

## Review

# Analyzing inter-sectoral linkages in India

Dilip Saikia

Institute for Financial Management and Research, Chennai- 600034, Tamil Nadu, India. E-mail: [dilip.gu@gmail.com](mailto:dilip.gu@gmail.com).

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**The paper examines the inter-sectoral linkages among the three major sectors- agriculture, industry and service- of Indian economy using the input-output framework. We observed that the inter-sectoral linkages have been undergoing structural changes during the pre- and post-reform periods. The 'agriculture-industry' linkage has not only been deteriorating over the years, it has undergone directional changes as both the production and demand linkages, which were primarily from industry to agriculture in the pre-reform period, transformed to agriculture to industry in the post-reform period. While there has not been any significant interdependence between agriculture and service sectors, there is strong interdependence between industry and service sectors and it has improved in the post-reform period.**

**Key words:** Agriculture, industry, sectoral linkage, service, Indian economy.

## INTRODUCTION

The Indian economy has been undergoing a structural change in its sectoral composition over the years. From a primary agro-based economy during the 1970s, the economy has been emerging as predominant in the service sector since 1990s. This structural change and the uneven pattern of sectoral growth and the recent spurt of service led growth is likely to cause substantial changes in the production and demand linkages among various sectors, which in turn, could have significant implication for the overall growth of the economy. At the same time the changes in the policy environment as a result of the economic reforms process, WTO agreement, and growing integration with the world economy in the post-reform (post 1991) period is also likely to have significant impact on the linkages between different sectors of the economy. It is widely recognized that the burden of structural adjustment and fiscal stabilization has been registered in its most virulent form in the agriculture sector. The post-reform period has witnessed significant decline in capital formation in the agriculture sector, especially in the public sector<sup>1</sup>. The trade liberalization has led to shifts in cropping patterns towards cash crops such as cotton, oilseeds, sugar cane, etc., which not only reducing food availability but also increasing the volatility of agricultural incomes (Jha, 2010). Finally, as a part of the structural change within the industry sector the importance of agro-based industries has come down in the post-reform period. Also the 'jobless' growth of the organized manufacturing sector

and the decline in employment elasticity of the service sector<sup>2</sup> in the post-reform period has put intense pressure in the farms sector, which ultimately end up with vast numbers of workers moved out of the farm sector into self-employment for mere subsistence.

In view of the structural changes in sectoral growth composition of India's economy the present paper examines the inter-sectoral linkages among the three major sectors- agriculture, industry and service- using the input-output framework.

## NATURE OF SECTORAL LINKAGES

The concept of sectoral linkage, which evolved from Hirschman's theory of 'unbalanced growth', has been recognized as playing a crucial role and providing substantial contributions towards guiding the appropriate strategies for future economic development. It describes a sector's relationship with the rest of the economy through its direct and indirect intermediate purchases and sales. The sectors with the highest linkages are likely to stimulate rapid growth of production, income, and employment (Hirschman, 1958).

Because of the mutual interdependence and symbiotic relationship between agriculture and industry, the contribution of agriculture to industry is well known, especially in developing countries. The relationship between agriculture and industry has been seen from

different channels. First, agriculture supplies food grains to industry to facilitate absorption of labor in the industry sector. Secondly, agriculture supplies the inputs like raw cotton, jute, tea, coffee etc. needed by the agro-based industries. Thirdly, industry supplies industrial inputs, such as fertilizer, pesticides, machinery etc. to the agriculture sector. Fourthly, agriculture influences the output of industrial consumer goods through demand. Fifthly, agriculture generates surpluses of savings, which can be mobilized for investment in industry, and other sectors of the economy. Sixthly, fluctuations in agricultural production may affect private corporate investment decisions through the impact of the terms of trade on profitability.

