



Sector Analysis on Make in India

KEYWORDS

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Background

'Make In India' is a program launched by prime minister "Narendra Modi" to encourage companies to manufacture their products in India. It is an initiative to urge companies — indigenous and international — to invest in India. The focus is on making India a global manufacturing hub. The campaign is aimed to transform the economy from the services-driven growth model to labor-intensive manufacturing-driven growth.

According to Justin Lin, a former chief economist at the World Bank, China will shed 85 million manufacturing jobs in the next few years because of fast rising wages. India can attract some of these jobs—and it desperately needs to—if it can cut bureaucratic hurdles that scare away new businesses.

The program includes major new initiatives designed to facilitate investment, foster innovation, protect intellectual property, and build best-in-class manufacturing infrastructure.

Following 25 sectors are identified under 'Make In India' initiative:

Auto Components	Automobiles	Aviation
Biotechnology	Chemicals	Construction
Defense	Electrical Machinery	Electronic Systems
Food Processing	IT and BPM	Leather
Media Entertainment	Mining	Oil and Gas
Pharmaceuticals	Ports	Railways
Renewable Energy	Roads	Space
Textiles	Thermal Power	Tourism
Wellness		

Of these 25 sectors, Government has allowed 100% Foreign Direct Investment, except in Space(74%), Defense(49%) and News Media(26%).

The objective of 'Make In India' initiative can help India not only to compete with other developed and developing nation but also to improve Employment, Infrastructure, Health, Education and other basic necessities.

Currently, the manufacturing sector in India contributes over 15 per cent of the GDP. The Government of India, under the Make in India initiative, is trying to give boost to the contribution made by the manufacturing sector and

aims to take it up to 25 per cent of the GDP.

India is known for its services export (57% of the GDP contributed from Service sector) and many doubt India's ability on driving the manufacturing sector which is prime objective of 'Make In India' initiative.

65% of India's 1.2 billion populations are under the age of 35. The average age of an Indian in 2020 will be 29, compared with 37 in China and the United States. In the next decade, India is expected to have the largest available workforce in the world. But if the country cannot create jobs for its youth, the demographic advantage would be wasted.

'Make In India' initiatives has soared common man's expectation from the policy makers in achieving better growth rate, employment generation and development. Authors got motivation to study and understand what are the sectors which can do better in manufacturing and other 'Make In India' initiatives. This paper studies the linkage analysis of various sectors which policy makers should consider while planning for allocating the resources to 'Make In India' identified sectors. Linkage analysis will give the current status of sectors inter-dependency relationship. Linkage analysis results can help policy makers to draw suitable policies around key sectors which can be geared towards higher growth of the economy. Also decision maker can focus on weaker sectors for further improvements.

► Review of Literature

Given the importance of the linkage effects for an economy, no doubt there are a number of papers that estimated the linkage coefficients for the sectors for India as well as other countries across the globe. Two strands of literature are observed; one that deals with broad sectors of the economy viz., primary, secondary and tertiary and the other that concentrates on the sub sectors.

For example, using Input-Output (I-O) and simultaneous equation framework, Pr. Ashwani & Pr. Vashist have examined for the years 2003-04 and 2006-07, the importance of sectorial linkages among agriculture, industry and some other sector for Indian economy Using Leontief's I-O framework. The analysis also computes the income effects.

After a longitudinal I-O linkage survey (1993-94, 1998-99 and 2003-04) and calculation Tulika Bhattacharya and Meenakshi Rajeev found that key sectors of Indian economy, which play a positive and important role in determining India's growth process as well as alleviating poverty. In case of direct & indirect forward linkage, the key sectors are 'mining & quarrying (energy + non-energy)', 'ferrous & non-ferrous metals', 'electricity, gas & water supply',

'chemicals & pharmaceuticals', etc. which maintain their trend in all the aforementioned years .

What has come out from the whole discussion is that most of the above mentioned authors have a pre-conceive notion about linkages of certain sectors and thus examined the linkage effect of those specified sector only, while the current research allows the data to speak by computing the extent of linkages of all possible sectors defined by our Prime Minister for 'Make In India'. Thus, the current research is broader in scope than what is done earlier. This paper also defines all strong manufacturing sectors which do not come under 'Make in India' spot light. In this way, the current research fills the gap of the existing literature.

➤ **Research Methodology and Data Sources**

Input-Output Table (IOTT) (*input output coefficient matrix*) for year 2007-2008 prepared by Central Statistical Organization is used as the base for the study. The IOTT has 130 X 130 sector classification.

The methodology use Leontief's input output model, according to which an Input-Output Table reflects inter-industry relationships within an economy, showing how output from one industrial sector may become an input to another industrial sector. In the inter-industry matrix, column entries typically represent inputs to an industrial sector, while row entries represent outputs from a given sector. This format therefore shows how dependent each sector is on every other sector, both as a customer of outputs from other sectors and as a supplier of inputs.

The sectoral strength is captured by the computation of Backward (BL) and Forward linkages (FL). These linkages were first described by Hirschman (1958). Backward Linkage refers to the impact of increase in the output of a downstream industry on its demand for inputs from upstream industries. Forward Linkage refers to the impact of increased production in an upstream industry on requirements of downstream industries.

Following steps are taken to calculate the BL and FL:

1. From IOTT, Leontief Inverse Matrix (L) is calculated to understand interaction between different sectors of economics. Leontief Inverse Matrix is calculated as Leontief Inverse Matrix (L) =

Where, I is 130 X 130 Identity Matrix and A is 130 X 130 *input output coefficient matrix*.

I =

A = where i and j = 130

In Leontief inverse matrix each sector is directly or indirectly linked with other sectors. For each sector j, linkages are of two types: Backward Linkage (BL) and Forward Linkage (FL).

Backward linkages describe direct and indirect economic inputs of other sectors into sector j. Forward linkage describe direct and indirect economic inputs of sector j, into all other sectors.

