EXPLORING THE EVOLUTION OF INDIA'S ECONOMIC STRUCTURE: THE CASE OF MANUFACTURING-SERVICES INTER-LINKAGES

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The Context

- India's pattern of economic development viewed from the structuralist perspective, has been distinct since the 1990s (Kochhar et. al 2006, Papola 2006, Ghose 2015)
- These studies show that in a cross country analysis India's service sector share in GDP has been comparably much larger and contributed much less to employment share since 1990s
- On the other hand the manufacturing sector contribution to employment and output remained comparably low

- Manufacturing GDP share stagnated at 15-16 percent between 1991-92 and 2012-13 as compared to a rise from 9 percent to 15 percent between 1950-51 and 1990-91
- Manufacturing employment share hovered around 10-12 percent between 1993-94 and 2011-12
- Services GDP share increased from 38 percent to 53 percent between 1991-92 to 2012-13 as compared to a rise from 27 percent to 36 percent between 1950-51 to 1990-91
- Service employment share increased from 21 percent to 27 percent between 1993-94 and 2011-12
- The gap in the average value added between those employed in manufacturing and service sector has been persistently high during the post-reform period

Sectoral structure of growth

- The gap between manufacturing and services annual average growth rates has increased in favour of services since the 1990s
- Service sector has been the fastest growing sector in the Indian economy since 1990-91 (except between 2000-01 to 2009-10 when it was second fastest and only 30 basis points behind construction)

Table 1: Average annual growth rate of sectors in India (at 2004-05 prices)

Sector/Year	1980-81 to 1989-90	1990-91 to 1999-2000	2000-01 to 2009-10	2010-11 to 2015-16
Agriculture, forestry and fishing	3.3	3.1	2.6	2.5
Mining and Quarrying	8.2	4.2	4.6	4.5
Manufacturing	6.4	5.8	8.1	4.0
Electricity, Gas and Water Supply	8.8	7.3	6.0	5.4
Construction	3.8	4.9	9.6	4.6
Services	6.8	8.0	9.3	9.0
GDP	5.4	5.9	7.5	6.7

Source: Author's calculations of Compound Annual growth rates (CAGRs) at 2004-05 prices based on back series, NAS 2011 and NAS 2017, Central Statistics Office, Government of India.

Engines of growth: Structuralist Perspective

- Seminal works of Hirschman (1958) and Kaldor (1967) provide bases for identification of growth-inducing sectors in an economy
- Industrialization through manufacturing sector growth has been central to a Kaldorian economic growth paradigm
- The Hirschmanian arguments rest on the idea of backward and forward linkages of sectors in ascertaining their growth stimulating potential on the economy. Manufacturing activities have implicitly assumed particular significance
- Hirschman suggested the use of input-output tables in assessing inter-sectoral linkages

Engines of Growth: Post 1990s

- Recent works have seriously investigated if there is a role of service sector as a driver of economic growth
- Kucera & Roncolato (2016) identify three important views from the literature on this issue

a) services as a substitute to manufacturing as an engine of growth, (Ghani & O'Connel, 2014)

b) service sector as a leading or lagging complement to manufacturing sector in the growth process, (Dasgupta and Singh, 2006)

c) co-evolutionary movement of services and manufacturing in the growth process (Guerrieri & Meliciani , 2005)

Structural change and Manufacturing-Services Inter-linkages

- Manufacturing-service sector production inter-dependence expected to increase over the course of economic development (Park ,1987; Park & Chan, 1989; Guerrieri & Meliciani , 2005)
- Tregenna (2008) for the South African economy, finds that even with a decline in manufacturing share in GDP and a larger service-GDP share, manufacturing remained more “growth pulling” in terms of its backward linkages with the rest of the economy
- The share of services in manufacturing value added as an input has globally increased since 1990s (Driemeier and Nayyar, 2018, World Bank Report)
- To the best of knowledge, no study has been found to have looked at manufacturing-services production and demand linkages associated with the post-reform structural change in India

Objective of the research

- To understand the evolution manufacturing and service sectors within India's production structure during the post-reforms period
- To understand manufacturing and services production and demand inter-dependence in the Indian economy
- To situate the findings of the analysis in the evolution of structural change during the post liberalization period for India

Data

- Five Input-Output Transactions Tables (IOTTs) available in the post-1990 period have been used
- 1993-94, 1998-99 (115 sectors), 2003-04, 2007-08, 2013-14 (130 sectors)
- Four tables i.e. from 1993-94 to 2007-08 officially available from Central Statistics Office (CSO), Government of India
- 2013-14 table procured from National Council of Applied Economic Research, India. Produced using officially available Supply and Use Table 2012-13 provided by CSO
- Commodity by Commodity tables have been used