Whereas some of these channels emphasize on the supply side or production side, others stress the linkages through the demand side. The production linkages basically arise from the interdependence of the sectors for meeting the needs of their productive inputs, whereas the demand linkage arises from the interdependence of the sectors for meeting final consumption. Further, based on the direction of interdependence, the linkages can also be categorized into two groups. One is the backward linkage, which identifies how a sector depends on others for their input supplies, and the other is the forward linkage, which identifies how the sector distributes its outputs to the remaining economy.

Unlike the two-way interdependence between agriculture and industry, the linkage between agriculture and service sectors is one-way and it is mainly backward linkage. On the other hand, industry has two-way linkages with the service sector and the level of linkage is much higher compared to agriculture sector. Further, service sector has stronger backward linkages compared to forward linkages with both agriculture and industry (Singh, 2007 and Gordon and Gupta, 2004).

## LITERATURE REVIEW

Most of the studies in India have followed the Lewisian 'two-sector' framework for discussing sectoral linkages. This is because of India's predominantly agrarian economy and an agro-based industrial structure, due to which the interrelationship between agriculture and industry has received major attention among the researchers and policy makers since the beginning of the planning period, while the linkages of service sector with the rest of two sectors has been overlooked. In the pre-independence and early post-independence period, the industry sector had a close relationship with agriculture due to the agro-based industrial structure. Satyasai and Viswanathan (1999) found that the output elasticity of industry with respect to agriculture was 0.13 during 1950/51 to 1965/66. Rangarajan (1982) has found that a 1.0% growth in agricultural production increases industrial

production by 0.5%, and thus, GDP by 0.7% during 1961 to 1972.

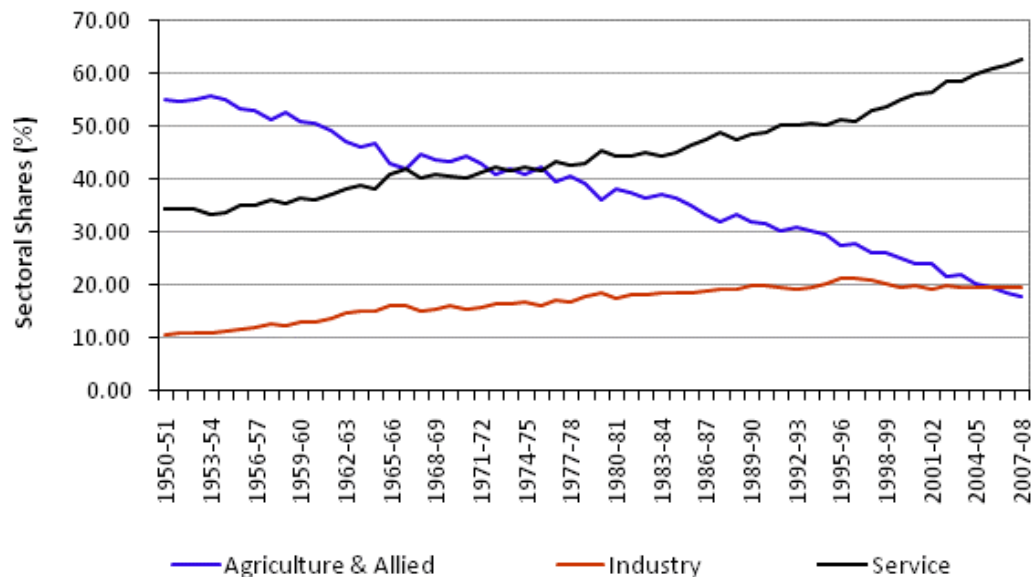
The industrial sector witnessed a slow growth, followed by stagnation since the mid 1960s, which was largely attributed to the stunned agricultural growth and favorable agricultural terms of trade (TOT)<sup>3</sup>, among other factors (Patnaik, 1972; Nayyar, 1978; Bathla, 2003). In fact the interdependence between the two sectors has found to be weakened during the 1980s and 1990s (Bhattacharya and Mitra, 1989; Satyasai and Viswanathan, 1999). For instance, Bhattacharya and Rao (1986) have found that the partial output elasticity of industry with respect to agriculture has declined from 0.15 during 1951/52 to 1965/66 to 0.03 during 1966/67 to 1983/84.

