

Employment and Skills in the Three States of the East Coast Economic Corridor

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Employment and Skills in the Three States of the East Coast Economic Corridor

1. Introduction:

The Indian economy is in a transition phase, having moved from a low income country to a low-middle income category in 2007. Due to high growth of output (8 percent per annum 2003-4 to 2013-14) along with structural transformation (falling absolute and percentage share of employment in agriculture and corresponding rise in employment in non-farm sectors³), the incidence of poverty has declined (Planning Commission, 2012). This decline in the incidence of poverty along with increased real wages (particularly in rural areas) influenced household consumption patterns. However, rising capital intensity (see Mehrotra et al., 2014) in manufacturing and high skill demand and supply gaps (see Mitra, 2013) has affected growth of jobs in the non-farm sectors in India.

With recent increased enrolments at secondary and higher level of education (both general and technical educations), large number of youths are expected to enter the labour market (See Rangarajan et al., 2011; Kannan and Raveenran, 2012; Mehrotra et al., 2014; and Mehrotra and Parida, 2017). Unless non-farm sector employment (manufacturing and skilled service sector jobs in particular) is created, the unemployment rate is going to rise for youths joining the labour force with a certain level of education and skills. This rising unemployment among educated youths would hinder the process of structural transformation that began since 2005.

The major objectives of this paper are: (i) to explore the recent trends and patterns of sectoral employment in India; (ii) to identify the sub-sectors of manufacturing, non-manufacturing and service sectors that help growth of non-farm employment between 2011-12 and 2015-16; (iii) to explore the quality of employment generated in non-farm sectors; (iv) and to measure the existing skill gaps (by sectors) which have long term implications on growth of jobs in non-farm sectors.

This paper is organised into seven major sections. Section two discusses sources of data and methodology for sectoral skill gap calculation. In section three we have explained the overall as well as the sub-sectoral employment trends in India and three states under consideration. Section four provides a detailed discussion on skill distribution of the workforce by sub-sectors. In section five we provide the employment trends by size of enterprises. The manufacturing and service sector skill gaps and youth unemployment patterns by level of education is discussed in section six. Finally section seven provides the summary of findings.

³ About 5 million per annum decline of agricultural workforce and with a corresponding 7 million increase of non-farm employment during 2004-05 and 2011-12 (See Mehrotra et al., 2014).

2. Data and Methods

This paper is based on secondary data. For calculating sectoral employment both National Sample Survey (NSS) and Labour Bureau (LB) annual survey data are used. Both 61st round (2004-05) and 68th round (2011-12) of NSS are used. However, due to unavailability of recent NSS data, we have used the most recent LB (2015-16) employment-unemployment data, the sample for which covers about 156,000 households. The sample size covered in LB survey is comparable with that of National Sample Survey (NSS). A few including researchers and government officers stated that LB data is likely to suffer seasonality issues, and hence this data is less used. However, we argue that this data can be used for the analysis of non-farm sector employment in India, as it has hardly anything to do with seasonality. Furthermore, LB survey uses a similar framework and more or less similar set of questions that NSS uses. The sample size of LB is comparable to NSS. Though LB survey started collecting employment and un-employment data since 2010-11, only 2014-15 and 2015-16 data are used for public consumption. Due to unavailability of previous (2013-14 and before) round LB survey data, we have compared the estimates of NSS (up to 2011-12) and LB (2015-16) data. Both NSS and LB estimates are adjusted to total census population (projected for specific period of survey based on monthly exponential growth rates) for generating absolute number of employment, labour force and unemployed population.

Employment, unemployment and labour force estimates are calculated using both usual principal and subsidiary status⁴ of the workers. We have also estimated number and share of workers by their level of skill. The level of skill is based on the level of general, technical and vocational education. When we have categorised general education into various levels viz., illiterates, below primary, primary, middle, secondary, higher secondary, graduate, and post graduate and above etc., we exclude those who have acquired technical education. In case of technical education, we have four major categories viz., no technical education, below graduate level technical education, graduate level technical education, and post graduate and above level technical education. It is important to note that in our estimation, general and technical education categories are two mutually exclusive groups. Because we have separated general education sample from technical education sample by considering only no technical education categories. Those who have at least one technical degree are excluded from general education sample. However, the possession of vocational training information is collected by a separate question in the same survey questionnaire, and hence it is likely to include both general and technical education categories as well. There would be some overlap in this case.

Earlier studies like Mitra (2013) and Estevao and Tsounta (2011), however, used a different skill mismatch index (see Equation 1), using the education level of total population and total workforce.

⁴ The usual principal status activity of any individuals (worker) implies that during a particular year most of the times (normally more than 6 months) he/she is involved in that particular activity. While the subsidiary activity status implies that apart from the principal status if any other activity is performed for a smaller (normally less than 6 months) period of time. While calculating employment status we need to consider both these status because a few individuals do not have any principal status activities, while for some others both principal and subsidiary status is given. Therefore, during the estimation process the double counting is avoided by taking an appropriate measure.

Their index is a bit misleading as it does not provide any specific range of the index to measure high or low skill gap. Furthermore, it is likely to provide only supply side information. Hence we propose a new and appropriate skill gap index (see Equation 2), which can be used to estimate both sector specific and education level wise skill gap index (SGI).

$$SMI = \sum_{j=1}^n (S_{jt} - M_{jt})^2 \quad (1)$$

Where, SGI=skill gap Index

j= skill level and n= number of skill category

S_{jt} =Proportion of population with skill level j at time t

M_{jt} =Proportion of employees with skill level j at time t

$$SGI = \left(\frac{L_{st} - E_{st}^i}{L_{st}} \right) * (1 - S_s^i) \quad (2)$$

Where,

SGI=skill gap Index

S_s^i = Share of workers with S level of skill in the i^{th} sector.

L_{st} =Size of labour force with skill level S at period t

E_{st}^i =Size of workforce with skill level S, in sector I, at period t

This is a qualitative measure of skill gap, which considers both demand and supply side information. In the supply side, we have used the size of labour force by various levels of education. On the demand side, on the other hand, we have used two important pieces of information viz., (i) total *number* of workers in a particular sector (or subsector) by their level of education, and for each level of education, the *share* of workers employed in that particular sector (subsectors).

The range of the SGI is from zero to one. While a SGI value zero implies no skill gap, a value equal to unity implies very severe skill gap. Moreover, we consider four important ranges of values for this SGI. If the SGI value is between 0 to 0.25 implies a low level of skill gap; a value between 0.26 to 0.5 implies moderate skill gap; while SGI value between 0.51 to 0.75 implies a high skill gap; and SGI value greater than 0.75 implies severe degree of skill gap.

This SGI value also reflects the employer's choice and preference pattern for a particular skill category of workers. For example, a low value of SGI implies employer's preference is high and vice versa.

3. Labour force and employment trends in India and three eastern states

3.1. Overall employment trends and its distribution

How many young people are looking for jobs in India in any given year? This has been a question that

has exercised policy makers for many years in India. This is relevant because India's demographic dividend can only be realised if all those joining the labour force actually get non-agricultural jobs. Between independence in 1947 and 2004-5 the share of workforce employed in agriculture was falling slowly, while the absolute numbers in agriculture were increasing, demonstrating that structural transformation in the economy had been slow. This transformation picked up pace after 2004-5, as GDP growth picked up pace after that.

However, a myth has gained ground in India (among policy-makers, academics, journalists) that 12 million are joining the labour force each year, hence 1 mn new jobs must be created every month. Actually, the numbers joining were 12 mn pa only during 1999-2000 to 2004-5, never before nor since then. Between 2004-5 and 2011-12 only 2 mn pa were joining the labour force, and Table 1 shows that that number has not changed since then.

The country's total labour force is clearly growing but overall growth is relatively small between 2011-12 and 2015-16 (5 years). The overall growth in the labour force has been nearly 10 million. However if one looks at the size of the youthful labour force (LF) between ages 15 and 29 there has been a very sharp increase of 40 million from 147 to 187 million. This clearly suggests that, while older members of the workforce are exiting the labour force, all *the increase in the LF is coming from young people leaving school and joining the LF*. In fact it is noticeable that the older part of the LF should have declined by 30 million if the youthful part increased by 40 since the overall increase is only 10 million workers.

In the three states under consideration – Tamil Nadu, Andhra Pradesh and Odisha – the trend in the overall size of the labour force completely mirrors this national increase in the youthful labour force and a decline in the older part of the labour force. In fact the increases in the overall size of the labour force in the 3 states is entirely explained by the rise in the young joining the labour force. The Industrial Corridor between Vizag and Chennai will need to play a major role in absorbing these young.

Since the workforce for total employment tends to track the size of the labour force we note from table 1 that the numbers employed have also been systematically rising. It is not suggested here that the rising quantity of employment automatically translates into improving quality of jobs.

Sectoral trends

Table 1b shows that the share of the workforce in *agriculture* has been falling steadily, but the fall slowed sharply after 2011-12, when the pace of non-agricultural job growth slowed (along with GDP growth). The most remarkable development is that there has been a sharp slowdown since 2012 in the numbers leaving agriculture in the total Indian workforce compared to the period between 2011-12 and 2015-16. Between 2011-12 and 2015-16 there has been a minor decrease in the numbers employed in agriculture from 230 to 225 million. However, the much more remarkable fact is that while there was a fall in the number of youth in agriculture between 2004-05 and 2011-12, after 2011-12 there has been a significant *increase* in youth remaining in agriculture. In fact there was a 24 million increase of youth in agriculture; as a result the share of 15-29 year olds who were employed in agriculture rose from 44% to 47%. At first glance this may seem a bit counterintuitive. However on reflection it is clear that

t there are two groups of youth here. First, one has to recognise that census 2011 told us that there was a very large cohort between the ages of 5 and 19 who were neither in work nor in school in that year. That number amounted to some 88 million between the ages of 5 and 19 in the year 2011. They had either never been to school or had been enrolled and then dropped out. Clearly a rising share of uneducated youth have joined agriculture having nowhere else to go given that job growth since 2011-12 in the economy even in construction has not been significant. Second, it is also clear that a growing proportion of youth are going to school. As we will discuss in a later section (see Table 9 on this subject), the lack of non-agricultural jobs has meant that even these educated youth are remaining in agriculture, or at least they are declaring to the enumerators (of the Labour Bureau Household Survey during 2015-16) that they are working in agriculture – even though there might be little work for them. After all, women are leaving agriculture in very large numbers due to a series of factors (on which see Mehrotra and Sinha, 2017; Mehrotra and Parida, 2017), so demand for labour in agriculture is falling generally (except for MGNREGA type of work).

Between 2004-5 and 2011-12 there was a very sharp increase in those employed in *construction* within non-manufacturing, which can be explained by the significant investment in infrastructure and real estate that occurred over that period (to which both the public and private sectors contributed). That increase has clearly slowed significantly after 2011-12. This is evident from the rather small increase of 5 million in the total workforce in non-manufacturing whether it is among youth or the total workforce. So while non-manufacturing had seen a near doubling in its share in employment between 2004-5 and 2011-12, there is a decline in its share since then.

How slow job growth has been since 2011/12 is demonstrated by the fact that the *manufacturing* workforce has declined overall and for youth as well. It appears that as GDP growth slowed after 2011-12, youth – who had benefitted significantly in terms of jobs in manufacturing – have suffered disproportionately after 2011-12 due to the manufacturing slowdown (see table on sectoral value added growth). The share of all youth who had manufacturing jobs in 2015-16 is much lower than in 2011-12. The period between 2010 and 2015 saw a remarkable increase in secondary school enrolment in India, from 58% to 85% for the relevant age cohort. In other words, just as more and more youth were getting better education, fewer were being able to find employment in manufacturing. In fact, clearly manufacturing, far from being an absorber of surplus labour, has in fact been shedding labour since 2011-12. This is consistent with the slow growth rate of manufacturing in the last 5 years. Not surprising also that youth were resorting to remain in agriculture after 2011-12.

What is clear in fact is that the only sector of the economy that has seen a significant increase in absorption of surplus labour especially of the young joining the labour force, is *services*, in which employment has jumped from 36 million in 2011-12 to nearly 52 million in 2015-16 for youth and for all labour from 127 to 141 million. Services employment grew not only significantly between 2004-5 and 2011-12 but also between 2011-12 and 2015-16. The share of services as an employing sector also rose for both groups since 2004-5 consistently.

Overall and sectoral employment trends in Tamil Nadu, Andhra Pradesh and Odisha

For the three states under consideration the agricultural work force grew after 2011-12 although it had fallen between 2004-5 and 2011-12. This is a distressing development. Table 1a shows that the share of the youthful labour force absorbed by agriculture also grew in each of the three states.