2. We use concept developed by Rasmussen (1956) and Hirschman (1958) for measuring linkages - Backward Linkage (BL) and Forward Linkage (FL) BL refer to demand-pull concept and FL to supply-push concept.

a) The backward linkage based on the Leontief inverse

matrix is defined as the column sums of the inverse matrix.

$b_{ij} =$ where i and j = 130

Where

Is the element of Leontief inverse matrix that is denoted by L =

Is column multiplier of the sector j

'n' is number of sector in IOTT = 130

b) The Forward linkage based on the Leontief inverse matrix is defined as the row sums of the inverse matrix.

$b_{ij} =$ where i and j = 130

Where

Is the element of Leontief inverse matrix that is denoted by L =

Is row multiplier of the sector i

The usual interpretation as per Rasmussen (1956) and Hirschman (1958) are:

1. $BL_j > 1$ indicates that a unit change in final demand in sector j will create an above-average increase in activity in the economy.
2. $FL_i > 1$, it is asserted that a unit change in all sectors' final demand would create an above-average increase in sector i.
3. A key sector, is usually defined as one in which both indices are greater than 1 i.e. $BL_j > 1$ and $FL_i > 1$.
4. Sector is considered as *backward oriented linkage* if $BL_j > 1$ and $FL_i < 1$.
5. Sector is considered as *forward oriented linkage* if $FL_i > 1$ and $BL_j < 1$.
6. Where both Backward and Forward linkages are less than 1 is considered as *weakly linkage oriented sector*.

Our focus is on key sector as economy grows at faster pace on putting concentration on these sectors.

➤ **Critical Analysis**

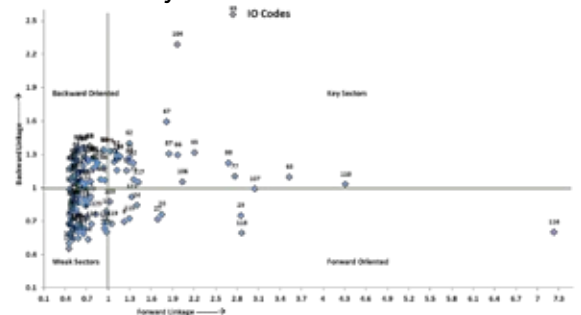


Figure – 1: Key Sectors, Forward, Backward, Weak Linkages in 4 Quadrants

Figure 1, Depicts 4 Quadrants having Key, Backward oriented, Forward Oriented and Weak Linkages based on Hirschman-Rasmussen index. Out of 130 IO Codes, there are 24 Key sectors, 12 Forward Oriented, 43 Backward ori-

ented and 51 Weak sectors. The details are present in Appendix. Tables 1 to table 4 below are based on the backward and forward linkage of the 130 X 130 Matrix of IOTT Coefficients. **Appendix** contains the full details.

Table 1: Key Sectors based on 2007-2008 IOTT

S. No.	IO Code	Commodity	FL	BL	Sector
22		Animal services(agricultural)	1.118459811	1.270748	Animal Husbandry
43		Miscellaneous food products	1.123729146	1.154403	Manufacturing
57		Paper, paper prods. & newsprint	1.258542252	1.150318	Manufacturing
62		Plastic products	1.29570719	1.397629	Manufacturing
63		Petroleum products	3.534716724	1.09444	Manufacturing
65		Inorganic heavy chemicals	2.206212504	1.314836	Manufacturing
66		Organic heavy chemicals	1.97516031	1.29346	Manufacturing
67		Fertilizers	1.817767301	1.591639	Manufacturing
68		Pesticides	1.167671946	1.277927	Manufacturing
72		Synthetic fibers, resin	1.298525998	1.270626	Manufacturing
73		Other chemicals	1.355914903	1.0709	Manufacturing
77		Iron, steel and ferro alloys	2.772345396	1.100579	Manufacturing
78		Iron and steel casting & forging	1.083597994	1.232093	Manufacturing
79		Iron and steel foundries	1.028268955	1.325281	Manufacturing
80		Non-ferrous basic metals	2.68283613	1.22102	Manufacturing
82		Miscellaneous metal products	1.351338322	1.220291	Manufacturing
87		Other non-electrical machinery	1.849414353	1.303556	Manufacturing
92		Communication equipments	1.115854915	1.303381	Manufacturing
93		Other electrical Machinery	1.297366948	1.231314	Manufacturing
95		Ships and boats	2.745354627	2.556871	Manufacturing
104		Aircraft & spacecraft	1.96683387	2.286645	Manufacturing
106		Construction	2.037919998	1.051501	Construction
110		Land transport including via pipeline	4.317280188	1.027153	Land transport including via pipeline
117		Hotels and restaurants	1.423841577	1.045539	Hotels and Restaurants

From **Table 1**, it is observed that, Manufacturing of the IOTT has highest number of Key Sector Linkages. Petroleum products, Ship and Boats, Iron, steel & ferro alloys, Non-ferrous basic metals and Inorganic heavy chemicals are key sectors with greater than 2 Backward Linkage.

Aircraft & spacecraft have greater than 2 Forward Linkage.

Other Key sectors are Animal services (Agriculture), Construction, Land transport including via Pipeline and

Table 2: Forward Oriented Sectors based on 2007-2008 IOTT

S.No.	IO Code	Commodity	FL	BL	Sector
8		Sugarcane	1.223729773	0.691975	Agriculture
20		Other crops	1.750319051	0.759284	Agriculture
24		Other livst. produ.	1.401600705	0.8396	Animal Husbandry

S.No.	IO Code	Commodity	FL	BL	Sector
27		Coal and lignite	1.691630436	0.71574	Mining and Quarrying
29		Crude petroleum	2.853108555	0.748326	Mining and Quarrying
107		Electricity	3.048509325	0.987856	Electricity
109		Railway transport services	1.022255536	0.871986	Railway transport Srv.
115		Communication	1.294800499	0.722386	Communication
116		Trade	7.232110504	0.598697	Trade
118		Banking	2.865580839	0.591328	Banking
119		Insurance	1.052920045	0.676074	Insurance
123		Business services	1.328509693	0.916092	Other Services

From **Table 2**, Shows the Forward Oriented Sectors. It is found that Trade (IO Code 116) has highest Forward linkage followed by IO Electricity (IO Code 107), Crude Petroleum (IO code 29) and Banking (IO Code 118). All these have Forward linkages Greater than 2.