Contradictorily, Satyasai and Viswanathan (1999) found that the output elasticity of industry with respect to agriculture has increased from 0.13 during 1950/51 to 1965/66 to 0.18 during 1966/67 to 1983/84, and then remained at the same level 0.18 during 1984/85 to 1996/97. The deteriorating linkages between agriculture and industry have been primarily credited to the deficiency in demand for agricultural products, decline in share of agro-based industries and slow employment growth (Rangarajan, 1982; Bhattacharya and Rao, 1986; Chowdhury and Chowdhury, 1995). Sastry et al. (2003), for the period 1981/82 to 1999/2000, found that the forward production linkage between agriculture and industry has declined, whereas backward production linkage has increased. They also found significant impact of agricultural output on industrial output, and that agriculture's demand linkage to industry has declined, while that of from industry to agriculture has increased.

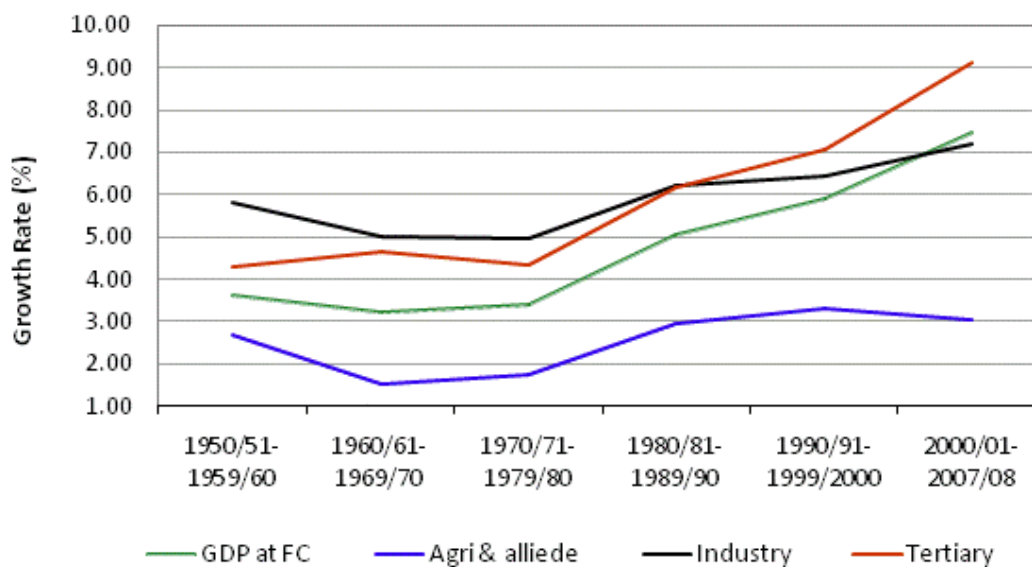
Thus, the existing literature not only provides contradictory results but also do not provide a clear trend of the inter-sectoral linkages in India. Further, the service sector has been overlooked in the literature. The present paper fills this gap by analyzing the interdependence among the three major sectors- agriculture, industry and service- using the input-output framework.

## SECTORAL COMPOSITION OF INDIA'S ECONOMY

Before analyzing the trends in the sectoral linkages, it will be worthwhile to review the sectoral composition of India's economy. Figure 1 presents the temporal behavior of the share of economic activities, clubbed under primary, secondary and tertiary sectors in the national income for the period 1950/51 to 2007/08. Over the years, the share of real income from primary sector (agriculture and allied activities) has declined from 55.0% in 1950/51 to 17.75% in 2007/08. In contrast, industry's share together with electricity, gas, water, sanitation and construction activities considered under the secondary sector has accelerated from 10.16 to 20%, whereas



**Figure 1.** Sectoral share of GDP at FC (at 1999-2000 prices). Source: Handbook of Statistics on Indian Economy (2008, 2009).