An equally distressing development is that the manufacturing workforce has fallen for both the entire workforce as well as for youth in all 3 states. The size of services employment for the entire labour force as well as youth in all 3 states has risen. As far as non-manufacturing employment, which is mostly accounted for by construction employment, the fast pace of growth between 2004-5 and 2011-12 has not been sustained at all since 2011-12. However, at least the share of construction employment has continued to rise in all three states throughout the period under examination. In other words, construction was likely to be absorbing some of the educated as well as uneducated youth joining the labour force.

Table 1A: Sectoral Employment Trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Sectors	Absolute Number of Workers (in million)					
	<i>All ages (15 years and above)</i>			<i>Youths (15 to 29 years)</i>		
	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015-16</i>
Tamil Nadu						
Agriculture	15.1	11.5	11.8	3.7	1.8	3.4
Manufacturing	6.3	6.5	5.8	2.6	2.3	1.9
Non-manufacturing	2.2	4.6	5.1	0.8	1.1	1.6
Service	8.9	10.2	11.1	2.6	2.9	3.7
Total employment	32.6	32.8	33.7	9.7	8.1	10.6
Unemployed	0.6	0.8	1.2	0.5	0.7	0.6
Labour force	33.2	33.6	34.9	10.2	8.7	11.1
Andhra Pradesh						
Agriculture	23.1	21.1	23.8	7.9	5.3	8.2
Manufacturing	4.2	4.0	3.6	1.9	1.3	1.2
Non-manufacturing	2.3	3.8	4.0	1.0	1.3	1.5
Service	9.5	11.1	10.3	3.3	3.2	3.5
Total employment	39.0	39.9	41.8	14.2	11.2	14.4
Unemployed	0.5	0.8	1.5	0.5	0.7	0.7
Labour force	39.6	40.7	43.2	14.7	11.9	15.1
Odisha						
Agriculture	10.5	9.7	8.1	3.7	2.6	2.7
Manufacturing	1.9	1.7	1.3	0.7	0.6	0.4
Non-manufacturing	1.2	2.3	2.7	0.4	0.8	1.0
Service	3.1	3.8	5.2	0.9	1.0	1.7
Total employment	16.6	17.5	17.2	5.8	5.0	5.9
Unemployed	1.1	0.4	0.6	0.8	0.3	0.3
Labour force	17.7	17.9	17.8	6.6	5.3	6.1
All India						
Agriculture	266.2	230.4	225.0	86.8	60.9	84.8
Manufacturing	53.1	58.9	49.8	22.7	22.2	19.5
Non-manufacturing	29.6	55.2	59.6	11.7	19.4	24.0
Service	107.5	127.3	140.8	34.9	35.8	51.7
Total employment	456.5	471.8	475.2	156.1	138.4	179.9
Unemployed	10.7	10.3	16.5	9.0	9.0	7.3
Labour force	467.2	482.2	491.7	165.1	147.4	187.2

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 1B: Sectoral Employment (%) Trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Sectors	Percentage share of Workers					
	<i>All ages (15 years and above)</i>			<i>Youths (15 to 29 years)</i>		
	2004-05	2011-12	2015	2004-05	2011-12	2015-16
Tamil Nadu						
Agriculture	46.3	35.1	35.0	38.1	22.2	32.1
Manufacturing	19.3	19.8	17.2	26.8	28.4	17.9
Non-manufacturing	6.7	14.0	15.1	8.2	13.6	15.1
Service	27.3	31.1	32.9	26.8	35.8	34.9
WPR	65.9	58.1	57.4	59.1	45.5	59.0
UR	1.8	2.4	3.4	4.9	8.0	5.4
LFPR	67.1	59.5	59.4	62.2	48.9	61.8
Andhra Pradesh						
Agriculture	59.2	52.9	56.9	55.6	47.3	56.9
Manufacturing	10.8	10.0	8.6	13.4	11.6	8.3
Non-manufacturing	5.9	9.5	9.6	7.0	11.6	10.4
Service	24.4	27.8	24.6	23.2	28.6	24.3
WPR	69.4	62.0	62.4	65.7	48.2	64.0
UR	1.3	2.0	3.5	3.4	5.9	4.6
LFPR	70.4	63.3	64.5	68.0	51.3	67.1
Odisha						
Agriculture	63.3	55.4	47.1	63.8	52.0	45.8
Manufacturing	11.4	9.7	7.6	12.1	12.0	6.8
Non-manufacturing	7.2	13.1	15.7	6.9	16.0	16.9
Service	18.7	21.7	30.2	15.5	20.0	28.8
WPR	62.1	57.1	53.9	55.8	49.3	55.4
UR	6.2	2.2	3.4	12.1	5.7	4.9
LFPR	66.2	58.4	55.7	63.5	52.2	57.2
All India						
Agriculture	58.3	48.8	47.3	55.6	44.0	47.1
Manufacturing	11.6	12.5	10.5	14.5	16.0	10.8
Non-manufacturing	6.5	11.7	12.5	7.5	14.0	13.3
Service	23.5	27.0	29.6	22.4	25.9	28.7
WPR	62.2	54.7	52.4	54.8	43.2	53.3
UR	2.3	2.1	3.4	5.5	6.1	3.9
LFPR	63.7	55.9	54.2	57.9	46.0	55.5

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

3.2. Sub-sectoral employment trends and its composition

Here we examine the trends in employment within manufacturing, non-manufacturing and services.

Manufacturing

Table 2 shows that total manufacturing employment has *fallen significantly* between 2011-12 and 2015-16 by a sharp 10 million (as we noted above), after having risen earlier. In the period between 2004-5 and 2011-12 manufacturing employment growth was reasonably robust (grew by 6 million).

All the *labour intensive* manufacturing sectors like food processing, tobacco, textiles, apparel, leather, wood and furniture have seen a decline at the all India level. Only the tobacco and textiles sub-sectors within manufacturing have seen a fall in their share of total manufacturing employment in India. The fall in the textiles' share requires policy attention, while the fall in tobacco is consistent with government policy to reduce tobacco consumption in the country.

There has been some absolute increase in employment across India in the relatively *capital intensive* sectors like chemicals, basic metals, electronics and electrical machinery, medical instruments and motor vehicles.

In Tamil Nadu a most important labour intensive sector is leather. While labour intensive manufacturing sectors have seen an absolute decline in manufacturing employment, the leather sector experienced some growth in employment. However it is disturbing that in Tamil Nadu, which is one of the relatively industrialized states of India, capital-intensive manufacturing has not shown employment growth, although between 2004-5 and 2011-12 it seemed to be performing slightly better. Manufacturing employment growth in Tamil Nadu was not particularly impressive in any of the sectors except apparel between the period 2004-5 and 2011-12, but since then the sector has shed workers.

In Andhra Pradesh apparel is the only labour intensive manufacturing sector that has seen an increase of employment. All other labour intensive manufacturing has shown a decline. It is not only labour intensive manufacturing but all manufacturing employment that suffered a decline after 2011-12.

In Odisha overall manufacturing employment has not only fallen between 2004-5 and 2011-12 but also since then. This is particularly worrying since Odisha is not one of the states where manufacturing is particularly important as an employer in any case. Both Tamil Nadu and Andhra Pradesh have much larger manufacturing employment levels compared to Odisha. The only manufacturing sector in Odisha which has shown a minor increase in employment is apparel. All other manufacturing sectors account for very little employment in Odisha. Clearly, VCIC should play an important role in increasing manufacturing output and employment in Odisha.

Table 2A: Sub-sector wise manufacturing employment trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015.

Sub-sectors	Absolute number of employment (in million)											
	<i>Tamil Nadu</i>			<i>Andhra Pradesh</i>			<i>Odisha</i>			<i>All India</i>		
	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>
Food & Beverages	0.49	0.57	0.46	0.63	0.59	0.54	0.17	0.20	0.14	5.51	6.40	5.30
Tobaco Products	0.41	0.47	0.24	0.68	0.66	0.06	0.14	0.11	0.06	4.51	4.74	2.78
Textiles	1.92	1.67	1.48	0.83	0.33	0.59	0.18	0.04	0.16	9.35	9.02	6.70
Wearing Apparel	0.69	0.96	0.89	0.54	0.83	0.92	0.09	0.19	0.18	7.24	9.41	9.29
Leather Products	0.20	0.26	0.39	0.04	0.03	0.01	0.00	0.00	0.01	1.23	1.22	1.53
Wood Products	0.41	0.34	0.19	0.37	0.31	0.23	0.70	0.48	0.11	5.15	3.80	1.97
Paper Products	0.05	0.08	0.05	0.02	0.08	0.02	0.02	0.01	0.03	0.58	0.54	0.41
Printing media	0.15	0.09	0.07	0.06	0.05	0.05	0.01	0.00	0.00	0.93	0.62	0.52
Petroleum Products	0.04	0.00	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.11	0.15	0.11
Chemical Products	0.56	0.25	0.29	0.10	0.05	0.04	0.01	0.01	0.00	1.99	1.16	0.99
Rubber & Plastics	0.06	0.12	0.11	0.02	0.01	0.02	0.01	0.00	0.01	0.76	1.13	1.08
Non-metalic Products	0.25	0.25	0.17	0.36	0.24	0.20	0.34	0.19	0.11	4.43	4.92	3.34
Basic metals	0.06	0.08	0.17	0.07	0.05	0.12	0.08	0.16	0.16	0.97	1.50	2.54
Fabricated Metals	0.27	0.38	0.28	0.14	0.18	0.10	0.06	0.04	0.04	2.56	2.97	1.53
Machinery Equipment	0.13	0.11	0.07	0.07	0.02	0.02	0.01	0.01	0.01	1.30	0.97	0.39
Electronics machinery	0.02	0.05	0.04	0.02	0.03	0.01	0.00	0.00	0.00	0.25	0.43	0.40
Electrical machinery	0.04	0.05	0.09	0.01	0.02	0.05	0.00	0.02	0.01	0.69	0.99	0.81
Medical instruments	0.01	0.02	0.02	0.00	0.12	0.08	0.00	0.00	0.00	0.15	0.78	0.52
Motor vehicles	0.14	0.15	0.25	0.01	0.01	0.01	0.00	0.00	0.00	0.65	0.96	0.89
Other Transports	0.02	0.04	0.07	0.03	0.07	0.01	0.01	0.00	0.00	0.39	0.54	0.30
Furniture	0.41	0.10	0.08	0.21	0.12	0.09	0.06	0.14	0.06	4.29	2.38	2.96
Recycling	0.00	0.47	0.39	0.00	0.20	0.44	0.00	0.08	0.15	0.08	4.26	5.43
Total	6.34	6.53	5.81	4.22	3.99	3.63	1.87	1.69	1.27	53.14	58.92	49.78

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 2B: Sub-sector wise manufacturing employment (%) trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015.