Table 3: Backward Oriented Sectors based on 2007-2008 IOTT

S.No.	IO Code	Commodity	FL	BL	Sector
1		Paddy	0.955344446	1.065356	Agriculture
3		Jowar	0.492625585	1.089591	Agriculture
38		Sugar	0.538911432	1.103313	Manufacturing
39		Khandsari, boora	0.519321804	1.098163	Manufacturing
40		Hydrogenated oil(vanaspati)	0.512079487	1.240298	Manufacturing
41		Edible oils other than vanaspati	0.794418116	1.173849	Manufacturing
42		Tea and coffee processing	0.470868765	1.175991	Manufacturing
44		Beverages	0.532878259	1.164436	Manufacturing
47		Cotton textiles	0.721172341	1.233869	Manufacturing
48		Woolen textiles	0.623249261	1.056149	Manufacturing
49		Silk textiles	0.54899208	1.299258	Manufacturing
50		Art silk, synthetic fiber textiles	0.935439867	1.338494	Manufacturing
53		Readymade garments	0.601978514	1.14063	Manufacturing
54		Miscellaneous textile products	0.804841434	1.256298	Manufacturing
58		Printing and publishing	0.649242051	1.198002	Manufacturing
59		Leather footwear	0.467351744	1.167118	Manufacturing
60		Leather and leather products	0.892377246	1.073284	Manufacturing
61		Rubber products	0.753310245	1.055277	Manufacturing
69		Paints, varnishes and lacquers	0.697047381	1.041737	Manufacturing
70		Drugs and medicines	0.769324818	1.260127	Manufacturing
71		Soaps, cosmetics & glycerin	0.550605064	1.232024	Manufacturing
75		Cement	0.585213475	1.050194	Manufacturing
76		Other non-metallic mineral prods.	0.664748781	1.152942	Manufacturing
81		Hand tools, hardware	0.831341082	1.187435	Manufacturing
83		Tractors and agri. implements	0.530926974	1.21588	Manufacturing

84	Industrial machinery(F & T)	0.645362409	1.361969	Manufacturing
85	Industrial machinery(others)	0.678338807	1.275337	Manufacturing
86	Machine tools	0.935947338	1.179697	Manufacturing
88	Electrical industrial Machinery	0.749631684	1.36769	Manufacturing
89	Electrical wires & cables	0.569402829	1.357944	Manufacturing
90	Batteries	0.560150103	1.256161	Manufacturing
91	Electrical appliances	0.513610901	1.192625	Manufacturing
94	Electronic equipments(incl. TV)	0.952321591	1.332417	Manufacturing
96	Rail equipments	0.819786524	1.243746	Manufacturing
97	Motor vehicles	0.742356138	1.371159	Manufacturing
98	Motor cycles and scooters	0.665343383	1.346685	Manufacturing
99	Bicycles, cycle-rickshaw	0.612738949	1.34144	Manufacturing
100	Other transport equipments	0.473512297	1.066335	Manufacturing
102	Medical, precision optical instrumentations	0.573868135	1.138385	Manufacturing
103	Jems & jewelry	0.715724288	1.246519	Manufacturing
105	Miscellaneous manufacturing	0.852429762	1.219637	Manufacturing
111	Water transport	0.541187115	1.036182	Water transport
112	Air transport	0.672389091	1.005614	Air Transport

Table 3, Shows the Backward Oriented Sectors. Of the 43 Sectors based on IOTT, it is found that manufacturing is the predominant area with good number of sectors having orientation towards Backward Linkage.

Table 4: Weak Sectors based on 2007-2008 IOTT

S. No.	IO Code	Commodity	FL	BL	Sector
2		Wheat	0.707584631	0.849669	Agriculture
4		Bajra	0.488338608	0.773585	Agriculture
5		Maize	0.495716614	0.895864	Agriculture
6		Gram	0.561536618	0.768373	Agriculture
7		Pulses	0.756770113	0.919402	Agriculture
9		Groundnut	0.690893978	0.736414	Agriculture
10		Coconut	0.489722514	0.791972	Agriculture
11		Other oilseeds	0.970573662	0.78663	Agriculture
12		Jute	0.550585783	0.802729	Agriculture
13		Cotton	0.678304233	0.840437	Agriculture
14		Tea	0.565974966	0.65559	Agriculture
15		Coffee	0.52333533	0.800586	Agriculture
16		Rubber	0.59602632	0.663629	Agriculture
17		Tobacco	0.478554293	0.730793	Agriculture
18		Fruits	0.719154467	0.532576	Agriculture
19		Vegetables	0.506347638	0.538747	Agriculture
21		Milk and milk products	0.645369118	0.62357	Animal Husbandry
23		Poultry & Eggs	0.486392483	0.772185	Animal Husbandry