**Figure 2.** Sector wise trend growth rate of GDP (at 1999-00 prices). Source: Handbook of Statistics on Indian Economy (2008, 2009).

the tertiary sector's share has gone up from 34.27% to 62.87% during the same period.

A decade-wise trend growth rates in each sector during 1950/51 to 2007/08 indicates a shift towards higher growth only from the early eighties (Figure 2). Before that, primary sector growth rate was below 2.0% in the 1960s and 1970s compared to a higher growth rate of 2.74% during the 1950s. Secondary sector too witnessed a similar picture of high output growth in the 1950s

(6%) and a comparatively lesser rate (5.15% and 5.07%) in the subsequent decades. Further, higher rates of growth achieved in the primary and secondary sectors at 3% and 6.41% during the 1980s remained more or less unchanged in the decade that followed. In contrast, the tertiary sector's growth excelled from 4.40% in the 1950s to 6.35% in the 1980s, to 7.32% in the 1990s and then 9% during 2000/01 to 2007/08, and thus, become the prime mover of overall growth of the economy.

At a glance, the declining share of agriculture to gross domestic product (GDP) gives an indication of waning role of agriculture in the national economy. However, this share does not adequately reflect the role that the agriculture has played and will continue to play in India's economic growth (Vyas, 2004). The sector has exhibited only a marginal decline in the workforce. The sector accommodated 79.9% of the total workforce in 1961, which declined to 59.9% in 2000/01 and then to 52.0% in 2006/07. In absolute terms, agriculture provided employment to 237.8 million persons in 2000/01 (Economic Survey, 2008/2009). Vogel (1994) and Bathla (2003) argued that agriculture continues to be an important sector in terms of positively influencing development of manufacturing and overall economy despite the deceleration in its share in total income.

### INTER-SECTORAL LINKAGES IN INDIA: INPUT-OUTPUT ANALYSIS

The structural relationships among the sectors in an economy are generally examined in different ways. The literature largely focuses on estimating sectoral output growth multiplier, elasticity of sectoral output, employment multiplier, forward and backward linkages, etc. Over the years different methodologies have been developed for these estimates, such as input-output (I-O) analysis, social accounting matrix (SAM), econometric modeling and statistical causality tests, computable general equilibrium modeling (CGE), etc. (Saikia, 2011). However, all these methodologies have their advantages as well as disadvantages. Except the I-O table, SAM and CGE approach other econometric modeling and statistical causality tests have criticized because of the fact that they can estimate only the partial linkages between the sectors. In fact the I-O framework has been criticized because of its static nature and generally related to a reference period (Sonis et al., 1995; Zakariah and Ahmed, 1999) and for not including the flow of capital goods (Bon 2000, cited in Gemmill et al., 2006). In this paper we have employed the input-output methodology to examine the sectoral linkages in India.

### INPUT-OUTPUT FRAMEWORK

An input-output (I-O) table reflects the interdependence among different sectors in an economy. It explains how output of one sector goes into another sector where it is used as an input, and thereby shows interdependence of the sectors, both as buyer of output and as supplier of inputs. Each column of the I-O table represents the value of a sector's inputs, whereas each row represents value of a sector's outputs.

Formally, the I-O framework can be explained as follows; If an economy consists of three sectors: agriculture (1), industry (2) and services (3), then the input-output coefficient matrix of the economy can be written as Equation 1:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \tag{1}$$

Where,  $a_{ij}$  is the amount of  $i^{th}$  input required for producing 1 unit of  $j^{th}$  sector's output. Now, the value added in  $j^{th}$  sector is given by the relation (Equation 2):

$$V_j = 1 - \sum_{i=1}^3 a_{ij} - a_{pj} \tag{2}$$

Where,  $a_{pj}$  is the amount of imported input required per unit of sector  $j$ . Now, given a final demand vector for the three sectors' output ( $F$ ) production and value added in the three sectors are immediately obtained from Equations 1 and 2 as (Equation 3):

$$[I - A]X = F \tag{3}$$

Where,  $X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$  gives the column vector of the three

sectors' gross output,  $x_1$ ,  $x_2$  and  $x_3$  and, represents the three sectors' final demand,  $f_1$ ,  $f_2$  and  $f_3$ .