Sub-sectors	Percentage share of employment											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Food & Beverages	7.73	8.73	7.92	14.93	14.79	14.88	9.09	11.83	11.02	10.37	10.86	10.65
Tobaco Products	6.47	7.20	4.13	16.11	16.54	1.65	7.49	6.51	4.72	8.49	8.04	5.58
Textiles	30.28	25.57	25.47	19.67	8.27	16.25	9.63	2.37	12.60	17.60	15.31	13.46
Wearing Apparel	10.88	14.70	15.32	12.80	20.80	25.34	4.81	11.24	14.17	13.62	15.97	18.66
Leather Products	3.15	3.98	6.71	0.95	0.75	0.28	0.00	0.00	0.79	2.31	2.07	3.07
Wood Products	6.47	5.21	3.27	8.77	7.77	6.34	37.43	28.40	8.66	9.69	6.45	3.96
Paper Products	0.79	1.23	0.86	0.47	2.01	0.55	1.07	0.59	2.36	1.09	0.92	0.82
Printing media	2.37	1.38	1.20	1.42	1.25	1.38	0.53	0.00	0.00	1.75	1.05	1.04
Petroleum Products	0.63	0.00	0.17	0.24	0.00	0.28	0.00	1.18	0.00	0.21	0.25	0.22
Chemical Products	8.83	3.83	4.99	2.37	1.25	1.10	0.53	0.59	0.00	3.74	1.97	1.99
Rubber & Plastics	0.95	1.84	1.89	0.47	0.25	0.55	0.53	0.00	0.79	1.43	1.92	2.17
Non-metalic Products	3.94	3.83	2.93	8.53	6.02	5.51	18.18	11.24	8.66	8.34	8.35	6.71
Basic metals	0.95	1.23	2.93	1.66	1.25	3.31	4.28	9.47	12.60	1.83	2.55	5.10
Fabricated Metals	4.26	5.82	4.82	3.32	4.51	2.75	3.21	2.37	3.15	4.82	5.04	3.07
Machinery Equipment	2.05	1.68	1.20	1.66	0.50	0.55	0.53	0.59	0.79	2.45	1.65	0.78
Electronics machinery	0.32	0.77	0.69	0.47	0.75	0.28	0.00	0.00	0.00	0.47	0.73	0.80
Electrical machinery	0.63	0.77	1.55	0.24	0.50	1.38	0.00	1.18	0.79	1.30	1.68	1.63
Medical instruments	0.16	0.31	0.34	0.00	3.01	2.20	0.00	0.00	0.00	0.28	1.32	1.04
Motor vehicles	2.21	2.30	4.30	0.24	0.25	0.28	0.00	0.00	0.00	1.22	1.63	1.79
Other Transports	0.32	0.61	1.20	0.71	1.75	0.28	0.53	0.00	0.00	0.73	0.92	0.60
Furniture	6.47	1.53	1.38	4.98	3.01	2.48	3.21	8.28	4.72	8.07	4.04	5.95
Recycling	0.00	7.20	6.71	0.00	5.01	12.12	0.00	4.73	11.81	0.15	7.23	10.91
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Non-manufacturing

Between 2004-5 and 2011-12 infrastructure investment was booming and along with it was construction employment, which increased from nearly 30 million in 2004-5 to 55 million in 2011-12. While construction employment continued to grow in India after that, its growth was not sustained. This is evident even in the three states under consideration - Tamil Nadu, Andhra Pradesh and Odisha.

The only state (of the three) that experienced an increase in employment in non-manufacturing sub-sectors outside of construction was Odisha in the coal and lignite extraction sector.

Services

Over the period 2003-4 to 2011-12 India's GDP growth rate rose sharply to 8.4 percent per annum, which was unprecedented in India's history. Services sector employment growth was also robust over that period rising by nearly 3 million per annum. Services employment has continued to grow since then, though its growth has slowed down slightly.

While service sector employment across the board has increased it is also clear that the traditional services (wholesale trade, retail trade) employment has been growing rather slowly. It is a welcome development that it is modern services show the greatest dynamism from 2004-5 to 2015-16. These modern service sub-sectors are sale/maintenance of motor vehicles, hotels and restaurants, air transport, posts and telecommunications, financial intermediation, insurance and pension funding, computers and related activities, and finally research and development. In addition public administration, education and health have also seen a significant increase.

In Tamil Nadu, which is one of the motor vehicle manufacturing hubs of the country, there has been significant increase in the sale, maintenance and repair of vehicles. This activity is smaller in the other two states, but has seen growth in employment in this activity. Given the backward and forward linkages that have developed in Tamil Nadu on account of the auto industry, it won't be surprising if the VCIC actually results in even greater such investment occurring here.

Another modern service that has grown sharply in all three states is computers and related activities. Chennai (TN's capital) and Hyderabad (Telengana's capital) both are among the hubs in India for such activities. Not surprisingly employment has grown significantly in both these states in this sector. This activity is much smaller in Odisha, and accordingly is a smaller employer.

The whole country has seen an expansion of telecom services, so this has been one of the dynamic sectors in providing employment, especially in TN and AP, though to a lesser extent in Odisha.

Financial intermediation and insurance/pension funding has grown across the country, and has similarly grown in all three states.

Public administration has continued to see a decline in both absolute and relative terms across the country, but also in the TN and AP, though not in Odisha.

Both health and education, the two main social services, have seen a significant rise in employment in the country as well as in the three states under consideration. Moreover, the disaggregated employment by government and private sector composition (see Figure 1 through Figure 4) shows that employment growth in education is driven by both public and private sectors during 2004-05- and 2011-12. However, in case of health it is the private sector that boosted employment growth during 2004-05- and 2011-12, and the public sector does not contribute much.

The state-wise comparison of public and private sector employment in education shows that growth of jobs in private enterprises is much higher than that of public sector enterprises. The state of Odisha is the exception, in which public sector enterprise are generating most of the jobs in education.

In the health sector, on the other hand, all these states show that growth of jobs in private enterprises is driving employment growth during 2004-05- and 2011-12.

Table 3A: Sub-sector wise non-manufacturing employment trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Sub-sectors	Absolute number of employment (in million)											
	<i>Tamil Nadu</i>			<i>Andhra Pradesh</i>			<i>Odisha</i>			<i>All India</i>		
	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>
Coal, lignite extraction	0.02	0.00	0.03	0.15	0.11	0.01	0.07	0.03	0.08	0.79	0.59	0.59
Extraction of crude petroleum	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.09	0.17	0.05
Mining of uranium ores	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.01	0.00	0.13	0.10
Mining of metal ores	0.01	0.19	0.05	0.01	0.26	0.21	0.01	0.05	0.03	0.06	1.66	0.98
Other mining & quarrying	0.08	0.00	0.02	0.32	0.00	0.00	0.05	0.00	0.03	1.68	0.01	0.10
Electricity, water and gas distribution	0.09	0.23	0.16	0.05	0.15	0.08	0.04	0.07	0.06	1.24	2.43	1.36
Construction	2.01	4.16	4.78	1.76	3.24	3.66	1.01	2.11	2.53	25.74	50.21	56.38
Total	2.20	4.58	5.06	2.29	3.75	3.98	1.18	2.27	2.73	29.60	55.21	59.56

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 3B: Sub-sector wise non-manufacturing employment (%) trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Sub-sectors	Percentage share of employment											
	<i>Tamil Nadu</i>			<i>Andhra Pradesh</i>			<i>Odisha</i>			<i>All India</i>		
	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>
Coal, lignite extraction	0.91	0.00	0.59	6.55	2.93	0.25	5.93	1.32	2.93	2.67	1.07	0.99
Extraction of crude petroleum	0.00	0.00	0.40	0.44	0.00	0.25	0.00	0.00	0.00	0.30	0.31	0.08
Mining of uranium ores	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.88	0.37	0.00	0.24	0.17
Mining of metal ores	0.45	4.15	0.99	0.44	6.93	5.28	0.85	2.20	1.10	0.20	3.01	1.65
Other mining & quarrying	3.64	0.00	0.40	13.97	0.00	0.00	4.24	0.00	1.10	5.68	0.02	0.17
Electricity, water and gas distribution	4.09	5.02	3.16	2.18	4.00	2.01	3.39	3.08	2.20	4.19	4.40	2.28
Construction	91.36	90.83	94.47	76.86	86.40	91.96	85.59	92.95	92.67	86.96	90.94	94.66
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 4A: Sub-sector wise service sector employment trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Sub-sectors	Absolute number of employment (in million)											
	<i>Tamil Nadu</i>			<i>Andhra Pradesh</i>			<i>Odisha</i>			<i>All India</i>		
	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015</i>
Sale, maintenance and repair of motor vehicles	0.25	0.36	0.44	0.18	0.21	0.28	0.07	0.06	0.10	2.49	3.25	4.34
Wholesale trade except motor vehicles	0.37	0.33	0.52	0.45	0.37	0.21	0.10	0.09	0.16	5.08	5.31	5.42
Retail trade except motor vehicles	2.46	2.52	2.42	2.71	2.90	2.58	1.07	1.27	1.48	33.66	35.55	37.99
Hotels & Restaurants	0.74	0.94	0.69	0.66	0.60	0.72	0.20	0.28	0.26	5.66	7.70	7.19
Land transport	1.15	1.47	1.62	1.48	1.90	1.60	0.38	0.53	0.61	15.22	17.53	18.93
Water transport	0.01	0.02	0.02	0.00	0.02	0.04	0.00	0.01	0.00	0.09	0.14	0.15
Air transport	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.09
auxiliary transport activities	0.06	0.10	0.21	0.04	0.11	0.09	0.01	0.04	0.09	0.50	0.94	1.20
Post and telecommunications	0.23	0.51	0.68	0.17	0.44	0.35	0.07	0.09	0.09	1.89	4.28	4.61
Financial intermediation	0.28	0.37	0.33	0.17	0.27	0.25	0.05	0.05	0.20	2.11	2.57	3.20
Insurance and pension funding	0.04	0.10	0.08	0.04	0.02	0.04	0.03	0.02	0.06	0.56	0.96	1.21
Activities auxiliary to financial intermediation	0.01	0.05	0.06	0.01	0.05	0.03	0.00	0.02	0.01	0.22	0.78	0.36
Real estate activities	0.06	0.13	0.09	0.01	0.08	0.10	0.01	0.01	0.00	0.42	0.93	0.98
Renting of machinery and equipment	0.06	0.06	0.01	0.04	0.02	0.02	0.02	0.02	0.02	0.52	0.56	0.44
Computer and related activities	0.15	0.07	0.27	0.00	0.09	0.14	0.01	0.02	0.04	0.82	1.51	3.11
Research and development	0.00	0.07	0.06	0.08	0.11	0.06	0.00	0.02	0.03	0.03	1.13	1.03
Other business activities	0.28	0.23	0.58	0.16	0.24	0.17	0.05	0.02	0.28	2.48	2.55	6.79
Public administration and defence	0.69	0.45	0.39	0.54	0.77	0.64	0.24	0.22	0.30	8.37	7.95	7.22
Education	0.71	0.85	1.10	0.82	1.16	1.34	0.42	0.49	0.94	11.22	14.16	19.28
Health & Social work	0.33	0.28	0.41	0.31	0.36	0.44	0.08	0.08	0.15	3.59	4.38	5.01
Other Social Services (art, entertainment,	1.01	1.28	1.07	1.53	1.38	1.23	0.31	0.45	0.35	12.55	15.01	12.27
Total	8.92	10.18	11.05	9.46	11.11	10.32	3.09	3.80	5.16	107.54	127.25	140.83