S. No.	IO Code	Commodity	FL	BL	Sector
25		Forestry and logging	0.978988871	0.598581	Forestry and Logging
26		Fishing	0.531187854	0.642782	Fishing
28		Natural gas	0.949909864	0.630889	Mining and Quarrying
30		Iron ore	0.57674949	0.602085	Mining and Quarrying
31		Manganese ore	0.475848181	0.563298	Mining and Quarrying
32		Bauxite	0.460281221	0.579556	Mining and Quarrying
33		Copper ore	0.612837132	0.646059	Mining and Quarrying
34		Other metallic minerals	0.504339205	0.618842	Mining and Quarrying
35		Lime stone	0.48596373	0.712317	Mining and Quarrying
36		Mica	0.45454164	0.67348	Mining and Quarrying
37		Other non metallic minerals	0.654628395	0.583259	Mining and Quarrying
45		Tobacco products	0.503503403	0.841238	Manufacturing
46		Khadi, cotton textiles(handlooms)	0.523796075	0.929323	Manufacturing
51		Jute, hemp, mesta textiles	0.570987092	0.97145	Manufacturing
52		Carpet weaving	0.455495778	0.984225	Manufacturing
55		Furniture and fixtures-wooden	0.58608617	0.98675	Manufacturing
56		Wood and wood products	0.671735013	0.891161	Manufacturing
64		Coal tar products	0.590455287	0.916391	Manufacturing
74		Structural clay products	0.551671986	0.957889	Manufacturing
101		Watches and clocks	0.593718311	0.864282	Manufacturing
108		Water supply	0.527176443	0.868214	Water supply
113		Supporting and aux. tpt activities	0.744601902	0.898934	Supporting and aux. tpt activities
114		Storage and warehousing	0.496460696	0.875633	Storage and warehousing
120		Ownership of dwellings	0.451938119	0.496946	Ownership of dwellings
121		Education and research	0.582983299	0.545604	Education and research
122		Medical and health	0.491256446	0.858233	Medical and health
124		Computer & related activities	0.765334958	0.671806	Other Services
125		Legal services	0.676673946	0.628791	Other Services
126		Real estate activities	0.549095482	0.647344	Other Services
127		Renting of machinery & equipment	0.537364179	0.626706	Other Services
128		O.com, social&personal services	0.94703476	0.673994	Other Services
129		Other services	0.8282729	0.759981	Other Services
130		Public administration	0.451938119	0.451938	Public administration

Table 4 suggests, of the 130 Sectors in IOTT, 51 sectors are weak sectors which have Forward & Backward Linkage less value 1. Of these Agriculture has 16, "Quarrying & mining" and Manufacturing has 9 each and "Other Service" has 6.

➤ **CRITICAL ANALYSIS ON MAKE IN INDIA SECTORS**
 "Make In India" is an initiative discovered in year 2014.

The last data set from Central Statistical Organization (CSO) of India was published in 2007-08. In 2007-08 Statistical Survey works on 24 sectors as discussed in Critical Analysis section.

Within this last six year sectors are shifted, business policies and political frames have changed. In order to perform the critical analysis on 'Make In India' identified 25 sectors, Authors have mapped 130 X 130 IOTT matrix from CSO to 25 sectors mentioned in **Appendix**. Inferences based on BL and FL on 25 Sectors as follows:

1. Automobiles:

Two industries come under this Sector mentioned below along with its backward and Forward Linkage.

SL NO	INDUSTRY	FL	BL
97	Motor vehicles	0.742356138	1.371159482
98	Motor cycles and scooters	0.665343383	1.346685114

Both Forward Linkages are in fraction. According to this data, in this sector no key industry is available. But backward linkage is strong in this sector.

Based on the Make in India Web Portal, Financial benefits proposed by Government to boost this sector are reduction in duties. The reductions are:

- Small cars and motorcycles 12% to 8%
- Commercial vehicles and SUVs 30% to 25%
- Large and mid segment cars 27% to 20%

2. Aviation & Space:

SL NO	INDUSTRY	FL	BL
104	Aircraft & spacecraft	1.96683387	2.286645097
112	Air transport	0.672389091	1.005613743

In this sector Aircraft & Spacecraft comes under Key industry. Air Transport is backward oriented. So Aviation sector is a strong sector for "Make In India".

India government takes some initiative of exemption on duty of aircraft imported services for repair and maintenance. Also takes some initiatives to prepare some airports in Metro Cities.

So this sector also covers a part of Construction and Space sector. Airport preparation is the part of Construction and Spacecraft related to Space.

3. Chemicals: A number of industries are related with this sector.

SL NO	INDUSTRY	FL	BL
65	Inorganic heavy chemicals	2.206212504	1.314835635
66	Organic heavy chemicals	1.97516031	1.293459821
67	Fertilizers	1.817767301	1.591639432
68	Pesticides	1.167671946	1.277926722
69	Paints, varnishes and lacquers	0.697047381	1.041737285
70	Drugs and medicines	0.769324818	1.260126769
71	Soaps, cosmetics & glycerin	0.550605064	1.232023564
72	Synthetic fibers, resin	1.298525998	1.270626117
73	Other chemicals	1.355914903	1.070899774

74	Structural clay products	0.551671986	0.957889153
75	Cement	0.585213475	1.050194021

Inorganic & Organic Chemicals, Fertilizers, Pesticides, Pesticides, Synthetic fibers, resin and Other chemicals comes under key industry. Backward linkage is also strong in Paints, varnishes and lacquers, Drugs and medicines, Soaps, cosmetics & glycerin and Cement. So, this is a strong sector for improvement. Lots of industries are related with this sector.

In 2014-15 union Budget basic custom duty percentages are reduced drastically for various chemicals.

4. Construction, Roads & Highways: This is a collaboration of two sector.

SL NO	INDUSTRY	FL	BL
126	Real estate activities	0.549095482	0.647344195
106	Construction	2.037919998	1.051501493

Construction is a key sector here. Real estate activities are not strong in Forward Backward linkage point of view.

In 2014-15 union Budget "One Hundred Smart City", "Amritsar Kolkata Industrial Corridor", "Chennai-Bengaluru Industrial Corridor", "Bengaluru Mumbai Economic Corridor" and "Vizag-Chennai Corridor" are the positive steps for this sector.

5. Electrical Machinery

SL NO	INDUSTRY	FL	BL
84	Industrial machinery(F & T)	0.645362409	1.361969218
85	Industrial machinery(others)	0.678338807	1.27533662
86	Machine tools	0.935947338	1.179696997
88	Electrical industrial Machinery	0.749631684	1.367690376
89	Electrical wires & cables	0.569402829	1.357943696
90	Batteries	0.560150103	1.256160511
91	Electrical appliances	0.513610901	1.192625424

There are no key industries. But Backward linkages of every Industry are strong.