Pre-multiplying LHS and RHS of (Equation 3) by  $[I - A]^{-1}$  we obtain output of the three sectors,  $X$ , as a function of  $F$  (Equation 4):

$$X = [I - A]^{-1} F \tag{4}$$

The corresponding vector of incomes originating in the three sectors is then given by Equation 5:

$$Y = \begin{bmatrix} y_2 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} v_1 & 0 & 0 \\ 0 & v_2 & 0 \\ 0 & 0 & v_3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} v_1 & 0 & 0 \\ 0 & v_2 & 0 \\ 0 & 0 & v_3 \end{bmatrix} [I - A]^{-1} F \tag{5}$$

Now, the aggregate income of the economy  $Y$  is nothing but the sum of sectoral incomes (Equation 6):

$$Y = \sum_{i=1}^3 y_i \tag{6}$$

**Table 1.** Sectoral share matrices (production linkages).

Sector	Agriculture	Industry	Services
	<b>1968-1969</b>		
Agriculture	0.182	0.127	0.017
Industry	0.043	0.333	0.132
Services	0.016	0.135	0.096
<b>1979-1980</b>			
Agriculture	0.160	0.130	0.039
Industry	0.068	0.345	0.105
Services	0.020	0.149	0.096
<b>1989-1990</b>			
Agriculture	0.166	0.042	0.035
Industry	0.144	0.373	0.172
Services	0.047	0.188	0.185
<b>1993-1994</b>			
Agriculture	0.145	0.035	0.034
Industry	0.140	0.365	0.150
Services	0.048	0.213	0.195
<b>1998-1999</b>			
Agriculture	0.118	0.033	0.025
Industry	0.195	0.421	0.211
Services	0.029	0.101	0.132
<b>2003-2004</b>			
Agriculture	0.196	0.028	0.029
Industry	0.180	0.455	0.216
Services	0.045	0.108	0.129

Source: Compiled from Sastry et al. (2003) and Kaur et al. (2009).

Equations (5) and (6) indicate how aggregate and sectoral incomes of the economy are given by the composition of final demand and the economy's input-output coefficient matrix.

In the I-O framework the measurement of linkages has been made based on either the Leontief production matrix (the Matrix A) or the Leontief inverse matrix  $[(I-A)^{-1}]$ . In India, the I-O tables are prepared by the Central Statistical Organisation (CSO) of the Government of India. These tables are in the form of square matrices, where each row shows the use of output of a sector as inputs used in different sectors and for final use in the economy during the year. They cover all sectors and their subsectors of the economy. As of now, there are 8 such national I-O tables available in India for the years: 1968/69, 1973/74, 1979/80, 1983/84, 1989/90, 1993/94,

1999/00, and 2003/04. These matrices are thus analyzed.

## PRODUCTION LINKAGES

The production linkages basically arise from the interdependence of one sector on others for meeting the needs of their productive inputs. For example, the output of agriculture provides inputs for many industries, such as sugar, cotton textiles, jute textiles, sugarcane, and tobacco. Similarly, agriculture also absorbs the outputs of other sectors as inputs required in the production process. The major industrial outputs coming under this category are fertilizers, pesticides, machine tools, electricity, etc.