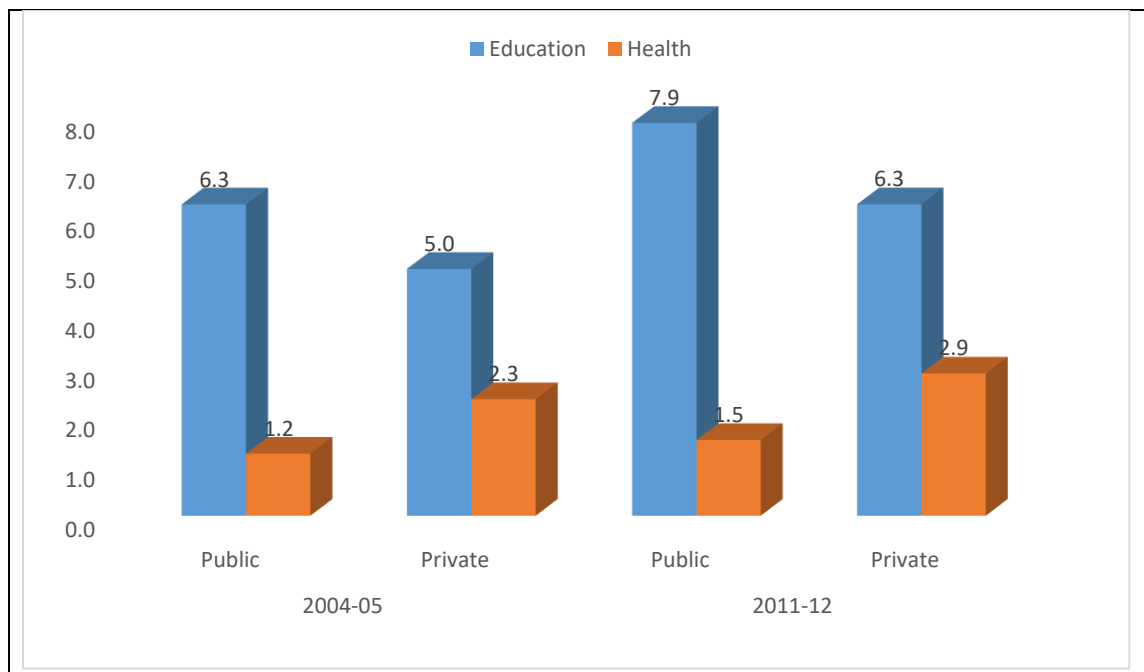
Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 4B: Sub-sector wise service sector employment (%) trends in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Sub-sectors	Percentage share of employment											
	<i>Tamil Nadu</i>			<i>Andhra Pradesh</i>			<i>Odisha</i>			<i>All India</i>		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Sale, maintenance and repair of motor vehicles	2.80	3.54	3.98	1.90	1.89	2.71	2.27	1.58	1.94	2.32	2.55	3.08
Wholesale trade except motor vehicles	4.15	3.24	4.71	4.76	3.33	2.03	3.24	2.37	3.10	4.72	4.17	3.85
Retail trade except motor vehicles	27.58	24.75	21.90	28.65	26.10	25.00	34.63	33.42	28.68	31.30	27.94	26.98
Hotels & Restaurants	8.30	9.23	6.24	6.98	5.40	6.98	6.47	7.37	5.04	5.26	6.05	5.11
Land transport	12.89	14.44	14.66	15.64	17.10	15.50	12.30	13.95	11.82	14.15	13.78	13.44
Water transport	0.11	0.20	0.18	0.00	0.18	0.39	0.00	0.26	0.00	0.08	0.11	0.11
Air transport	0.22	0.00	0.09	0.11	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0.06
auxiliary transport activities	0.67	0.98	1.90	0.42	0.99	0.87	0.32	1.05	1.74	0.46	0.74	0.85
Post and telecommunications	2.58	5.01	6.15	1.80	3.96	3.39	2.27	2.37	1.74	1.76	3.36	3.27
Financial intermediation	3.14	3.63	2.99	1.80	2.43	2.42	1.62	1.32	3.88	1.96	2.02	2.27
Insurance and pension funding	0.45	0.98	0.72	0.42	0.18	0.39	0.97	0.53	1.16	0.52	0.75	0.86
Activities auxiliary to financial intermediation	0.11	0.49	0.54	0.11	0.45	0.29	0.00	0.53	0.19	0.20	0.61	0.26
Real estate activities	0.67	1.28	0.81	0.11	0.72	0.97	0.32	0.26	0.00	0.39	0.73	0.70
Renting of machinery and equipment	0.67	0.59	0.09	0.42	0.18	0.19	0.65	0.53	0.39	0.48	0.44	0.31
Computer and related activities	1.68	0.69	2.44	0.00	0.81	1.36	0.32	0.53	0.78	0.76	1.19	2.21
Research and development	0.00	0.69	0.54	0.85	0.99	0.58	0.00	0.53	0.58	0.03	0.89	0.73
Other business activities	3.14	2.26	5.25	1.69	2.16	1.65	1.62	0.53	5.43	2.31	2.00	4.82
Public administration and defence	7.74	4.42	3.53	5.71	6.93	6.20	7.77	5.79	5.81	7.78	6.25	5.13
Education	7.96	8.35	9.95	8.67	10.44	12.98	13.59	12.89	18.22	10.43	11.13	13.69
Health & Social work	3.70	2.75	3.71	3.28	3.24	4.26	2.59	2.11	2.91	3.34	3.44	3.56
Other Social Services (art, entertainment,	11.32	12.57	9.68	16.17	12.42	11.92	10.03	11.84	6.78	11.67	11.80	8.71
Total	100	100	100	100	100	100	100	100	100	100	100	100

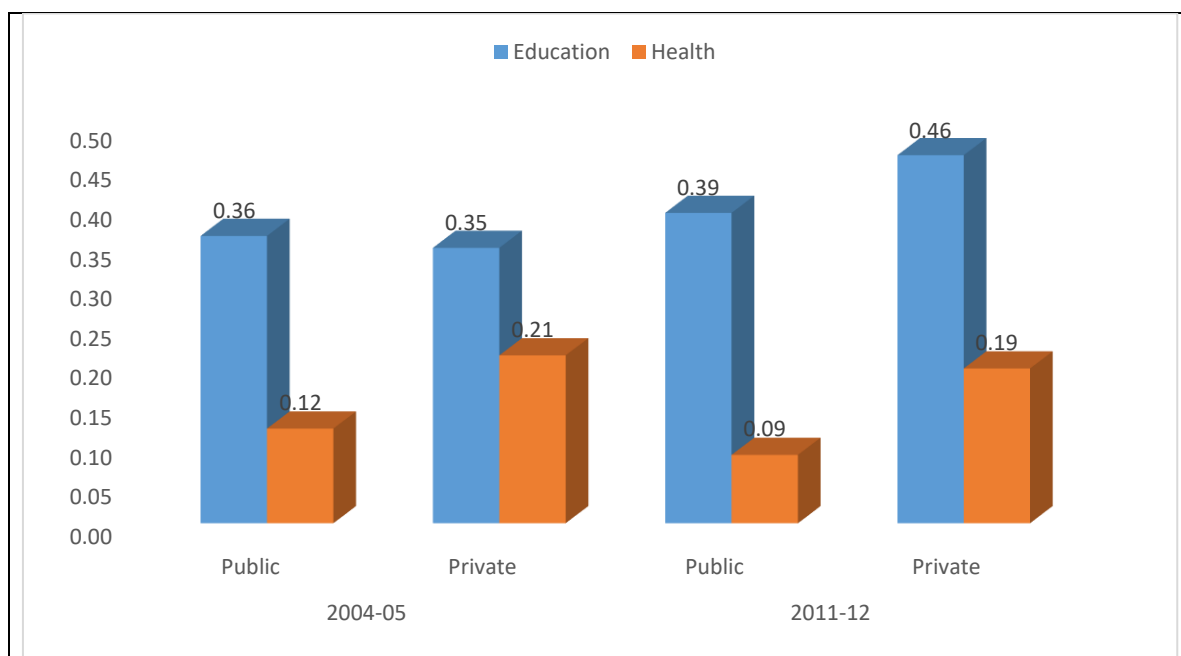
Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Figure 1: Employment in Education and health sub-sectors by public and private enterprises in India (mn)



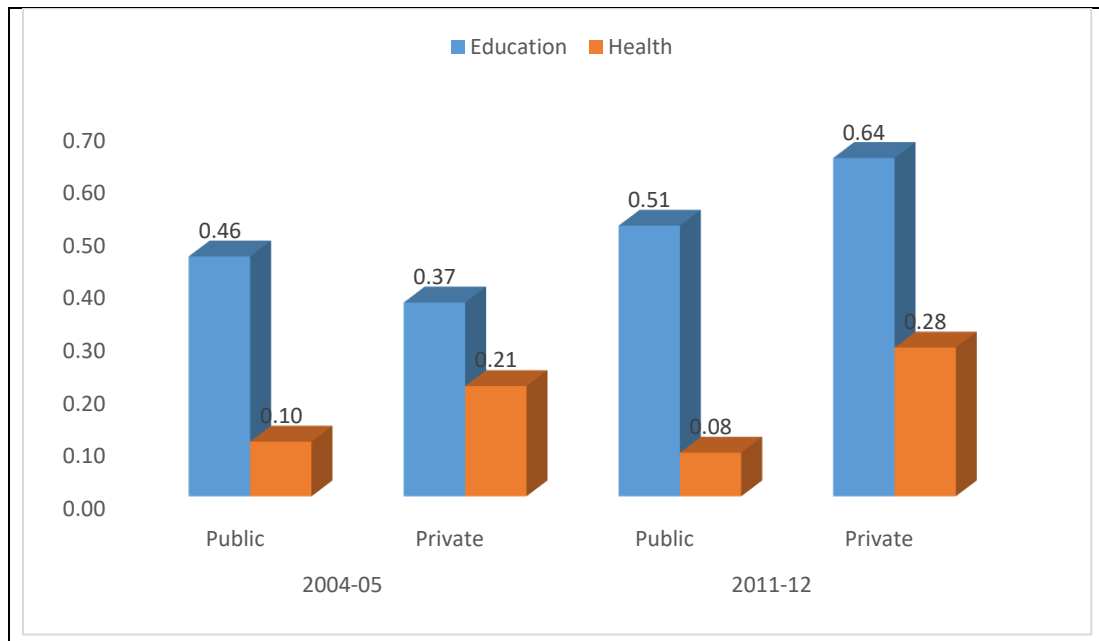
Source: Authors' estimation based on NSS (61st and 68th rounds) unit level data.

Figure 2: Employment in Education and health sub-sectors by public and private enterprises in Tamil Nadu (mn)



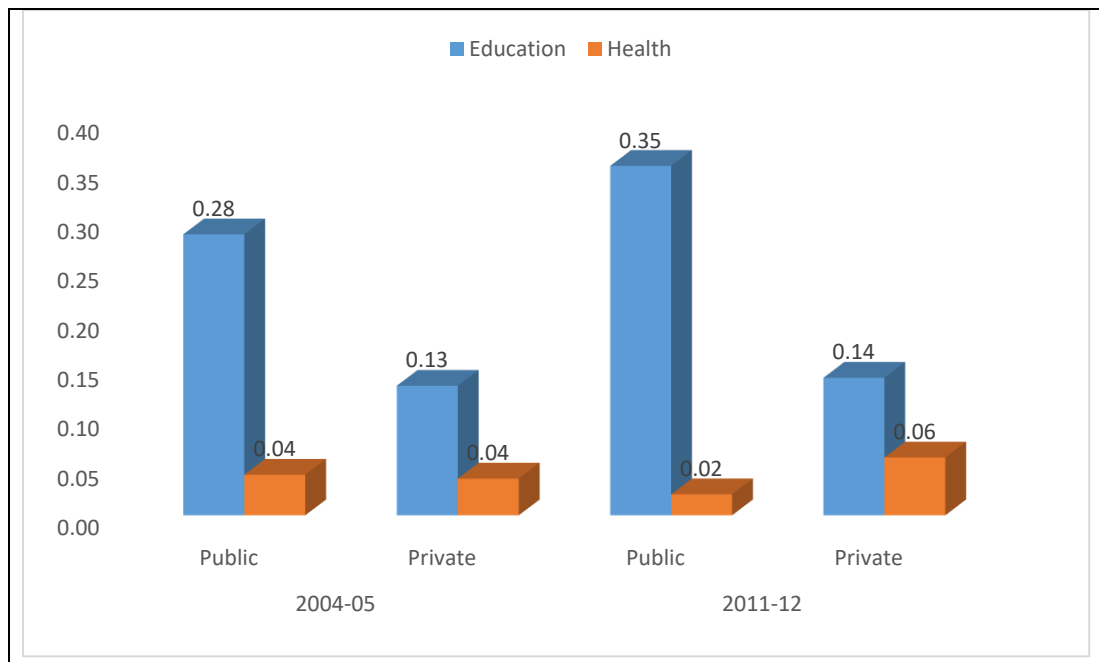
Source: Authors' estimation based on NSS (61st and 68th rounds) unit level data.

Figure 3: Employment in Education and health sub-sectors by public and private enterprises in Andhra Pradesh (mn)



Source: Authors' estimation based on NSS (61st and 68th rounds) unit level data.

Figure 4: Employment in Education and health sub-sectors by public and private enterprises in Odisha (mn)



Source: Authors' estimation based on NSS (61st and 68th rounds) unit level data.

3.3. Sectoral growth and employment elasticities

Both output growth and sectoral employment elasticities are crucial for the growth of jobs in any sector. During 2004-05 and 2011-12, average growth of agriculture output in India was satisfactory (4.1 percent). This high growth along with the negative employment elasticity (-0.5) were responsible for the structural transformation that began over 2004-05 and 2011-12. However, since 2012 the employment elasticity in agriculture improved (-0.32) and growth of output declined due to several factors including climatic and political conditions. As a result in a few states including Andhra and Odisha employment elasticity in agriculture became positive again. This could be distress driven.

Another upsetting development occurred in the manufacturing sector. Although overall growth of manufacturing sector is still high (fallen from about 9.1 percent to 7.1 percent), employment elasticity turned to negative. As a result overall manufacturing sector employment declined. The overall employment elasticity was quite low (0.16) during 2004-05 and 2011-12, which became negative (-0.59) during 2011-12 and 2015-16. This might be due to growing capital intensity and rising skill gap in this sector. We will discuss this issue in the later sections of this paper.

However, both non-manufacturing and service sectors continued to generate employment opportunities post 2011-12. In the non-manufacturing sector, both output growth and employment elasticity has come down, and hence the growth of jobs. However, employment elasticity in the service sector improved during 2011-12 and 2015-16. The employment elasticity of service sector increased from 0.26 to 0.33. The output growth in this sector is 7.7 percent during 2011-12 and 2015-16.