15% Investment allowances and various Tax deductions steps are taking by India government.

6. Mining

SL NO	INDUSTRY	FL	BL
27	Coal and lignite	1.691630436	0.715740142
30	Iron ore	0.57674949	0.602084723
31	Manganese ore	0.475848181	0.563298357
32	Bauxite	0.460281221	0.579555527
33	Copper ore	0.612837132	0.646058822
34	Other metallic minerals	0.504339205	0.618842466
35	Lime stone	0.48596373	0.712317074
36	Mica	0.45454164	0.673479546
37	Other non metallic minerals	0.654628395	0.583258912
64	Coal tar products	0.590455287	0.91639058
76	Other non-metallic mineral prods.	0.664748781	1.152941599
77	Iron, steel and ferro alloys	2.772345396	1.100578543

78	Iron and steel casting & forging	1.083597994	1.232092649
79	Iron and steel foundries	1.028268955	1.325281271
80	Non-ferrous basic metals	2.68283613	1.221020418
81	Hand tools, hardware	0.831341082	1.187435323
82	Miscellaneous metal products	1.351338322	1.220290821

There is a long list about this sector. But only three key sectors are here. This is not a very strong sector for IOTT point of view.

Some basic Customs Duty relaxations are given on various part of this sector in Union Budget 2014-15.

7. Oil and Gas

SL NO	INDUSTRY	FL	BL
28	Natural gas	0.949909864	0.63088933
29	Crude petroleum	2.853108555	0.748325862
63	Petroleum products	3.534716724	1.094440483

Petroleum product is a Key Sector here. Forward linkage of crud petroleum is also strong. Excise duty cuts of branded petrol from INR 7.50 per liter to INR 2.35 per liter, 15,000 km of gas pipeline and custom reduction is the aggressive steps for India government to improve this sectors.

8. Leather

SL NO	INDUSTRY	FL	BL
59	Leather footwear	0.467351744	1.167117524
60	Leather and leather products	0.892377246	1.073283676

Backward linkages are strong but know Key sectors are here.

Indian Leather Development Program and its subsectors (Mega Leather Clusters, Common Effluent Treatment Plants etc.) are providing some good parentages for the improvement of this sector.

9. Electronic Systems

SL NO	INDUSTRY	FL	BL
92	Communication equipments	1.115854915	1.303381281
93	Other electrical Machinery	1.297366948	1.231313793
94	Electronic equipments(incl.TV)	0.952321591	1.332417239

Communication equipment, other electrical Machinery comes under key sector. Backward linkages of Electronic equipment are also strong.

Basic customs duty on LCD and LED TV panels are reduced in union Budget 2014-15.

10. Thermal Power & Renewable Energy

SL NO	INDUSTRY	FL	BL
107	Electricity	3.048509325	0.987856165

In this sector forward linkage is strong but no key sector linkage is there.

Deen Dayal Upadhyaya Gram Jyoti Yojana, Income Tax reduction for the power sector (generation, distribution and transmission) and ultra-modern super critical coal-based thermal power technology are the initiatives about the im-

provement of Thermal Power sector.

ultra-mega solar power projects in Rajasthan, Gujarat, Tamil Nadu and Ladakh in J&K, Excise duty reduction to zero are the positive steps about Renewable Energy sector.

11. IT and BPM

SL NO	INDUSTRY	FL	BL
115	Communication	1.294800499	0.722385636
123	Business services	1.328509693	0.916092345
124	Computer & related activities	0.765334958	0.671806262

No key sector here but Business Services and Communication have a strong forward linkage.

Pan-India programme – Digital India and a national rural internet and technology mission for services in villages and schools are the steps taken in Union Budget 2014-15.

12. Railways

SL NO	INDUSTRY	FL	BL
96	Rail equipments	0.819786524	1.243746066
109	Railway transport services	1.022255536	0.871985805

No key sector is there.

Incentives are in areas such as rebates in land cost, relaxation in stamp duty on the sale or lease of land, power tariff incentives, concessional rates of interest on loans, investment subsidies/tax incentives, backward areas subsidies and special incentive packages for mega projects are the positive about this sector.

13. Tourism

SL NO	INDUSTRY	FL	BL
117	Hotels and restaurants	1.423841577	1.045538719

This is a key sector.

National Mission on Pilgrimage Rejuvenation and Spiritual Augmentation (PRASAD), National Heritage City Development and Augmentation Yojana (HRIDAY) and Sarnath-Gaya-Varanasi Buddhist circuit are the aggressive steps about this sector.

14. Food Processing

SL NO	INDUSTRY	FL	BL
1	Paddy	0.955344446	1.065356
2	Wheat	0.707584631	0.849668595
3	Jowar	0.492625585	1.089591253
4	Bajra	0.488338608	0.773584774
5	Maize	0.495716614	0.895863843
6	Gram	0.561536618	0.768373392
7	Pulses	0.756770113	0.919401795
8	Sugarcane	1.223729773	0.691974564
9	Groundnut	0.690893978	0.736414389
10	Coconut	0.489722514	0.791971741
11	Other oilseeds	0.970573662	0.786629991
14	Tea	0.565974966	0.655589965
15	Coffee	0.52333533	0.800586101
18	Fruits	0.719154467	0.53257636
19	Vegetables	0.506347638	0.538747254

20	Other crops	1.750319051	0.759284399
21	Milk and milk products	0.645369118	0.623569911
22	Animal services(agricultural)	1.118459811	1.270748349
23	Poultry & Eggs	0.486392483	0.77218494
24	Other liv.st. produ.	1.401600705	0.839600256
25	Forestry and logging	0.978988871	0.598581427
26	Fishing	0.531187854	0.642782351
38	Sugar	0.538911432	1.103313461
39	Khandsari, boora	0.519321804	1.098163339
40	Hydrogenated oil(vanaspati)	0.512079487	1.240298066
41	Edible oils other than vanaspati	0.794418116	1.17384901
42	Tea and coffee processing	0.470868765	1.175991073
43	Miscellaneous food products	1.123729146	1.154402772
44	Beverages	0.532878259	1.164435598

Lots of industries are added with this sector but only two key industries are available only. So, this is not a strong sector in IOTT point of view.