Table 1 presents the sectoral share matrix, which explains

the production linkages among various sectors of India's economy. In 1968/69, to produce one unit of agricultural output 0.182 unit of input was required from agriculture itself, 0.043 units from industry and another 0.016 units from service sector. In 1993/94, agriculture's input requirements from industry and service sector was 0.140 units and 0.048 units respectively. This input requirement from industry to agriculture further increased to 0.195 units in 1998/99 and then decline to 0.180 units in 2003/04, whereas that from services to agriculture declined to 0.029 units in 1998/99 and then marginally increased to 0.045 units in 2003/04. This increase in the input proportion from industry to agriculture almost by three times in during 1968/69 to 1993/94 indicates the modernization of agriculture, and thereby, enhancing the dependence of agriculture on the industry for inputs. However, the increase is not much remarkable in the post-reform period, as there has been only around 40% increase during 1993/94 to 1998/99 and then decline during 1998/99 to 2003/04. This is quite surprising because agriculture has a favorable TOT with industry sector during this period, which means income from the farm sector has been increased but it is not realized in the consumption of industrial products.<sup>4</sup>

In respect of industry to produce one unit of output, input requirements from agriculture and service sectors were 0.127 and 0.135 units respectively in 1968/69. However, the input requirement from agriculture has declined to 0.035 units in 1993/94, whereas that of from service sector has increased to 0.213 during the same time. By 2003/04, the industry's input requirement from agriculture further declined to 0.028 units and that from service sector also declined to 0.108 units. The decline in industry's input requirement from agriculture reflects the fact that over the years the industrial sector has become broad based and diversified with different manufacturing activities, and the agro-based industries no longer continue their dominance in India's industrial scenario.

Considering the service sector, the input requirements to produce one unit of service in 1968/69 were 0.017 units from agriculture, 0.132 units from industry and 0.096 units of its own, which increased to 0.034 units from agriculture, 0.150 units from industry and 0.195 units of its own in 1993/94. By 2003/04, service sector's inputs requirements from agriculture has declined to 0.029 units, while that from industry increased to 0.216 units. Thus, as we have argued in an earlier section, service sector has stronger production linkages with industry and the linkages is both way. On the other hand, the sector's linkages with agriculture are not stronger from any of the sides and it has become weaker in the post-reform period.

Now, a comparison of the I-O tables for 1993/94 with 1968/69 and that for 2003/04 with 1993/94 reveals the shifts in industry's production linkages in favor of agriculture moderately and service sector sharply during 1968/69 to

1993/94, whereas there is a halt in the production linkage with agriculture and a significant decline with service sector during the post-reform period (1993/94 to 2003/04).

## DEMAND LINKAGES

The demand linkage among the sectors operates through factor incomes. For instance, as agricultural income increase, this brings about an increase in the demand for industrial consumer goods and some producer goods, such as pumps, tractors, fertilizers, pesticides, etc. and different services such as trade, transport and communication, banking and insurance, hotel and restaurant, etc.

The demand linkages can be examined by using the Leontief inverse matrices, that is, the  $(I - A)^{-1}$  matrix, where 'A' is the I-O coefficient matrix. Such inverse matrices are reported in Table 2. It reveals that a rise in the demand in agriculture by one unit was likely to raise demand for industrial goods by 0.087 units and demand for services by 0.035 units in 1968/69. In 1993/94, one unit of rise in the agricultural output was likely to enhance the demand for industrial goods by 0.297 units and that of for services by 0.149 units. Agriculture's demand linkages to industry further increased to 0.446 units in 2003/04, while that to services declined to 0.123 units during the same.

Unlike the agriculture's demand linkages to industry, the industry's demand linkage to agriculture has been weakened during both the pre- and post-reform periods. On the other hand, industry's demand linkage with services has become double in 1993/94 and then it returned to the initial position in 2003/04. In 1968/69 one unit of rise in industrial output was likely to enhance demand for agriculture commodities by 0.247 units, which declined to 0.087 units in 1993/94 and then to 0.077 units in 2003/04. On the other hand, one unit of rise in industrial output was likely to enhance demand for services by 0.237 units in 1968/69, which considerably increased to 0.457 units in 1993/94 and then declined to 0.247 in 2003/04.