Table 5: Sectoral growth and employment elasticities in India, Tamil Nadu, Andhra Pradesh and Odisha, 2005-2016

States	Employment elasticity		Annual growth rate of Output	
	2005-2012	2013-2016	2005-2012	2013-2016
Agriculture and Allied Sector				
Andhra Pradesh	-0.47	0.86	2.7	3.6
Odisha	-0.34	6.91	3.1	-0.7
Tamil Nadu	-0.64	-0.59	6.0	-0.9
India (GDP)	-0.50	-0.32	4.1	1.8
Manufacturing Sector				
Andhra Pradesh	-0.10	1.01	8.2	-2.4
Odisha	-0.16	-0.97	9.5	7.3
Tamil Nadu	0.04	-0.62	9.9	4.7
India (GDP)	0.16	-0.59	9.1	7.1
Non-manufacturing Sector				
Andhra Pradesh	0.91	0.36	7.8	4.0
Odisha	1.12	2.28	8.3	2.0
Tamil Nadu	0.97	0.51	10.8	4.9
India (GDP)	1.05	0.61	8.5	3.1
Service Sector				
Andhra Pradesh	0.27	-0.20	8.5	9.3
Odisha	0.32	0.97	9.3	7.9
Tamil Nadu	0.18	0.26	10.6	7.8
India (GDP)	0.26	0.33	9.3	7.7

Source: Authors' calculation using NSS & LB employment and Reserve Bank's GSDP data.

4. Identifying major employment generating sub-sectors by rural and urban areas: Three Eastern states (AP, TN and Odisha)

In Section 3 we had used two-digit analysis for the years 2004-5 (NSS), 2011-12 (NSS) and 2015-16 (Labour Bureau) data to examine employment trends. However, this section (from Tables 6 onwards) undertakes an analysis of NSS 2011-12 data at three-digit level of disaggregation for manufacturing, non-manufacturing and service sub-sectors. Using this data we have tried to identify which specific sub-sectors might generate employment and therefore require greater attention of skills-related policy-makers, knowing that the Vizag-Chennai Industrial Corridor (VCIC) is going to generate employment in non-agricultural sectors.

The manufacturing sectors are normally distinguished by two categories: labour-intensive sub-sectors and capital-intensive sub-sectors. Both will need the attention of policy-makers and project funders in the sense that VCIC will generate industries in both types of activities, because markets will become more integrated across the state, across neighbouring states, as well as possibly with littoral South-east Asian nations that might be destinations for the exports of these sub-sectors.

Among services sectors, we make a distinction between traditional versus modern services. The traditional services are trade (wholesale and retail) and railway transportation (which carry bulk primary commodities like coal, etc), which are both large employers, in absolute terms, of relatively low-skilled workers. Modern services are, however, many more in number and much more diverse in nature: sale, maintenance and repair of motor vehicles; air transport and highway transportation (the latter carries most of India's goods trade across the country, more than the railways); telecommunications; financial intermediation, insurance and pension funding; computer and related services; research and development; education; and health and social work.

We also take the analysis much further as we disaggregate the employment generating sectors for rural and urban areas in each state. This is necessary because it gives a deeper understanding where the employment generating sectors are physically located. As in the earlier section the analysis proceeds state-wise for the three states under consideration in the present phase of the VCIC.

For all states we examine in turn the sub-sectors of non-manufacturing, manufacturing and services.

Andhra Pradesh

Non-manufacturing Sector

Non-manufacturing employment generation in rural Andhra Pradesh is mainly driven by construction sector jobs. Most of the major subsectors in non-manufacturing sector are labour intensive in nature (see Table 6a).

In *rural* areas, the subsectors like construction of buildings and utility projects, electrical plumbing, building completion and finishing activities, road constructions, and quarrying of stone, sand and clay were the major employment generating sectors. During 2011-12, the construction of buildings alone created about 59 percent of the total non-manufacturing sector employment. This is followed by the construction of utility projects (18 percent). The subsector quarrying of stone, sand and clay etc., which is related to construction of building and roads created about 10 percent of the non-manufacturing sector jobs.

In *urban* areas, the subsectors like construction of buildings, building completion and finishing activities along with mining of hard coal (relatively capital intensive subsectors as compared to rest of the subsectors) subsectors drove non-manufacturing sector employment. About 63 percent of total non-manufacturing sector employment in urban Andhra Pradesh was generated by construction of buildings. Building completion and finishing activities created about 9 percent of the non-manufacturing sector employment. About 7 percent of the non-manufacturing sector employment in urban Andhra Pradesh was generated by the subsector mining of hard coal.

We have highlighted in yellow the top ranked sectors within non-manufacturing that have generated jobs in each of rural and urban areas. These are specific sub-sectors within construction that might require more workers with skills.

Table 6a: Employment Generating Sectors in Non-manufacturing Sectors Andhra Pradesh, 2011-12

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Mining of hard coal	3.3	97.6	100.9	0.14	6.64	2.69	10	3	7
Mining of lignite	0.0	6.5	6.5	0.00	0.44	0.17	14	12	14
Mining of iron ores	0.0	0.5	0.5	0.00	0.04	0.01	14	16	16
Quarrying of stone, sand and clay	228.0	33.1	261.1	9.99	2.25	6.96	3	8	3
Support activities for petroleum and natural gas mining	0.2	0.0	0.2	0.01	0.00	0.01	13	17	18
Electric power generation, transmission and distribution	59.6	54.1	113.7	2.61	3.68	3.03	5	7	6
Manufacture of gas; distribution of gaseous fuels through mains	0.0	13.4	13.4	0.00	0.91	0.36	14	10	11
Water collection, treatment and supply	0.5	0.0	0.5	0.02	0.00	0.01	12	17	17
Waste collection	0.0	13.4	13.4	0.00	0.91	0.36	14	9	10
Materials recovery	0.5	0.8	1.3	0.02	0.05	0.04	11	15	15
Construction of buildings	1346.5	921.3	2267.8	58.99	62.67	60.43	1	1	1
Construction of roads and railways	162.4	60.7	223.1	7.12	4.13	5.95	4	5	4
Construction of utility projects	409.3	2.5	411.8	17.93	0.17	10.97	2	13	2
Construction of other civil engineering projects	8.8	2.4	11.3	0.39	0.17	0.30	8	14	12
Demolition and site preparation	5.2	58.3	63.6	0.23	3.97	1.69	9	6	9
Electrical, plumbing and other construction installation activities	25.6	65.0	90.6	1.12	4.42	2.41	7	4	8
Building completion and finishing	32.4	133.7	166.1	1.42	9.09	4.43	6	2	5
Other specialized construction activities	0.0	6.7	6.7	0.00	0.45	0.18	14	11	13
Non-manufacturing Sector Total (Million)	2.3	1.5	3.8	100	100	100			

Manufacturing Sector

Manufacturing employment generation in rural Andhra Pradesh is slightly different than that of urban Andhra Pradesh. In rural areas, the top employment generating subsectors are labour intensive in nature. In the urban areas a few capital intensive sectors are also among the top employment generating sectors (see Table 6b).

In *rural* areas, the manufacturing subsector like wearing apparel (22 percent), tobacco products (20 percent), products of wood, cork, straw and plaiting materials (9 percent), non-metallic mineral products (8 percent), grain mill products, starches and starch products (6 percent), food products other than dairy, vegetable and animal oils and fats etc. (5 percent), spinning, weaving and finishing of textiles (4 percent), manufacture of furniture (3.5 percent) , and processing and preserving of meat (3 percent) etc. are the major employment generating sectors.

In *Urban* Andhra Pradesh, on the other hand manufacturing subsectors like wearing apparel (19 percent), tobacco products (12 percent), spinning, weaving and finishing of textiles (9 percent), food products other than dairy, vegetable and animal oils and fats etc. (6 percent), products of wood, cork, straw and plaiting materials (6 percent), Manufacture of pharmaceuticals, medicinal chemical and botanical products (4.5 percent), manufacture of jewellery, bijouterie and related articles (4.4 percent), fabricated metal products; metalworking service activities (3.6 percent), and processing, preserving of meat (3.2 percent), and non-metallic mineral products (3 percent) etc., are the major employment generating sectors.

These are also the sectors that should be focused upon in respect of skill needs.

Table 6b: Employment Generating Sectors in Manufacturing Sectors Andhra Pradesh, 2011-12

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Processing and preserving of meat	65.3	53.7	119.1	2.84	3.17	2.98	9	9	10
Processing and preserving of fish, crustaceans and molluscs	0.1	0.0	0.1	0.00	0.00	0.00	41	48	52
Processing and preserving of fruit and vegetables	15.7	1.8	17.5	0.68	0.11	0.44	23	43	26
Manufacture of vegetable and animal oils and fats	0.4	11.0	11.4	0.02	0.65	0.29	39	24	31
Manufacture of dairy products	1.4	0.4	1.8	0.06	0.02	0.04	35	47	48
Manufacture of grain mill products, starches and starch products	133.4	48.0	181.4	5.80	2.84	4.54	5	11	7
Manufacture of other food products	107.9	100.5	208.4	4.69	5.93	5.22	6	4	6
Manufacture of prepared animal feeds	4.8	0.0	4.8	0.21	0.00	0.12	30	48	41
Manufacture of beverages	22.7	22.1	44.8	0.99	1.31	1.12	18	20	18
Manufacture of tobacco products	462.2	200.2	662.4	20.09	11.82	16.58	2	2	2
Spinning, weaving and finishing of textiles	81.3	156.9	238.2	3.53	9.27	5.96	7	3	4
Manufacture of other textiles	55.1	35.9	91.0	2.39	2.12	2.28	10	14	13
Manufacture of wearing apparel, except fur apparel	503.0	325.8	828.8	21.86	19.24	20.75	1	1	1
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	9.8	7.5	17.3	0.43	0.44	0.43	25	29	27
Manufacture of footwear	5.0	7.2	12.3	0.22	0.43	0.31	29	32	30
Sawmilling and planing of wood	2.7	5.7	8.4	0.12	0.34	0.21	32	34	35
Manufacture of products of wood, cork, straw and plaiting materials	202.4	99.2	301.5	8.80	5.86	7.55	3	5	3
Manufacture of paper and paper products	41.0	36.9	77.9	1.78	2.18	1.95	13	13	14
Printing and service activities related to printing	14.2	31.9	46.2	0.62	1.88	1.16	24	17	17
Manufacture of refined petroleum products	0.0	3.4	3.4	0.00	0.20	0.08	42	37	44
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	17.9	8.8	26.7	0.78	0.52	0.67	20	28	23
Manufacture of other chemical products	6.9	14.5	21.4	0.30	0.86	0.54	26	21	25
Manufacture of pharmaceuticals, medicinal chemical and botanical products	47.6	76.9	124.6	2.07	4.54	3.12	11	6	8
Manufacture of rubber products	0.0	2.5	2.5	0.00	0.15	0.06	42	38	45
Manufacture of plastics products	0.3	10.8	11.1	0.01	0.64	0.28	40	25	32
Manufacture of glass and glass products	0.0	0.7	0.7	0.00	0.04	0.02	42	46	51

Manufacture of non-metallic mineral products n.e.c.	185.3	49.2	234.5	8.05	2.90	5.87	4	10	5
Manufacture of basic iron and steel	16.0	24.5	40.5	0.70	1.45	1.01	21	19	20
Manufacture of basic precious and other non-ferrous metals	6.7	0.0	6.7	0.29	0.00	0.17	27	48	39
Casting of metals	6.5	1.1	7.6	0.28	0.07	0.19	28	45	37
Manufacture of structural metal products, tanks, reservoirs and steam generators	24.4	32.8	57.2	1.06	1.94	1.43	17	16	15
Manufacture of weapons and ammunition	21.9	1.9	23.8	0.95	0.11	0.60	19	42	24
Manufacture of other fabricated metal products; metalworking service activities	36.0	60.4	96.4	1.56	3.57	2.41	14	8	12
Manufacture of electronic components	0.0	14.0	14.0	0.00	0.83	0.35	42	22	29
Manufacture of communication equipment	0.0	9.7	9.7	0.00	0.57	0.24	42	27	34
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	0.0	2.5	2.5	0.00	0.15	0.06	42	40	46
Manufacture of optical instruments and equipment	0.0	2.2	2.2	0.00	0.13	0.05	42	41	47
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	0.0	9.8	9.8	0.00	0.58	0.24	42	26	33
Manufacture of wiring and wiring devices	0.0	7.4	7.4	0.00	0.43	0.18	42	31	38
Manufacture of domestic appliances	1.2	6.6	7.8	0.05	0.39	0.19	37	33	36
Manufacture of general purpose machinery	1.7	13.2	14.8	0.07	0.78	0.37	34	23	28
Manufacture of special-purpose machinery	4.2	0.0	4.2	0.18	0.00	0.11	31	48	43
Manufacture of motor vehicles	1.3	0.0	1.3	0.06	0.00	0.03	36	48	50
Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	0.8	3.8	4.6	0.04	0.22	0.12	38	36	42
Building of ships and boats	0.0	34.2	34.2	0.00	2.02	0.86	42	15	21
Manufacture of railway locomotives and rolling stock	26.1	7.4	33.5	1.14	0.43	0.84	16	30	22
Manufacture of furniture	78.2	42.7	120.9	3.40	2.52	3.03	8	12	9
Manufacture of jewellery, bijouterie and related articles	27.0	73.8	100.7	1.17	4.36	2.52	15	7	11
Manufacture of games and toys	2.7	3.8	6.5	0.12	0.23	0.16	33	35	40
Manufacture of medical and dental instruments and supplies	0.0	1.7	1.7	0.00	0.10	0.04	42	44	49
Other manufacturing n.e.c.	15.8	25.7	41.5	0.69	1.52	1.04	22	18	19
Repair of fabricated metal products, machinery and equipment	44.2	2.5	46.7	1.92	0.15	1.17	12	39	16
Manufacturing Sector Total (Million)	2.3	1.7	4.0	100	100	100			

Service Sectors

The service sector employment in Andhra Pradesh is driven by both traditional and modern services. In rural Andhra Pradesh, the share of employment generation of traditional services is relatively higher, whereas in urban areas newer form of services are coming up in recent years, and they hold a major share of employment generation in urban Andhra Pradesh (see Table 6c).