- CSO (2012) suggests the use of commodity by commodity table under industry technology assumption:

"***The commodity x commodity table is found to be more suitable in most applications since demand is for a particular commodity or group of commodities and not for the mixed range of output of an industry*** *and thus there is no need to transform the final demand vectors from one unit to another. Moreover, the calculated commodity outputs can be transformed using the market share or product mix matrix into industry output levels. This sequence of calculations makes an industry x industry table unattractive.* ***Further, for a commodity x commodity table, transfers made under the commodity technology assumption, sometimes give rise to negative entries which are difficult to explain****. Thus only commodity x commodity table under industry technology assumption has been presented in the present report*. "

CSO (2012)

Manufacturing and Services in India's Production Structure

Decline in service input cost share in the Indian economy

Table 2: Share of different sectors in total input cost of the Indian economy

S No.	Year	1993-94	1998-99	2003-04	2007-08	2013-14
	Sectors*					
1	Agriculture and Allied activities	15	14	13	12	11
2	Mining and quarrying	7	6	8	9	13
3	Manufacturing	38	39	42	43	41
4	CEW#	9	9	8	8	11
5	Services	30	31	29	29	23
6	Total Input Cost	100	100	100	100	100

Source: Author's calculations based on IOTTs, CSO for the years 1993-94 to 2007-08 and IOTT prepared by Kanhaiya and Saluja (2016) for the year 2013-14

#Construction, Electricity and Water Supply

*Public administration and defense contained "0" entry in all the cases as it only enters IOTTs as a Final expenditure under the head of Government Final Consumption Expenditure

Growth Stimulating Potential

Table 3: Manufacturing and service sector backward-linkages

SNo.	Year	1993-94		1998-99		2003-04		2007-08		2013-14	
	Sectors	M	S	M	S	M	S	M	S	M	S
1	Agriculture, Forestry and Fishing	0.18	0.06	0.21	0.06	0.17	0.06	0.16	0.06	0.20	0.05
2	Mining and Quarrying	0.11	0.03	0.11	0.02	0.16	0.03	0.21	0.03	0.30	0.06
3	Manufacturing	1.60	0.23	1.58	0.24	1.67	0.26	1.74	0.26	1.65	0.29
4	CEW	0.10	0.07	0.10	0.07	0.10	0.05	0.08	0.04	0.13	0.15
5	Services	0.39	1.23	0.38	1.26	0.39	1.24	0.41	1.24	0.31	1.24
6	Bj(Total Backward Linkage=Sum of 1 to 6)	2.37	1.62	2.37	1.65	2.49	1.64	2.60	1.64	2.58	1.79

Source: Same as Table 2

M: Manufacturing; S: Services

Manufacturing and Services: Distribution of demand

Table 4: Distribution of Sector Total Demand (as percentage)

Sector	*Manufacturing sector*			*Service Sector*		
Year	*Intermediate demand*	*Final Demand*	*Total Demand*	*Intermediate demand*	*Final Demand*	*Total Demand*
1993-94	49	51	100	41	59	100
1998-99	47	53	100	39	61	100
2003-04	51	49	100	40	60	100
2007-08	51	49	100	41	59	100
2013-14	49	51	100	36	64	100

Source: Same as Table 2

Manufacturing-Services production inter-dependence

Decline in service input cost share in manufacturing production

Table 5: Manufacturing sector production linkages with different sectors (as % of its total input cost)

S No.	Year	1993-94	1998-99	2003-04	2007-08	2013-14
	Sectors					
1	Agriculture and Allied activities	13.1	15.5	10.7	9.1	14.5
2	Mining and quarrying	9.0	8.6	12.9	15.9	24.1
3	Manufacturing	45.9	44.6	47.0	48.2	43.0
4	CEW	5.5	6.0	5.3	3.5	5.2
5	Services	26.6	25.4	24.2	23.4	13.3
6	Total input cost of manufacturing sector	100	100	100	100	100

Source: Same as Table 2

Service sector more dependent on services vis-à-vis manufacturing

Table 6: Service sector production linkages with different sectors (as % of its total input cost)

S No.	Year	1993-94	1998-99	2003-04	2007-08	2013-14
	Sectors					
1	Agriculture and Allied activities	7.0	6.1	6.4	7.5	3.1
2	Mining and quarrying	1.1	0.9	0.1	0.1	0.3
3	Manufacturing	34.2	34.1	39.3	38.5	32.1
4	CEW	14.4	12.1	8.7	7.5	28.2
5	Services	43.3	46.8	45.5	46.3	36.3
6	Total input cost of service sector	100	100	100	100	100