The service sector's demand linkages to agriculture sector have remained more or less same over the pre- and post-reform periods, barring some marginal increase during 1979/80 and then started falling. On the other hand, the sector's demand linkages to industry sector increased by about 44% during 1968/69 to 1993/94 and by about 52% during 1993/94 to 2003/04.

## DISCUSSION

To sum up the major findings, both the production and demand linkages from agriculture to industry have increased during both the pre- and post-reform periods,

**Table 2.** Sectoral demand matrices  $[(I - A)^{-1}]$  (demand linkages).

Sector	Agriculture	Industry	Services
	1968-1969		
Agriculture	1.230	0.247	0.059
Industry	0.087	1.562	0.230
Services	0.035	0.237	1.141
<b>1979-1980</b>			
Agriculture	1.214	0.260	0.083
Industry	0.135	1.601	0.191
Services	0.049	0.269	1.139
<b>1989-1990</b>			
Agriculture	1.220	0.104	0.074
Industry	0.319	1.729	0.378
Services	0.144	0.404	1.318
<b>1993-1994</b>			
Agriculture	1.187	0.087	0.066
Industry	0.297	1.704	0.330
Services	0.149	0.457	1.334
<b>1998-1999</b>			
Agriculture	1.152	0.075	0.051
Industry	0.420	1.831	0.457
Services	0.087	0.216	1.207
<b>2003-2004</b>			
Agriculture	1.265	0.077	0.061
Industry	0.466	1.958	0.501
Services	0.123	0.247	1.213

Source: Compiled from Sastry et al. (2003) and Kaur et al. (2009).

whereas both the linkages from industry to agriculture have declined for both the periods. This implies that while agriculture's dependence on industry for modern inputs has increased, industry's dependence on agriculture for inputs has declined. Also agriculture's income elasticity to industrial goods has been considerably increased, while that of industry to agriculture has been weakened at the same time. Agriculture has a very weak linkage with service in both the production and demand sides, whereas industry's linkage with service sector is very strong from both the sides. The production linkage from industry to service has declined in the post reform period, though it has increased in the pre-reform period, whereas the demand linkage from industry to service has increased during both the periods. Further, both the production and demand linkages from services to industry have considerably increased during both the periods.

The decline in industry's dependence on agriculture can be easily understood from the fact that the share of agro-based industries, which directly depend on agriculture sector for meeting input requirements, has declined in the

post-reform period. As we have reported in Saikia (2011), the share of (organized sector) agro-based industries has come down from 32.91% to 26.59% in gross value added, from 44.55% to 40.37% in number of factories, from 29.72% to 18.02% in net income, and from 34.44 to 27.87% in net inputs during 1980/81 to 2003/04, whereas the share has increased from 44.35% to 47.48% and 12.47% to 26.88% respectively in terms of employment and gross capital formation during the same period. On the other hand, agriculture's increasing dependence on industry can be understood from the increasing farm mechanization and use of modern inputs in agriculture, which includes fertilizers, electricity, diesel, etc. The share of modern inputs (fertilizer, pesticides, electricity and diesel) in agriculture has increased from 2.58% during 1952/53 to 1967/68 to 29.18% during 1978/79 to 1990/91 and then to 38.28% during 1991/92 to 1997/98 (Misra, 2004). In terms of purchase value, the share modern inputs to total inputs (excluding labor) in agriculture is even impressive, and it increased from 5.28% in 1950/51 to 39.15% in 1970/71 and then 87.0%

in 1995/96 (Satyasai and Viswanathan, 1999). Similarly, the consumption of fertilizers (N+P+K) has increased from 53.2 kg/ha of gross cropped area (GCA) in 1950/51 to 9138 kg/ha of GCA in 2000/01, and the consumption of pesticides (technical grade materials) has increased from 1.8 kg/ha of GCA in 1950/51 to 41.0 kg/ha of GCA in 1990/91 and then declined to 23.8 kg/ha of gross cropped area in 2000/01 (reported in Saikia, 2011).