In *rural* areas, traditional service subsectors like: land transport (20 percent), retail sale of food, beverages and tobacco in specialized stores (16.5 percent), repair of personal and household goods, other personal service activities, and activities of households as employers of domestic personnel (13 percent).

Primary, secondary and higher education services (10.2 percent) created major share of service sector employment. However, new-fangled and modern services like mobile food service activities, and event catering and other food service activities (5 percent), business support service activities, and community social services (4.5 percent), monetary intermediation, insurance, and other financial service activities, except insurance and pension funding activities (2 percent) etc. are driving rural service sector employment in Andhra Pradesh in recent years.

In *Urban* Andhra Pradesh, though traditional service subsectors have created jobs; the share of employment in these subsectors (in total urban service sector jobs) is lower as compared to their respective shares in rural areas. These traditional service sectors are: land transport which has a 14.2 percent share of urban services employment, retail sale of food, beverages and tobacco in specialized stores (9.6 percent), primary, secondary and higher education services (10 percent), and repair of personal and household goods, and activities of households as employers of domestic personnel (8 percent).

On the other hand, modern services are driving urban service sector employment in Andhra Pradesh in recent years, like: restaurants, mobile food service activities, and event catering and other food and beverage serving activities (5 percent), business support service activities including call centres, administration of the state and community social services (4.5 percent), telecommunications, computer programming, consultancy and related activities (3.5 percent), real estate activities (which have boomed with commercial property construction and housing), legal activities, accounting, bookkeeping, auditing and tax consultancy (2 percent), and monetary intermediation, insurance, and other financial service activities (2 percent).

The growing share of employment in the modern service subsectors indicates that in Andhra Pradesh modern services would drive employment growth in the coming years, with a new dynamism in demand for such services expected as VCIC-related investment increases. Hence the *assessment of the skill requirements of these modern services like telecommunication, financial services, information and technology (IT), hotel trade, transportation, consultancy and business administration etc. is important* for sustaining service sector employment in Andhra Pradesh

Table 6c: Employment Generating Sectors in Service Sectors Andhra Pradesh, 2011-12

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Sale of motor vehicles	1.6	8.5	10.1	0.04	0.13	0.09	61	72	75
Maintenance and repair of motor vehicles	32.4	102.0	134.4	0.72	1.54	1.21	22	16	19
Sale of motor vehicle parts and accessories	4.0	9.5	13.5	0.09	0.14	0.12	53	69	69
Sale, maintenance and repair of motorcycles and related parts and accessories	13.3	41.6	54.9	0.30	0.63	0.49	37	35	34
Wholesale on a fee or contract basis	15.6	46.9	62.5	0.35	0.71	0.56	33	30	33
Wholesale of agricultural raw materials and live animals	14.2	26.1	40.3	0.32	0.39	0.36	34	45	45
Wholesale of food, beverages and tobacco	28.7	44.1	72.9	0.64	0.67	0.66	27	32	28
Wholesale of household goods	3.5	67.1	70.7	0.08	1.01	0.64	54	21	30
Wholesale of machinery, equipment and supplies	2.3	23.9	26.2	0.05	0.36	0.24	58	48	52
Other specialized wholesale	31.7	64.0	95.7	0.71	0.97	0.86	24	23	24
Non-specialized wholesale trade	0.5	2.6	3.1	0.01	0.04	0.03	70	84	86
Retail sale in non-specialized stores	225.6	233.6	459.1	5.02	3.53	4.13	4	9	6
Retail sale of food, beverages and tobacco in specialized stores	738.3	638.2	1376.4	16.44	9.64	12.39	2	2	2
Retail sale of automotive fuel in specialized stores	31.0	20.5	51.5	0.69	0.31	0.46	25	51	37
Retail sale of information and communications equipment in specialized stores	31.7	21.9	53.6	0.71	0.33	0.48	23	50	36
Retail sale of other household equipment in specialized stores	104.3	222.5	326.8	2.32	3.36	2.94	10	11	11
Retail sale of cultural and recreation goods in specialized stores	10.4	54.9	65.4	0.23	0.83	0.59	45	27	32
Retail sale of other goods in specialized stores	147.5	238.0	385.6	3.29	3.59	3.47	8	8	8
Retail sale via stalls and markets	13.3	32.8	46.1	0.30	0.49	0.41	38	40	40
Retail trade not in stores, stalls or markets	90.6	48.1	138.7	2.02	0.73	1.25	11	29	18
Transport via railways	11.8	54.3	66.1	0.26	0.82	0.60	43	28	31
Other land transport	896.0	941.7	1837.7	19.95	14.22	16.54	1	1	1
Sea and coastal water transport	0.0	20.3	20.3	0.00	0.31	0.18	74	53	61
Passenger air transport	0.0	1.8	1.8	0.00	0.03	0.02	74	86	87
Warehousing and storage	12.0	2.6	14.7	0.27	0.04	0.13	41	83	66
Support activities for transportation	24.7	66.1	90.8	0.55	1.00	0.82	28	22	25
Postal activities	18.7	2.4	21.1	0.42	0.04	0.19	30	85	58

Short term accommodation activities	11.9	11.6	23.5	0.27	0.17	0.21	42	62	56
Other accommodation	1.6	7.2	8.7	0.04	0.11	0.08	60	75	77
Restaurants and mobile food service activities	208.7	222.9	431.6	4.65	3.37	3.88	6	10	7
Event catering and other food service activities	16.2	31.3	47.6	0.36	0.47	0.43	32	41	39
Beverage serving activities	49.6	36.0	85.6	1.10	0.54	0.77	19	39	26
Publishing of books, periodicals and other publishing activities	12.7	29.4	42.1	0.28	0.44	0.38	39	42	44
Software publishing	0.0	6.3	6.3	0.00	0.09	0.06	74	77	80
Motion picture, video and television programme activities	0.0	23.8	23.8	0.00	0.36	0.21	74	49	55
Radio broadcasting	0.0	6.7	6.7	0.00	0.10	0.06	74	76	79
Television programming and broadcasting activities	0.0	5.5	5.5	0.00	0.08	0.05	74	78	81
Wired telecommunications activities	54.5	62.3	116.7	1.21	0.94	1.05	16	26	22
Wireless telecommunications activities	2.5	10.3	12.8	0.06	0.16	0.11	56	67	71
Computer programming, consultancy and related activities	13.8	159.4	173.2	0.31	2.41	1.56	35	13	15
Data processing, hosting and related activities; web portals	0.0	20.3	20.3	0.00	0.31	0.18	74	52	59
Other information service activities	0.2	14.0	14.3	0.01	0.21	0.13	73	59	68
Monetary intermediation	29.8	126.6	156.5	0.66	1.91	1.41	26	15	16
Trusts, funds and other financial vehicles	0.0	0.8	0.8	0.00	0.01	0.01	74	88	92
Other financial service activities, except insurance and pension funding activities	36.4	79.3	115.7	0.81	1.20	1.04	21	20	23
Insurance	11.1	10.8	21.8	0.25	0.16	0.20	44	66	57
Activities auxiliary to financial service activities, except insurance and pension funding	0.5	17.0	17.5	0.01	0.26	0.16	71	55	64
Activities auxiliary to insurance and pension funding	8.9	19.6	28.5	0.20	0.30	0.26	50	54	50
Fund management activities	0.0	3.5	3.5	0.00	0.05	0.03	74	80	83
Real estate activities with own or leased property	0.0	38.1	38.1	0.00	0.58	0.34	74	37	46
Real estate activities on a fee or contract basis	1.3	41.3	42.5	0.03	0.62	0.38	62	36	43
Legal activities	13.6	16.0	29.6	0.30	0.24	0.27	36	56	49
Accounting, bookkeeping and auditing activities; tax consultancy	1.0	43.0	44.0	0.02	0.65	0.40	64	33	41
Activities of head offices	0.0	1.1	1.1	0.00	0.02	0.01	74	87	88
Architectural and engineering activities and related technical consultancy	0.0	15.2	15.2	0.00	0.23	0.14	74	58	65
Technical testing and analysis	0.0	0.1	0.1	0.00	0.00	0.00	74	90	96
Research and experimental development on natural sciences and engineering	0.0	10.9	10.9	0.00	0.16	0.10	74	65	74
Advertising	0.8	0.0	0.8	0.02	0.00	0.01	66	91	91
Specialized design activities	0.0	7.9	7.9	0.00	0.12	0.07	74	74	78

Photographic activities	9.4	62.3	71.7	0.21	0.94	0.65	49	25	29
Other professional, scientific and technical activities n.e.c.	0.0	3.4	3.4	0.00	0.05	0.03	74	81	84
Veterinary activities	5.3	8.0	13.3	0.12	0.12	0.12	52	73	70
Renting and leasing of personal and household goods	9.7	8.8	18.5	0.22	0.13	0.17	48	70	63
Leasing of nonfinancial intangible assets	0.6	0.0	0.6	0.01	0.00	0.01	68	91	94
Temporary employment agency activities	0.0	3.9	3.9	0.00	0.06	0.04	74	79	82
Travel agency and tour operator activities	2.5	79.6	82.1	0.05	1.20	0.74	57	19	27
Private security activities	1.8	28.9	30.6	0.04	0.44	0.28	59	43	48
Security systems service activities	0.0	9.6	9.6	0.00	0.15	0.09	74	68	76
Cleaning activities	0.0	3.3	3.3	0.00	0.05	0.03	74	82	85
Office administrative and support activities	6.0	26.6	32.7	0.13	0.40	0.29	51	44	47
Activities of call centres	0.0	25.7	25.7	0.00	0.39	0.23	74	46	53
Business support service activities n.e.c.	37.9	12.0	49.9	0.84	0.18	0.45	20	61	38
Administration of the State and the economic and social policy of the community	142.7	328.0	470.7	3.18	4.95	4.24	9	3	5
Provision of services to the community as a whole	9.8	288.9	298.7	0.22	4.36	2.69	47	5	12
Compulsory social security activities	1.0	0.0	1.0	0.02	0.00	0.01	63	91	89
Primary education	199.2	172.7	371.9	4.44	2.61	3.35	7	12	9
Secondary education	209.0	326.8	535.8	4.65	4.93	4.82	5	4	4
Higher education	53.3	140.0	193.3	1.19	2.11	1.74	18	14	13
Other education	0.5	42.6	43.2	0.01	0.64	0.39	69	34	42
Educational support services	0.0	11.1	11.1	0.00	0.17	0.10	74	64	73
Hospital activities	53.6	98.3	152.0	1.19	1.49	1.37	17	17	17
Medical and dental practice activities	59.2	63.7	122.9	1.32	0.96	1.11	15	24	20
Other human health activities	17.1	37.5	54.6	0.38	0.57	0.49	31	38	35
Residential care activities for the elderly and disabled	0.9	0.0	0.9	0.02	0.00	0.01	65	91	90
Other residential care activities n.e.c.	3.1	11.1	14.3	0.07	0.17	0.13	55	63	67
Other social work activities without accommodation n.e.c.	20.2	0.2	20.3	0.45	0.00	0.18	29	89	60
Creative, arts and entertainment activities	12.6	15.4	28.0	0.28	0.23	0.25	40	57	51
Libraries, archives, museums and other cultural activities	0.4	0.0	0.4	0.01	0.00	0.00	72	91	95
Gambling and betting activities	10.1	8.6	18.7	0.22	0.13	0.17	46	71	62
Sports activities	0.0	24.5	24.5	0.00	0.37	0.22	74	47	54
Other amusement and recreation activities	0.7	0.0	0.7	0.02	0.00	0.01	67	91	93

Activities of other membership organizations	77.0	44.4	121.4	1.71	0.67	1.09	13	31	21
Repair of computers and communication equipment	0.0	12.6	12.6	0.00	0.19	0.11	74	60	72
Repair of personal and household goods	85.4	95.8	181.2	1.90	1.45	1.63	12	18	14
Other personal service activities	408.3	253.1	661.4	9.09	3.82	5.95	3	7	3
Activities of households as employers of domestic personnel	74.3	259.7	334.0	1.66	3.92	3.01	14	6	10
Service Sector Total (Million)	4.5	6.6	11.1	100	100	100			

Note: Highlighted sectors are the top job-creating sectors within services

Tamil Nadu

Non-manufacturing Sector

In the case of Tamil Nadu, we also observe that construction sector employment (more than 90 percent of total non-manufacturing employment) drives overall non-manufacturing employment. However, the subsectors like quarrying of stone, sand and clay, and electric power generation, transmission and distribution subsectors together generate about 7 percent of the non-manufacturing jobs (see Table 7a).