Some Investment allowance and exemption of customs duty is given in this sector improvement.

15.Textiles

SL NO	INDUSTRY	FL	BL
13	Cotton	0.678304233	0.840436754
46	Khadi, cotton textiles(handlooms)	0.523796075	0.929323217
47	Cotton textiles	0.721172341	1.233869374
48	Woolen textiles	0.623249261	1.056148717
49	Silk textiles	0.54899208	1.299258033
50	Art silk, synthetic fiber textiles	0.935439867	1.338494023
51	Jute, hemp, mesta textiles	0.570987092	0.971449904
52	Carpet weaving	0.455495778	0.984225237
53	Readymade garments	0.601978514	1.140629624
54	Miscellaneous textile products	0.804841434	1.256298352

Some of the sectors backward linkages are strong. But no Key Sector is present. So this sector is also not profitable in IOTT view.

Mega textile clusters at Bareilly, Lucknow, Surat, Kutch, Bhagalpur and Mysore and one in Tamil Nadu, Hastkala Academy for the preservation, revival and documentation of the handloom/handicraft sector and handlooms of Varanasi are the forward steps on this sector.

16.Pharmaceuticals

SL NO	INDUSTRY	FL	BL
122	Medical and health	0.491256446	0.858232872

This is a very weak sector in IOTT view.

Full exemption from excise duty is being provided for HIV/AIDS drugs and diagnostic, new drug testing laboratories and some Investment allowances are given for this sector.

17.Ports

SL NO	INDUSTRY	FL	BL
95	Ships and boats	2.745354627	2.556871428

111	Water transport	0.541187115	1.036181799
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Key Sector on this industry is Ships and boats. But this industry is not directly related with this sector. Backward linkage of Water transport is also strong.

'Jal Marg Vikas' and Outer Harbour Project in Tuticorin for Phase I are the forward steps on this sector.

18.Biotechnology

SL NO	INDUSTRY	FL	BL
102	Medical, precision&optical instru.s	0.573868135	1.138384801

Backward linkage is strong in this sector.

A lot of tax reduction and rebates are given in Union Budget 2014-15.

Authors are not able to mark four sectors to 130 X 130 IOTT matrixes. These are:

19.Auto Components

20.Defense

21.Media Entertainment

22.Wellness

Some industries are neglected from 'Make In India' spot light. But these sectors have either very strong FL or BL. These industries are Trade, Land transport including via pipeline, banking, Plastic products and Paper, paper production & newsprint etc. All linkage evolutions are given below.

SL NO	INDUSTRY	FL	BL
116	Trade	7.232110504	0.598696891
110	Land tpt including via pipeline	4.317280188	1.027153039
118	Banking	2.865580839	0.591327695
62	Plastic products	1.29570719	1.397628874
57	Paper, paper prods. & newsprint	1.258542252	1.150317692
103	Jems & jewelry	0.715724288	1.246518627
99	Bicycles, cycle-rickshaw	0.612738949	1.341440416
58	Printing and publishing	0.649242051	1.198002095
61	Rubber products	0.753310245	1.055277155
83	Tractors and agri. imple-ments	0.530926974	1.215880088
119	Insurance	1.052920045	0.67607438
113	Supporting and aux. tpt activities	0.744601902	0.898933691
128	O.com, social&personal services	0.94703476	0.673994409
129	Other services	0.828272942	0.759981102
55	Furniture and fixtures-wooden	0.58608617	0.986750432
56	Wood and wood products	0.671735013	0.891161296
100	Other transport equipments	0.473512297	1.066334931
101	Watches and clocks	0.593718311	0.864281632
108	Water supply	0.527176443	0.868214459
114	Storage and warehousing	0.496460696	0.875632909

12	Jute	0.550585783	0.802729031
45	Tobacco products	0.503503403	0.841237675
125	Legal services	0.676673946	0.628791343
16	Rubber	0.59602632	0.66362854
17	Tobacco	0.478554293	0.730793296
127	Renting of machinery & equipment	0.537364179	0.626705551
121	Education and research	0.582983299	0.545604379
120	Ownership of dwellings	0.451938119	0.496945627
130	Public administration	0.451938119	0.451938119

➤ Conclusion

The above result on IOTT Coefficient linkages suggests which sectors are Key, Forward, Backward and Weak oriented.

Sectors like Aviation, Space, Chemical, Construction, Mining, Electronics & Tourism of "Make In India" have strong

forward-backward linkages. Government should focus on the entire Key Sector (BL > 1 and FL > 1) to grow the economy. Some sectors of "Make In India" are weak. These are Pharmaceuticals, Food processing, textile etc. Government should also focus on sector which has strong Backward and Forward Oriented as these can also help in 'Make In India' successful initiative.

Some industries are having strong linkages but not considered in 'Make In India', Like Trade, Land tpt including via pipeline, Banking, Plastic products, Paper, paper prods, & newsprint. Considering these industries can also help in boost the economy and Government should evaluated these sectors to be part of 'Make In India' initiatives.

➤ Appendix

The table below suggests the Backward and Forward linkage calculated from the IO coefficient data year 2007-2008. Sector activities linked to commodities is based on the central statistical organization (CSO) mapping. Author has tried to map the Commodities with 25 "Make In India" initiatives which are mentioned below.