On the demand side, the increase in agriculture's income elasticity to industrial goods is mainly because of the increased farm income owing to a favorable TOT for agriculture. The TOT for agriculture (defined as the relative prices of agricultural to industrial products) in India has found to be favorable since the mid 1960s through 1990/91 to 2006/07, except the unfavorable TOT between 1977/78 and 1983/84 (reported in Saikia, 2011). As Misra (2004) reported, agriculture's purchase of final consumption from non-agriculture sector has increased considerably from Rs. 5435 Crore in 1970/71 to Rs. 20267 Crore in 1997/98 (both the figures are at 1971/72 prices).

The stronger interdependence between industry and service sectors from both the directions in terms of both the production and demand linkages is quite obvious and expected, given the fabulous growth of service sector for the last three decades or so, especially in the post-reform period. The industry sector not only achieved respectable growth during the post-reform period, it has been undergoing structural changes within the sector. Bathla (2003) remarked that the linkage becomes stronger as industrialization proceeds, because with the expansion of industry there will be increased demand for services such as trade, hotels and restaurants, and transportation and communication, banking and insurance and social services such as education, hospitals, and other infrastructure, etc.

Though the weak linkage between agriculture and service is expected for the pre-reform period, it is unexpected for the post-reform period. In recent years, there has been considerable investment in building rural infrastructure and connecting rural areas with the urban market centres. With such initiatives and increase in farm income due to higher productivity and favorable agricultural TOT, it is credible to expect that there will be increased demand for post-harvest facilities such as processing, storage, transport, communication and market, etc., and other specialized services such as transport and communication, banking and financial facilities, hotels and restaurants, etc., which in turn, will strengthen the interdependence between the two sectors.

## CONCLUSION AND IMPLICATIONS

The analysis of the paper reveals that the inter-sectoral

linkages among the major three sectors of the Indian economy have been undergoing structural changes and the traditional 'agriculture-industry' linkage has been deteriorating during the pre- and post-reform periods. While the agriculture-industry linkage was primarily through the production channel in the 1960s through 1980s, it translates primarily through the demand channel since 1990s. Both the production and demand linkages were primarily from industry to agriculture in the pre-reform period, which changed to agriculture to industry in the post-reform period. Further, agriculture's linkage with service is very weak from both the production and demand sides and even it has declined in the post-reform period, whereas industry has very strong production and demand linkages with service and it has improved in the post-reform period.

Given the structural changes in sectoral composition and inter-sectoral linkages several important policy implications regarding India's growth prospects can be drawn:

1. How sustainable is the service led growth? Is it possible to maintain a high economic growth with service sector as the prime mover of growth over a long period? This is because the production of services requires inputs from other sectors (Rakshit, 2007) and the growth of the sector depends on demand from other sectors (Bathla, 2003). Therefore, if the other sectors of the economy will not grow simultaneously then the service sector would be adversely affected by both the demand and supply constraints in the long run.
2. Can it be possible to restore the 'agriculture-industry' linkages? In recent years, India's agriculture sector has undergone significant structural changes in its growth rate and composition. The sector witnessed a shift from food grain production to commercial crops, fruits and vegetables, flower and horticulture, etc. This structural shift along with increasing consumption preferences for processed and differentiated food products, the development of contract farming and vertical linkages in agri-food supply chains, etc. have raised the possibility of enhancing 'agriculture-industry' interdependence in the near future.
3. What policies should be undertaken to enhance agricultural growth? It is well known that the agriculture sector has been bypassed by the economic reforms process. Some of the recent policy initiatives relating to agricultural sector include agriculture trade liberalisation in view with export-import measures, reduction of agriculture subsidies, and increase in procurement prices, etc. Though the sector has benefited from trade policy changes, it has suffered in other respects, most notably from the decline in public investment. Therefore, there is need for reformulating public policies and trade related measures in order to take the advantage of export potential of agro-products.



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