In *rural* areas, the subsectors like construction of buildings (40 percent), construction of utility projects (37 percent), construction of road and railways (10.5 percent), quarrying of stone, sand and clay (3 percent), and building completion and finishing activities (3 percent) created jobs.

Similarly, in *urban* Tamil Nadu non-manufacturing subsectors like construction of buildings (70.6 percent), building completion and finishing activities (7.2 percent), quarrying of stone, sand and clay (6.4 percent), electric power generation, transmission and distribution (5.4 percent), and electrical, plumbing and other construction installation activities (4.4 percent) were creating jobs in 2011-12. It is important to note that all of these sectors are labour intensive in nature, though the subsector electric power generation, transmission and distribution is relatively capital intensive.

Therefore, we argue that *unless the construction contractors (agents) start using labour replacing machines, due to either skill or any other issues, this sector is likely to generate much employment during the initial phase of the ECEC project.*

Table 7a: Employment Generating Sectors in Non-manufacturing Sectors, Tamil Nadu (2011-12)

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Quarrying of stone, sand and clay	100.1	81.7	181.7	3.03	6.43	3.97	4	3	5
Mining and quarrying n.e.c.	1.3	5.4	6.7	0.04	0.43	0.15	14	11	15
Electric power generation, transmission and distribution	53.5	68.8	122.3	1.62	5.42	2.67	6	4	6
Manufacture of gas; distribution of gaseous fuels through mains	0.0	15.2	15.2	0.00	1.19	0.33	15	7	14
Water collection, treatment and supply	30.2	0.0	30.2	0.91	0.00	0.66	9	16	10
Sewerage	0.0	0.2	0.2	0.00	0.02	0.01	15	15	17
Waste collection	9.6	9.1	18.7	0.29	0.72	0.41	12	9	12
Waste treatment and disposal	20.4	0.0	20.4	0.62	0.00	0.45	10	16	11
Materials recovery	4.0	12.0	16.0	0.12	0.94	0.35	13	8	13
Construction of buildings	1326.5	896.9	2223.4	40.13	70.58	48.59	1	1	1
Construction of roads and railways	346.8	6.0	352.8	10.49	0.47	7.71	3	10	3
Construction of utility projects	1215.4	2.6	1217.9	36.77	0.20	26.62	2	12	2
Construction of other civil engineering projects	37.0	1.4	38.5	1.12	0.11	0.84	8	14	8
Demolition and site preparation	12.5	22.0	34.6	0.38	1.73	0.76	11	6	9
Electrical, plumbing and other construction installation activities	50.9	55.6	106.5	1.54	4.37	2.33	7	5	7
Building completion and finishing	96.9	92.0	188.9	2.93	7.24	4.13	5	2	4
Other specialized construction activities	0.0	1.9	1.9	0.00	0.15	0.04	15	13	16
Non-manufacturing Sector Total (Million)	3.3	1.3	4.6	100	100	100			

Note: Highlighted sectors are the top ranked job creators within non-manufacturing

Manufacturing Sector

Manufacturing employment generation in Tamil Nadu is to some extent different than that of Andhra Pradesh. In both rural and urban Tamil Nadu, the top employment generating subsectors are both labour intensive (mostly) and capital intensive in nature (see Table 7b).

In *rural* areas, manufacturing subsectors generating jobs were spinning, weaving and finishing of textiles (23 percent of all manufacturing jobs), wearing apparel (10.6 percent), tobacco products (7.5 percent), products of wood, cork, straw and plaiting materials (7 percent), non-metallic mineral products (5.2 percent), chemical products other than basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms etc. (4.6 percent), and structural metal products, tanks, reservoirs and steam generators (4.4 percent). The last two subsectors are relatively capital intensive in nature.

Similarly, in *urban* Tamil Nadu, manufacturing subsector like spinning, weaving and finishing of textiles (22.6 percent), wearing apparel (10.7 percent), tobacco products (7 percent), knitted and crocheted apparel (4.5 percent), structural metal products, tanks, reservoirs and steam generators (3.6 percent), jewellery, bijouterie and related articles (3.3 percent), Manufacture of footwear (3 percent), and products of wood, cork, straw and plaiting materials (3 percent), and non-metallic mineral products (2 percent) etc. are the major employment generating subsectors.

This might be due to a comparative advantage (due to low-cost raw materials) that both labor and capital intensive units are operating in Tamil Nadu. These sectors together have created many jobs over the years. Given this fact, it is expected that the job opportunities in various labour and capital intensive subsectors would grow in the East Coast Economic Corridor.

Table 7b: Employment Generating Sectors in Manufacturing Sectors, Tamil Nadu (2011-12)

Name of the sectors	Total Employment (in '000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Processing and preserving of meat	15.0	59.2	74.2	0.52	1.63	1.14	29	18	22
Processing and preserving of fish, crustaceans and molluscs	21.6	11.9	33.5	0.75	0.33	0.51	21	39	31
Processing and preserving of fruit and vegetables	0.0	2.0	2.0	0.00	0.06	0.03	51	54	56
Manufacture of vegetable and animal oils and fats	0.0	5.3	5.3	0.00	0.15	0.08	51	47	49
Manufacture of dairy products	4.8	15.4	20.2	0.17	0.42	0.31	36	36	38
Manufacture of grain mill products, starches and starch products	19.7	67.4	87.0	0.68	1.85	1.33	27	14	18
Manufacture of other food products	120.7	177.7	298.3	4.18	4.88	4.57	8	4	5
Manufacture of prepared animal feeds	0.5	0.0	0.5	0.02	0.00	0.01	47	58	59
Manufacture of beverages	20.5	29.6	50.1	0.71	0.81	0.77	24	27	28
Manufacture of tobacco products	217.4	255.1	472.5	7.54	7.00	7.24	3	3	3
Spinning, weaving and finishing of textiles	666.3	825.6	1491.9	23.10	22.66	22.86	1	1	1
Manufacture of other textiles	79.0	98.3	177.3	2.74	2.70	2.72	11	10	11
Manufacture of wearing apparel, except fur apparel	304.9	390.3	695.3	10.57	10.71	10.65	2	2	2
Manufacture of articles of fur	0.0	12.7	12.7	0.00	0.35	0.19	51	38	44
Manufacture of knitted and crocheted apparel	94.0	162.8	256.9	3.26	4.47	3.94	10	5	6
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	54.0	45.4	99.4	1.87	1.25	1.52	15	22	17
Manufacture of footwear	54.0	107.3	161.3	1.87	2.95	2.47	14	8	13
Sawmilling and planing of wood	19.9	11.1	30.9	0.69	0.30	0.47	25	41	32
Manufacture of products of wood, cork, straw and plaiting materials	205.4	106.2	311.6	7.12	2.92	4.77	4	9	4
Manufacture of paper and paper products	19.8	59.0	78.8	0.69	1.62	1.21	26	19	21
Printing and service activities related to printing	18.3	67.1	85.3	0.63	1.84	1.31	28	16	19
Manufacture of refined petroleum products	1.4	2.9	4.3	0.05	0.08	0.07	42	52	50
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	7.6	44.1	51.7	0.26	1.21	0.79	33	23	27
Manufacture of other chemical products	131.7	68.0	199.7	4.57	1.87	3.06	6	13	9
Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.8	20.3	21.1	0.03	0.56	0.32	43	29	37

Manufacture of rubber products	14.5	43.9	58.4	0.50	1.21	0.89	30	24	25
Manufacture of plastics products	3.7	57.8	61.5	0.13	1.59	0.94	37	20	24
Manufacture of glass and glass products	3.5	15.7	19.2	0.12	0.43	0.29	38	35	40
Manufacture of non-metallic mineral products n.e.c.	151.2	76.2	227.4	5.24	2.09	3.48	5	12	8
Manufacture of basic iron and steel	6.4	18.5	24.9	0.22	0.51	0.38	34	32	34
Manufacture of basic precious and other non-ferrous metals	20.6	14.1	34.7	0.72	0.39	0.53	22	37	30
Casting of metals	11.8	9.4	21.2	0.41	0.26	0.32	32	43	36
Manufacture of structural metal products, tanks, reservoirs and steam generators	126.3	129.5	255.8	4.38	3.55	3.92	7	6	7
Manufacture of other fabricated metal products; metalworking service activities	72.1	56.6	128.6	2.50	1.55	1.97	12	21	14
Manufacture of electronic components	2.7	11.9	14.6	0.10	0.33	0.22	39	40	43
Manufacture of computers and peripheral equipment	0.0	9.6	9.6	0.00	0.26	0.15	51	42	47
Manufacture of communication equipment	2.5	0.2	2.8	0.09	0.01	0.04	40	57	55
Manufacture of consumer electronics	0.4	9.0	9.4	0.01	0.25	0.14	48	44	48
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	0.0	17.6	17.6	0.00	0.48	0.27	51	34	42
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	5.6	5.0	10.6	0.19	0.14	0.16	35	48	46
Manufacture of batteries and accumulators	0.0	2.9	2.9	0.00	0.08	0.04	51	51	53
Manufacture of wiring and wiring devices	0.0	3.3	3.3	0.00	0.09	0.05	51	50	52
Manufacture of electric lighting equipment	0.2	2.7	2.9	0.01	0.08	0.04	50	53	54
Manufacture of domestic appliances	0.5	19.4	19.9	0.02	0.53	0.31	45	30	39
Manufacture of other electrical equipment	2.2	8.5	10.7	0.08	0.23	0.16	41	45	45
Manufacture of general purpose machinery	0.6	24.9	25.5	0.02	0.68	0.39	44	28	33
Manufacture of special-purpose machinery	13.6	67.3	81.0	0.47	1.85	1.24	31	15	20
Manufacture of motor vehicles	37.5	19.1	56.6	1.30	0.52	0.87	17	31	26
Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	20.5	1.8	22.4	0.71	0.05	0.34	23	55	35
Manufacture of parts and accessories for motor vehicles	36.9	37.1	74.0	1.28	1.02	1.13	18	25	23
Manufacture of railway locomotives and rolling stock	0.0	1.1	1.1	0.00	0.03	0.02	51	56	57
Manufacture of military fighting vehicles	0.0	3.5	3.5	0.00	0.10	0.05	51	49	51

Manufacture of transport equipment n.e.c.	27.8	7.9	35.6	0.96	0.22	0.55	20	46	29
Manufacture of furniture	36.7	64.8	101.6	1.27	1.78	1.56	19	17	15
Manufacture of jewellery, bijouterie and related articles	42.7	118.6	161.4	1.48	3.26	2.47	16	7	12
Manufacture of musical instruments	0.5	0.0	0.5	0.02	0.00	0.01	46	58	58
Manufacture of sports goods	0.4	0.0	0.4	0.01	0.00	0.01	49	58	60
Manufacture of games and toys	0.0	17.7	17.7	0.00	0.49	0.27	51	33	41
Other manufacturing n.e.c.	97.1	89.6	186.7	3.37	2.46	2.86	9	11	10
Repair of fabricated metal products, machinery and equipment	68.5	32.9	101.4	2.37	0.90	1.55	13	26	16
Manufacturing Sector Total (Million)	2.9	3.6	6.5	100	100	100			

Service Sectors

A combination of traditional and modern service subsectors drives service sector employment in Tamil Nadu. The comparison of rural and urban areas shows that the share of employment generation of traditional services is relatively higher in rural areas, whereas in urban areas modern services dominates service sector employment growth (see Table 7c).