IO Code	Commodity	Author Assumption on 'Make in India' Associations	Forward Linkage	Backward Linkage	Sector as per CSO
1	Paddy	FOOD PROCESSING	0.955344446	1.065356	Agriculture
2	Wheat	FOOD PROCESSING	0.707584631	0.849669	Agriculture
3	Jowar	FOOD PROCESSING	0.492625585	1.089591	Agriculture
4	Bajra	FOOD PROCESSING	0.488338608	0.773585	Agriculture
5	Maize	FOOD PROCESSING	0.495716614	0.895864	Agriculture
6	Gram	FOOD PROCESSING	0.561536618	0.768373	Agriculture
7	Pulses	FOOD PROCESSING	0.756770113	0.919402	Agriculture
8	Sugarcane	FOOD PROCESSING	1.223729773	0.691975	Agriculture
9	Groundnut	FOOD PROCESSING	0.690893978	0.736414	Agriculture
10	Coconut	FOOD PROCESSING	0.489722514	0.791972	Agriculture
11	Other oilseeds	FOOD PROCESSING	0.970573662	0.78663	Agriculture
12	Jute		0.550585783	0.802729	Agriculture
13	Cotton	TEXTILES	0.678304233	0.840437	Agriculture
14	Tea	FOOD PROCESSING	0.565974966	0.65559	Agriculture
15	Coffee	FOOD PROCESSING	0.52333533	0.800586	Agriculture
16	Rubber		0.59602632	0.663629	Agriculture
17	Tobacco		0.478554293	0.730793	Agriculture
18	Fruits	FOOD PROCESSING	0.719154467	0.532576	Agriculture
19	Vegetables	FOOD PROCESSING	0.506347638	0.538747	Agriculture
20	Other crops	FOOD PROCESSING	1.750319051	0.759284	Agriculture
21	Milk and milk products	FOOD PROCESSING	0.645369118	0.62357	Animal Husbandry
22	Animal services (agricultural)	FOOD PROCESSING	1.118459811	1.270748	Animal Husbandry
23	Poultry & Eggs	FOOD PROCESSING	0.486392483	0.772185	Animal Husbandry
24	Other liv.st. produ.	FOOD PROCESSING	1.401600705	0.8396	Animal Husbandry
25	Forestry and logging	FOOD PROCESSING	0.978988871	0.598581	Forestry and Logging
26	Fishing	FOOD PROCESSING	0.531187854	0.642782	Fishing
27	Coal and lignite	MINING	1.691630436	0.71574	Mining and Quarrying

IO Code	Commodity	Author Assumption on 'Make in India' Associations	Forward Linkage	Backward Linkage	Sector as per CSO
28	Natural gas	O&G	0.949909864	0.630889	Mining and Quarrying
29	Crude petroleum	O&G	2.853108555	0.748326	Mining and Quarrying
30	Iron ore	MINING	0.57674949	0.602085	Mining and Quarrying
31	Manganese ore	MINING	0.475848181	0.563298	Mining and Quarrying
32	Bauxite	MINING	0.460281221	0.579556	Mining and Quarrying
33	Copper ore	MINING	0.612837132	0.646059	Mining and Quarrying
34	Other metallic minerals	MINING	0.504339205	0.618842	Mining and Quarrying
35	Lime stone	MINING	0.48596373	0.712317	Mining and Quarrying
36	Mica	MINING	0.45454164	0.67348	Mining and Quarrying
37	Other non metallic minerals	MINING	0.654628395	0.583259	Mining and Quarrying
38	Sugar	FOOD PROCESSING	0.538911432	1.103313	Manufacturing
39	Khandsari, boora	FOOD PROCESSING	0.519321804	1.098163	Manufacturing
40	Hydrogenated oil(vanaspati)	FOOD PROCESSING	0.512079487	1.240298	Manufacturing
41	Edible oils other than vanaspati	FOOD PROCESSING	0.794418116	1.173849	Manufacturing
42	Tea and coffee processing	FOOD PROCESSING	0.470868765	1.175991	Manufacturing
43	Miscellaneous food products	FOOD PROCESSING	1.123729146	1.154403	Manufacturing
44	Beverages	FOOD PROCESSING	0.532878259	1.164436	Manufacturing
45	Tobacco products		0.503503403	0.841238	Manufacturing
46	Khadi, cotton textiles(handlooms)	TEXTILES	0.523796075	0.929323	Manufacturing
47	Cotton textiles	TEXTILES	0.721172341	1.233869	Manufacturing
48	Woolen textiles	TEXTILES	0.623249261	1.056149	Manufacturing
49	Silk textiles	TEXTILES	0.54899208	1.299258	Manufacturing
50	Art silk, synthetic fiber textiles	TEXTILES	0.935439867	1.338494	Manufacturing
51	Jute, hemp, mesta textiles	TEXTILES	0.570987092	0.97145	Manufacturing
52	Carpet weaving	TEXTILES	0.455495778	0.984225	Manufacturing
53	Readymade garments	TEXTILES	0.601978514	1.14063	Manufacturing
54	Miscellaneous textile products	TEXTILES	0.804841434	1.256298	Manufacturing
55	Furniture and fixtures-wooden		0.58608617	0.98675	Manufacturing
56	Wood and wood products		0.671735013	0.891161	Manufacturing
57	Paper, paper prods. & news-print		1.258542252	1.150318	Manufacturing
58	Printing and publishing		0.649242051	1.198002	Manufacturing
59	Leather footwear	LEATHER	0.467351744	1.167118	Manufacturing
60	Leather and leather products	LEATHER	0.892377246	1.073284	Manufacturing
61	Rubber products		0.753310245	1.055277	Manufacturing
62	Plastic products		1.29570719	1.397629	Manufacturing
63	Petroleum products	O&G	3.534716724	1.09444	Manufacturing
64	Coal tar products	MINING	0.590455287	0.916391	Manufacturing
65	Inorganic heavy chemicals	CAMICALS	2.206212504	1.314836	Manufacturing
66	Organic heavy chemicals	CAMICALS	1.97516031	1.29346	Manufacturing
67	Fertilizers	CAMICALS	1.817767301	1.591639	Manufacturing
68	Pesticides	CAMICALS	1.167671946	1.277927	Manufacturing
69	Paints, varnishes and lacquers	CAMICALS	0.697047381	1.041737	Manufacturing

