.0220	0.0076	0.0059	0.0056	0.0065	0.0051	0.0061	0.0051
5	Construction related Mfg.	0.1624	0.1849	0.1555	0.1403	0.3216	0.1323	0.1634	0.1323
6	Other Manufacturing	0.8267	1.0734	0.7858	0.7388	0.7956	0.6985	0.7933	0.6985
7	Construction	0.0772	0.0525	0.0442	0.0399	0.0380	0.0291	0.0868	0.0291
8	Electricity, Gas, Water Supply	1.4856	0.1437	0.1232	0.1197	0.1207	0.0925	0.1200	0.0925
9	Transport	0.2661	1.2366	0.2886	0.2033	0.2050	0.1708	0.1919	0.1708
10	Trade	0.3489	0.3346	1.2707	0.2590	0.3073	0.2478	0.2835	0.2478
11	Financial services	0.1642	0.1636	0.1359	1.1815	0.1063	0.0895	0.1310	0.0895
12	Social Services	0.0520	0.0536	0.0521	0.0519	1.0540	0.0518	0.0525	0.0518
13	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
14	Other services	0.2690	0.2944	0.3045	0.2827	0.2538	0.2359	1.2604	0.2359
15	Household	2.4163	2.4163	2.4163	2.4163	2.4163	2.4163	2.4163	2.4163

Appendix table 1.8b
Elements of the Extended Inverse Matrix Indicating the Direct, Indirect and Induced Output Effects of Changes in Sectoral Final Demand in Vietnam Economy, 1999

Sl No	Sector	1	2	3	4	5	6	7
1	Agriculture	1.7633	0.6743	0.6787	0.6888	0.6945	0.7334	0.7433
2	Forestry	0.0301	1.0375	0.0300	0.0299	0.0306	0.0306	0.0301
3	Fishing	0.0596	0.0567	1.0690	0.0581	0.0648	0.0576	0.0575
4	Mining and quarrying	0.2200	0.2192	0.2192	1.2260	0.2233	0.2586	0.2422
5	Manufacturing	1.1115	1.0380	1.1054	1.3039	2.6564	1.1889	1.1489
6	Construction	0.2653	0.2503	0.2447	0.2654	0.2586	1.3722	0.2818
7	Electricity, Gas and Water Supply	0.0995	0.0952	0.0951	0.1709	0.1039	0.1030	1.1389
8	Transport	0.0965	0.0944	0.0958	0.112	0.1019	0.0986	0.1134
9	Trade	0.6604	0.6263	0.6394	0.7003	0.7454	0.6659	0.6571
10	Financial Services	0.0553	0.0560	0.0549	0.0579	0.0554	0.0601	0.0585
11	Public Administration and Defence	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	Social Services & Other Services	0.1561	0.1409	0.1519	0.1914	0.2072	0.1670	0.1499
13	Household	3.1664	3.1663	3.1667	3.1663	3.1669	3.1658	3.1659

Appendix table 1.8b *(contd…)*
Elements of the Extended Inverse Matrix Indicating the Direct, Indirect and Induced Output Effects of Changes in Sectoral Final Demand in Vietnam Economy, 1999

Sl No	Sector	8	9	10	11	12	13
1	Agriculture	0.7478	0.728	0.6851	0.6726	0.7397	0.6726
2	Forestry	0.0305	0.0302	0.0293	0.0296	0.0298	0.0296
3	Fishing	0.0575	0.0576	0.0572	0.0566	0.0574	0.0566
4	Mining and quarrying	0.2226	0.2219	0.2324	0.2187	0.2211	0.2187
5	Manufacturing	1.1498	1.1863	1.1056	1.0114	1.1374	1.0114
6	Construction	0.3359	0.3162	0.2397	0.2394	0.2922	0.2394
7	Electricity, Gas and Water Supply	0.0969	0.0979	0.0947	0.0939	0.1046	0.0939
8	Transport	1.1105	0.1172	0.0887	0.0881	0.0933	0.0881
9	Trade	0.7119	1.6502	0.6143	0.6213	0.6517	0.6213
10	Financial Services	0.0584	0.0559	1.0546	0.0536	0.0545	0.0536
11	Public Administration and Defence	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
12	Social Services & Other Services	0.1489	0.1506	0.1492	0.1375	1.1477	0.1375
13	Household	3.1666	3.1667	3.1183	3.1664	3.1664	3.1664

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These tables of India have been generated using the relevant data set provided by the Planning Commission government of India (GOI). Indian Institute of Management Ahmedabad (IIMA) has also generated similar tables using the same data set. We have employed IIMA methodology. There are very insignificant differences between this table and IIMA table. However we acknowledge the sources of the data and methodology used wish usual claimers.