Source: Same as Table 2

Manufacturing-Services Intermediate demand dependence

Decline in importance of services as a source of manufacturing intermediate demand

Table 7: Manufacturing sector demand linkages with different sectors (as a % of total intermediate demand for manufacturing)

S No.	*Year*	*1993-94*	*1998-99*	*2003-04*	*2007-08*	*2013-14*
	Sectors					
1	Agriculture and Allied activities	7.2	7.3	5.3	3.4	4.3
2	Mining and quarrying	1.3	0.8	1	0.8	1
3	Manufacturing	57.4	56	56.9	60.6	53.1
4	CEW	13.3	12.9	15.6	16.7	24.4
5	Services	20.8	23.1	21.2	18.5	16.6
6	Total intermediate demand for manufacturing sector	100	100	100	100	100

Source: Same as Table 2

Manufacturing remained an important source of service sector intermediate demand

Table 8: Service sector demand linkages with different sectors (as a % of total intermediate demand for services)

S No.	*Year*	*1993-94*	*1998-99*	*2003-04*	*2007-08*	*2013-14*
	Sectors					
1	Agriculture and Allied activities	9.5	6.8	7.7	7.2	5
2	Mining and quarrying	0.9	0.7	0.9	1	4.5
3	Manufacturing	41.6	39.4	41.7	43.9	28.9
4	CEW	15.1	14.1	14.7	14.7	26.3
5	Services	32.9	39.1	35	33.3	33.1
6	Total intermediate demand for service sector	100	100	100	100	100

Source: Same as Table 2

A closer look at the service sector

Table 9: Value added distribution within service sector (as a percentage of total service sector value added)

S No.	*Service Sub-Sectors*	*1993-94*	*1998-99*	*2003-04*	*2007-08*	*2013-14*
1	Wholesale and Retail Trade	29.6	32.1	30.3	32.6	23.4
2	Hotels and restaurants	3.5	2.2	2.9	3.6	3.7
3	Transport and Communication	26.6	17.2	18.9	16.7	14.2
4	Financial Services (Banking and Insurance)	10.2	14.6	13.2	11.4	13.4
5	Real estate, Renting and Business Services (RRB)*	-	-	17.5	20.1	29.4
6	Education and research	5.9	10.2	8	7.6	7.2
7	Medical and health	3.6	2.9	3.9	3.3	3.4
8	Other Services excluding 5 (9-5)#	-	-	5.3	4.6	5.1
9	Other Services plus RRB (8+5)	20.6	20.8	22.8	24.7	34.6
10	Services (sum of 1 to 8)	100	100	100	100	100

Source: Same as Table 2
*Includes real estate services related to commercial and residential buildings, legal services, computer-related services like software publishing, hardware consultancy etc., architectural and engineering services, business and management consultancy, advertising etc.
#Includes community social and personal services like laundry services, hair dressing, television broadcasting and services not elsewhere classified etc.
Note: Data on "5" and "8" is separately unavailable in 1993-94 and 1998-99 but data on "8+5" is available.

Table 10: Employment distribution within service sector (as percentage of total service sector employment)

S No.	*Service Sub-Sectors*	*1993-94*	*1999-00*	*2004-05*	*2009-10*	*2011-12*
1	Wholesale and Retail Trade	42.1	43.5	41.6	40.7	37.0
2	Hotels and restaurants	4.5	5.5	5.9	5.7	6.5
3	Transport and Communication	14.7	17.5	17.8	18.7	19.2
4	Financial Services (Banking and Insurance)	3.6	2.6	2.9	3.6	3.6
5	Real estate, Renting and Business Services (RRB)*	2.3	3.1	4.3	5.4	5.6
6	Education and research	11.5	10.3	11.2	11.0	11.8
7	Medical and health	4.2	3.4	3.5	3.4	3.7
8	Other Services excluding 5 (9-5)#	16.9	14.2	12.9	11.5	12.6
9	Other Services + RRB (8+5)	19.2	17.3	17.2	16.9	18.2
10	Services (sum of 1 to 8)	100	100	100	100	100

Source:Author's calculation using Employment data from Nayyar (2012) and Mehrotra et al. (2014)
*Includes real estate services related to commercial and residential buildings, legal services, computer-related services like software publishing, hardware consultancy etc., architectural and engineering services, business and management consultancy, advertising, legal services, renting of machinery and equipment etc.