IO Code	Commodity	Author Assumption on 'Make in India' Associations	Forward Linkage	Backward Linkage	Sector as per CSO
70	Drugs and medicines	CAMICALS	0.769324818	1.260127	Manufacturing
71	Soaps, cosmetics & glycerin	CAMICALS	0.550605064	1.232024	Manufacturing
72	Synthetic fibers, resin	CAMICALS	1.298525998	1.270626	Manufacturing
73	Other chemicals	CAMICALS	1.355914903	1.0709	Manufacturing
74	Structural clay products	CAMICALS	0.551671986	0.957889	Manufacturing
75	Cement	CAMICALS	0.585213475	1.050194	Manufacturing
76	Other non-metallic mineral prods.	MINING	0.664748781	1.152942	Manufacturing
77	Iron, steel and ferro alloys	MINING	2.772345396	1.100579	Manufacturing
78	Iron and steel casting & forging	MINING	1.083597994	1.232093	Manufacturing
79	Iron and steel foundries	MINING	1.028268955	1.325281	Manufacturing
80	Non-ferrous basic metals	MINING	2.68283613	1.22102	Manufacturing
81	Hand tools, hardware	MINING	0.831341082	1.187435	Manufacturing
82	Miscellaneous metal products	MINING	1.351338322	1.220291	Manufacturing
83	Tractors and agri. implements		0.530926974	1.21588	Manufacturing
84	Industrial machinery(F & T)	ELECTRICAL MACHINERY	0.645362409	1.361969	Manufacturing
85	Industrial machinery(others)	ELECTRICAL MACHINERY	0.678338807	1.275337	Manufacturing
86	Machine tools	ELECTRICAL MACHINERY	0.935947338	1.179697	Manufacturing
87	Other non-electrical machinery	Defence Manufacturing	1.849414353	1.303556	Manufacturing
88	Electrical industrial Machinery	ELECTRICAL MACHINERY	0.749631684	1.36769	Manufacturing
89	Electrical wires & cables	ELECTRICAL MACHINERY	0.569402829	1.357944	Manufacturing
90	Batteries	ELECTRICAL MACHINERY	0.560150103	1.256161	Manufacturing
91	Electrical appliances	ELECTRICAL MACHINERY	0.513610901	1.192625	Manufacturing
92	Communication equipments	ELECTRONIC SYSTEM	1.115854915	1.303381	Manufacturing
93	Other electrical Machinery	ELECTRONIC SYSTEM	1.297366948	1.231314	Manufacturing
94	Electronic equipments(incl.TV)	ELECTRONIC SYSTEM	0.952321591	1.332417	Manufacturing
95	Ships and boats	PORTS	2.745354627	2.556871	Manufacturing
96	Rail equipments	RAILWAYS	0.819786524	1.243746	Manufacturing
97	Motor vehicles	AUTOMOBILE	0.742356138	1.371159	Manufacturing
98	Motor cycles and scooters	AUTOMOBILE	0.665343383	1.346685	Manufacturing
99	Bicycles, cycle-rickshaw		0.612738949	1.34144	Manufacturing
100	Other transport equipments		0.473512297	1.066335	Manufacturing
101	Watches and clocks		0.593718311	0.864282	Manufacturing
102	Medical, precision & optical-instrus	BIOTECHNICAL	0.573868135	1.138385	Manufacturing
103	Jems & jewelry		0.715724288	1.246519	Manufacturing
104	Aircraft & spacecraft	AVEATION	1.96683387	2.286645	Manufacturing
105	Miscellaneous manufacturing	Defence Manufacturing	0.852429762	1.219637	Manufacturing
106	Construction	Construction, Roads & Highways	2.037919998	1.051501	Construction
107	Electricity	THERMAL & RENEWABLE POWER	3.048509325	0.987856	Electricity
108	Water supply		0.527176443	0.868214	Water supply
109	Railway transport services	RAILWAYS	1.022255536	0.871986	Railway transport services
110	Land tpt including via pipeline		4.317280188	1.027153	Land tpt including via pipeline

IO Code	Commodity	Author Assumption on 'Make in India' Associations	Forward Linkage	Backward Linkage	Sector as per CSO
111	Water transport	PORTS	0.541187115	1.036182	Water transport
112	Air transport	AVEATION	0.672389091	1.005614	Air Transport
113	Supporting and aux. tpt activities		0.744601902	0.898934	Supporting and aux. tpt activities
114	Storage and warehousing		0.496460696	0.875633	Storage and warehousing
115	Communication	IT	1.294800499	0.722386	Communication
116	Trade		7.232110504	0.598697	Trade
117	Hotels and restaurants	TOURISM & HOSPITALITY	1.423841577	1.045539	Hotels and restaurants
118	Banking	TOURISM & HOSPITALITY	2.865580839	0.591328	Banking
119	Insurance	TOURISM & HOSPITALITY	1.052920045	0.676074	Insurance
120	Ownership of dwellings		0.451938119	0.496946	Ownership of dwellings
121	Education and research		0.582983299	0.545604	Education and research
122	Medical and health	PHARMACEUTICAL	0.491256446	0.858233	Medical and health
123	Business services	IT	1.328509693	0.916092	Other Services
124	Computer & related activities	IT	0.765334958	0.671806	Other Services
125	Legal services		0.676673946	0.628791	Other Services
126	Real estate activities	Construction	0.549095482	0.647344	Other Services
127	Renting of machinery & equipment		0.537364179	0.626706	Other Services
128	O.com, social & personal services		0.94703476	0.673994	Other Services
129	Other services		0.828272943	0.759981	Other Services
130	Public administration		0.451938119	0.451938	Public administration

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