Growth Stimulating potential of service sub-sectors on the Indian economy

Table 11: Ranks of service sub-sectors in terms of their total backward linkages

S No.	*Sector*	*1993-94*	*1998-99*		*2003-04*	*2007-08*	*2013-14*
		Total No. of Ranks-12			Total No. of Ranks-21		
1	Air transport	-	-		4	3	1
2	Water transport	-	-		7	7	2
3	Legal services	-	-		18	18	3
4	Communication	8	10		12	11	4
5	Supporting and auxiliary transport activities	-	-		5	5	5
6	Land transport including via pipeline	-	-		3	2	6
7	Storage and warehousing	6	6		6	8	7
8	Other services not elsewhere classified (n.e.c) {S No. 23 minus 3, 9, 10, 11, 13 &15)}	-	-		11	10	8
9	Real estate activities	-	-		16	16	9
10	Renting of machinery & equipment	-	-		21	12	9
11	Other community, social & personal services	-	-		13	15	10
12	Hotels and restaurants	2	2		2	1	12
13	Business services				8	4	13
14	Railway transport services	4	3		1	6	14
15	Computer & related activities	-	-		14	13	15
16	Medical and health	1	1		9	9	16
17	Insurance	9	7		10	14	17
18	Wholesale and retail trade	7	8		15	17	18
19	Banking	11	9		17	19	19
20	Education and research	10	11		19	20	20
21	Ownership of dwellings	12	12		20	21	21
22	Other Transport	3	4		-	-	-
23	Composite Other services (Includes services S No. 3, 8, 9, 10, 11, 13 & 15)	5	5		-	-	-

Source: Same as Table 2

Note: The serial numbers of sectors follow the rank sequence of the year 2013-14 starting from the top ranked sector.

Importance of services sub-sectors in manufacturing production

Table 12: Percentage share of service sub-sectors in manufacturing input cost

S No.	*Sector*	*1993-94*	*1998-99*	*2003-04*	*2007-08*	*2013-14*
1	Railway transport services	1.6	1.4	1.4	1.0	0.7
2	Other transport services	7.4	4.9	5.4	5.9	2.1
3	Storage and warehousing	0.0	0.0	0.0	0.0	0.0
4	Communication	0.7	0.6	1.2	0.8	0.2
5	Wholesale and retail trade	10.2	9.9	9.3	9.7	7.4
6	Hotels and restaurants	0.0	0.0	0.0	0.0	0.1
7	Banking	3.1	5.2	3.7	2.8	1.6
8	Insurance	0.8	0.6	1.1	0.7	0.1
9	Ownership of dwellings	0.0	0.0	0.0	0.0	0.0
10	Education and research	0.0	0.0	0.0	0.0	0.0
11	Medical and health	0.0	0.0	0.0	0.0	0.0
12	Business services	-	-	0.5	0.8	1.1
13	Computer & related activities	-	-	0.3	0.4	0.0
14	Legal services	-	-	0.0	0.1	0.0
15	Real estate activities	-	-	0.0	0.0	0.0
16	Renting of machinery & equipment	-	-	0.0	0.0	0.1
17	Other community, social & personal services	-	-	0.9	1.0	0.0
18	Other services not elsewhere classified (n.e.c) {19-(12 to 17)}	-	-	0.2	0.2	0.0
19	Other services (Sum of 12 to 18)	2.7	2.8	2.1	2.4	1.2
20	All Services	26.6	25.4	24.2	23.4	13.3

Source: Same as Table 2

Major Sources of service sector demand

Table 13: Major components of service sector final demand (as percentage of final demand)

Component of Demand	*Private Final Consumption Expenditure*					*Exports*				
Sector/Year	*1993-94*	*1998-99*	*2003-04*	*2007-08*	*2013-14*	*1993-94*	*1998-99*	*2003-04*	*2007-08*	*2013-14*
Services	74.7	74.3	72.8	65.2	68.2	14.0	10.4	13.5	22.2	20.0

Source: Same as Table 2.

Table 14: **Share of different sectors in PFCE of the Indian Economy**

Sector	1993-94	1998-99	2003-04	2007-08	2013-14
Agriculture, Forestry and Fishing	38	31	26	24	17
Manufacturing	22	25	26	26	29
Services	39	42	47	49	51

Source: Same as Table 2

Table 15: Share of different sectors in Total Exports of the Indian economy

Sector	1993-93	1998-99	2003-04	2007-08	2013-14
Agriculture, Forestry and Fishing	6.5	8.4	4.5	2.9	5.7
Manufacturing	57.2	56.8	53.7	42.7	55.3
Services	34.1	34.0	35.4	48.1	37.8

Source: Same as Table 2

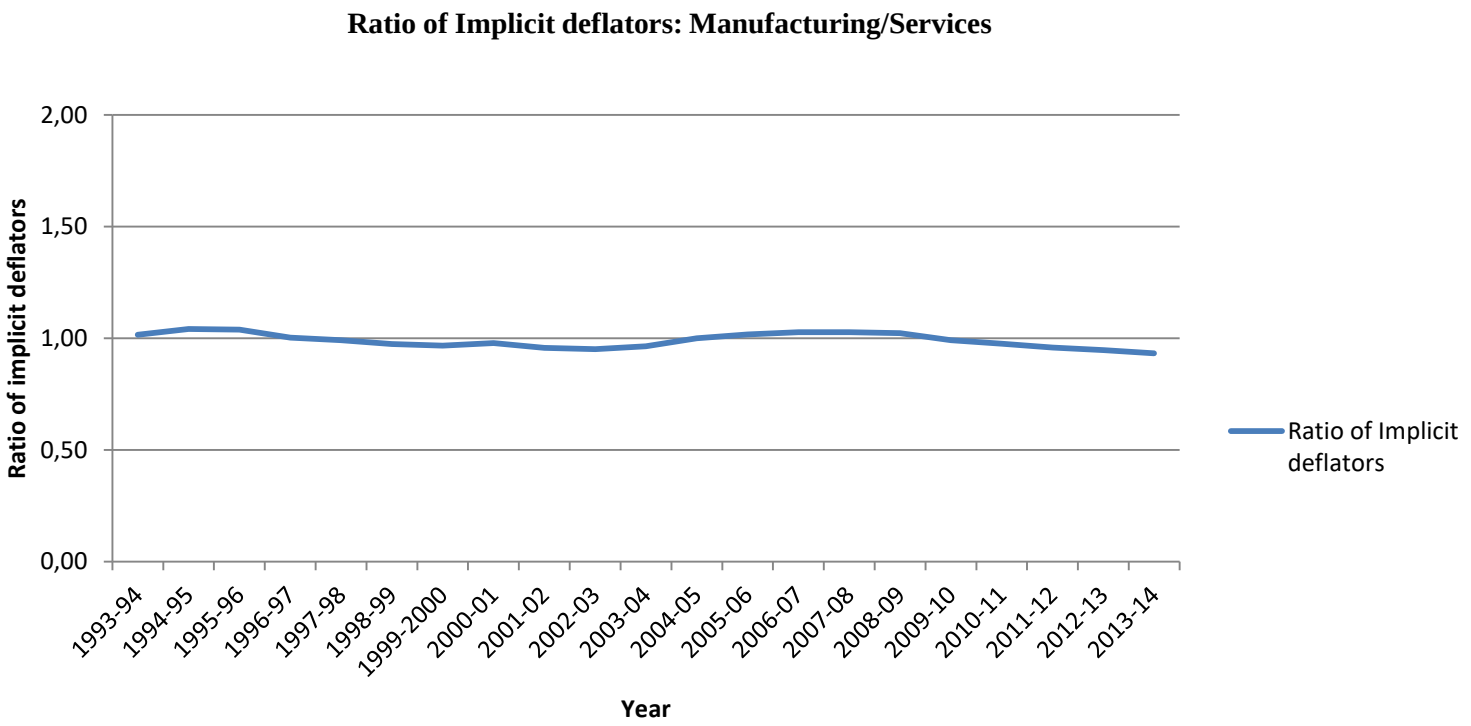
Summing up

Key findings

- Service sector importance in terms of input cost in production of the Indian economy and the manufacturing sector declined during the reforms period.
- It had limited spillover effects through backward-linkages.
- Intermediate demand played a smaller role as compared to final demand as a source of service sector demand. This role even went down further by 2013-14.
- Large gaps in value added share between those collectively associated /employed with modern services as compared to traditional services hinting towards disproportional and lack of broad-based character of service sector growth.
- Fast growing modern services contributed relatively much less to the employment and were not lead services in terms of growth stimulating impact on the economy
- Important role of private consumption as a source of service sector demand and the steep rise in share of services in India's private consumption. Uncharacteristic feature of India's post-reform growth
- Rakshit (2007), Nayyar (2012), Guha (2013) and Ghose (2015) suggest that income inequality has contributed to service sector growth.
- Recently, Basu and Das (2017) have attempted to establish a link between demand pattern and service sector growth but further work seems to be warranted to understand the link between service sector growth and the demand side

APPENDIX

Figure A1



Source: Author's calculation using NAS back series 2011, and NAS 2017, CSO, GOI