In rural areas, *traditional* service subsectors like land transport (19 percent), retail sale of food, beverages and tobacco in specialized stores (11.6 percent), repair of personal and household goods, other personal service activities, primary, secondary and higher education services (9 percent) and activities of households as employers of domestic personnel (8 percent), have a major share of service sector employment.

Among the *modern* service subsectors in rural areas the sectors like mobile food service activities, beverage servicing activities, and event catering and other food service activities (9 percent), administration of the state and the economic and social policy of the community (5.3 percent), and monetary intermediation, insurance, and other financial service activities, except insurance and pension funding activities (4 percent) etc. have contributed to the growth of modern service sector employment in *rural* Tamil Nadu.

In *Urban* Tamil Nadu, traditional service subsectors like land transport (11 percent), retail sale of other goods in specialized stores, and retail sale of other household equipment in specialized stores (9.2 percent), retail sale of food, beverages and tobacco in specialized stores (8.5 percent), primary, secondary and higher education services (7.6 percent), repair of personal and household goods, other personal service activities, and activities of households as employers of domestic personnel (8.5 percent) have created major share of service sector employment.

Moreover, modern service subsectors like restaurants, mobile food service activities, and event catering and other food service activities, and beverage serving activities (8.5 percent), activities of households as employers of domestic personnel, and other personal service activities (8.5 percent), real estate activities with own or leased property and on a fee or contract basis, legal activities, and accounting, bookkeeping and auditing activities and tax consultancy (5 percent), monetary intermediation, insurance, and other financial service activities, except insurance and pension funding activities (4.5 percent), administration of the state and the economic and social policy of the community, and community social services (3.7 percent), telecommunications, computer programming, consultancy and related activities (3.5 percent), and hospital activities (2 percent) etc. have generated a large share of employment in the service sector.

In Tamil Nadu, as in Andhra Pradesh, the growing share of employment in modern services suggests that these services would drive employment growth in the coming years. Hence the assessment of the skill requirements of these modern service sectors like telecommunication, financial services, information and technology (IT), hotel trade, transportation, consultancy and business administration etc. is important, particularly, from the service sector employment generation point of view.

Table 7c: Employment Generating Sectors in Service Sectors, Tamil Nadu (2011-12)

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Sale of motor vehicles	2.2	37.1	39.3	0.06	0.55	0.39	57	43	45
Maintenance and repair of motor vehicles	72.6	155.5	228.2	2.08	2.33	2.24	13	13	13
Sale of motor vehicle parts and accessories	14.7	13.6	28.2	0.42	0.20	0.28	37	64	53
Sale, maintenance and repair of motorcycles and related parts and accessories	17.4	47.1	64.5	0.50	0.71	0.63	31	34	34
Wholesale on a fee or contract basis	18.5	60.1	78.6	0.53	0.90	0.77	30	28	27
Wholesale of agricultural raw materials and live animals	9.5	38.4	47.9	0.27	0.58	0.47	43	41	40
Wholesale of food, beverages and tobacco	30.2	44.9	75.0	0.86	0.67	0.74	21	35	28
Wholesale of household goods	0.0	40.2	40.2	0.00	0.60	0.40	76	40	43
Wholesale of machinery, equipment and supplies	1.8	2.2	4.0	0.05	0.03	0.04	63	85	81
Other specialized wholesale	11.8	67.6	79.4	0.34	1.01	0.78	40	24	25
Retail sale in non-specialized stores	81.1	164.8	245.9	2.32	2.47	2.42	11	12	12
Retail sale of food, beverages and tobacco in specialized stores	406.8	569.0	975.9	11.62	8.52	9.59	2	2	2
Retail sale of automotive fuel in specialized stores	6.9	19.7	26.6	0.20	0.29	0.26	46	57	57
Retail sale of information and communications equipment in specialized stores	3.3	61.2	64.5	0.09	0.92	0.63	49	26	35
Retail sale of other household equipment in specialized stores	114.2	277.7	391.9	3.26	4.16	3.85	9	6	7
Retail sale of cultural and recreation goods in specialized stores	3.0	27.7	30.7	0.09	0.41	0.30	50	48	52
Retail sale of other goods in specialized stores	170.0	382.4	552.4	4.86	5.73	5.43	6	4	4
Retail sale via stalls and markets	2.3	10.1	12.5	0.07	0.15	0.12	55	67	70
Retail trade not in stores, stalls or markets	76.5	147.2	223.8	2.19	2.20	2.20	12	14	14
Transport via railways	20.3	44.0	64.3	0.58	0.66	0.63	28	36	36
Other land transport	667.8	736.0	1403.8	19.08	11.02	13.79	1	1	1
Transport via pipeline	2.8	0.0	2.8	0.08	0.00	0.03	53	95	86
Sea and coastal water transport	0.0	24.4	24.4	0.00	0.36	0.24	76	51	59
Passenger air transport	0.0	2.9	2.9	0.00	0.04	0.03	76	81	85
Warehousing and storage	0.0	4.6	4.6	0.00	0.07	0.05	76	78	80
Support activities for transportation	32.7	66.3	98.9	0.93	0.99	0.97	20	25	22
Postal activities	2.9	11.3	14.2	0.08	0.17	0.14	51	65	69

Courier activities	13.7	9.6	23.3	0.39	0.14	0.23	39	70	61
Short term accommodation activities	0.2	57.6	57.8	0.01	0.86	0.57	73	29	37
Other accommodation	9.6	7.2	16.9	0.28	0.11	0.17	42	72	67
Restaurants and mobile food service activities	176.1	385.1	561.1	5.03	5.77	5.51	5	3	3
Event catering and other food service activities	17.4	81.4	98.7	0.50	1.22	0.97	32	20	23
Beverage serving activities	112.8	92.1	204.9	3.22	1.38	2.01	10	19	16
Publishing of books, periodicals and other publishing activities	0.0	21.3	21.3	0.00	0.32	0.21	76	55	63
Software publishing	0.0	17.9	17.9	0.00	0.27	0.18	76	59	66
Motion picture, video and television programme activities	14.7	16.5	31.3	0.42	0.25	0.31	36	60	51
Radio broadcasting	0.0	7.2	7.2	0.00	0.11	0.07	76	73	74
Television programming and broadcasting activities	0.0	1.1	1.1	0.00	0.02	0.01	76	90	95
Wired telecommunications activities	16.2	56.7	72.8	0.46	0.85	0.72	34	30	30
Wireless telecommunications activities	0.1	14.9	14.9	0.00	0.22	0.15	74	62	68
Satellite telecommunications activities	1.7	0.0	1.7	0.05	0.00	0.02	65	95	93
Computer programming, consultancy and related activities	20.4	203.4	223.7	0.58	3.04	2.20	27	9	15
Data processing, hosting and related activities; web portals	1.8	40.8	42.6	0.05	0.61	0.42	61	39	42
Other information service activities	0.0	33.9	33.9	0.00	0.51	0.33	76	47	48
Monetary intermediation	68.8	198.5	267.3	1.97	2.97	2.63	14	10	10
Trusts, funds and other financial vehicles	0.0	0.3	0.3	0.00	0.00	0.00	76	93	99
Other financial service activities, except insurance and pension funding activities	50.5	48.9	99.5	1.44	0.73	0.98	18	33	21
Insurance	24.3	71.0	95.2	0.69	1.06	0.94	25	23	24
Activities auxiliary to financial service activities, except insurance and pension funding	0.0	19.9	19.9	0.00	0.30	0.20	76	56	64
Activities auxiliary to insurance and pension funding	8.8	14.9	23.6	0.25	0.22	0.23	44	63	60
Fund management activities	0.9	1.9	2.8	0.02	0.03	0.03	70	87	88
Real estate activities with own or leased property	1.7	72.0	73.7	0.05	1.08	0.72	66	22	29
Real estate activities on a fee or contract basis	18.5	35.1	53.6	0.53	0.53	0.53	29	46	38
Legal activities	1.9	37.5	39.4	0.06	0.56	0.39	60	42	44
Accounting, bookkeeping and auditing activities; tax consultancy	0.7	22.3	23.0	0.02	0.33	0.23	71	54	62
Management consultancy activities	0.0	4.8	4.8	0.00	0.07	0.05	76	77	79
Architectural and engineering activities and related technical consultancy	0.0	0.4	0.4	0.00	0.01	0.00	76	92	98
Specialized design activities	0.0	6.8	6.8	0.00	0.10	0.07	76	74	76
Photographic activities	1.8	36.7	38.5	0.05	0.55	0.38	62	44	46

Other professional, scientific and technical activities n.e.c.	0.0	2.3	2.3	0.00	0.04	0.02	76	83	90
Veterinary activities	14.7	11.1	25.8	0.42	0.17	0.25	35	66	58
Renting and leasing of motor vehicles	0.0	3.4	3.4	0.00	0.05	0.03	76	80	82
Renting and leasing of personal and household goods	28.1	23.4	51.5	0.80	0.35	0.51	22	52	39
Renting and leasing of other machinery, equipment and tangible goods	0.7	0.0	0.7	0.02	0.00	0.01	72	95	97
Activities of employment placement agencies	0.0	7.5	7.5	0.00	0.11	0.07	76	71	73
Temporary employment agency activities	0.0	2.1	2.1	0.00	0.03	0.02	75	86	92
Human resources provision and management of human resources functions	0.0	6.3	6.3	0.00	0.09	0.06	76	75	77
Travel agency and tour operator activities	0.0	27.1	27.1	0.00	0.41	0.27	76	50	56
Other reservation service activities	0.0	2.5	2.5	0.00	0.04	0.03	76	82	89
Private security activities	10.8	16.3	27.1	0.31	0.24	0.27	41	61	55
Security systems service activities	0.0	0.2	0.2	0.00	0.00	0.00	76	94	100
Combined facilities support activities	0.0	19.6	19.6	0.00	0.29	0.19	76	58	65
Cleaning activities	2.2	0.8	3.0	0.06	0.01	0.03	56	91	83
Office administrative and support activities	2.8	42.3	45.1	0.08	0.63	0.44	54	37	41
Activities of call centres	1.4	77.6	79.1	0.04	1.16	0.78	67	21	26
Business support service activities n.e.c.	0.0	9.6	9.6	0.00	0.14	0.09	76	69	71
Administration of the State and the economic and social policy of the community	184.9	194.7	379.6	5.28	2.92	3.73	4	11	8
Provision of services to the community as a whole	14.3	53.7	68.0	0.41	0.80	0.67	38	31	31
Compulsory social security activities	1.3	1.5	2.8	0.04	0.02	0.03	68	88	87
Primary education	133.6	113.1	246.7	3.82	1.69	2.42	8	17	11
Secondary education	155.5	253.6	409.0	4.44	3.80	4.02	7	7	6
Higher education	27.2	98.4	125.6	0.78	1.47	1.23	23	18	19
Other education	16.2	50.0	66.2	0.46	0.75	0.65	33	32	33
Educational support services	2.2	3.6	5.8	0.06	0.05	0.06	58	79	78
Hospital activities	52.2	115.0	167.3	1.49	1.72	1.64	17	16	18
Medical and dental practice activities	1.7	36.2	37.9	0.05	0.54	0.37	64	45	47
Other human health activities	5.1	22.6	27.7	0.15	0.34	0.27	47	53	54
Nursing care facilities	2.9	0.0	2.9	0.08	0.00	0.03	52	95	84
Residential care activities for the elderly and disabled	8.2	0.0	8.2	0.23	0.00	0.08	45	95	72
Other residential care activities n.e.c.	0.0	2.2	2.2	0.00	0.03	0.02	76	84	91
Social work activities without accommodation for the elderly and disabled	1.0	0.0	1.0	0.03	0.00	0.01	69	95	96
Other social work activities without accommodation n.e.c.	23.5	10.0	33.5	0.67	0.15	0.33	26	68	49

Creative, arts and entertainment activities	25.5	41.0	66.5	0.73	0.61	0.65	24	38	32
Libraries, archives, museums and other cultural activities	2.0	4.9	6.9	0.06	0.07	0.07	59	76	75
Other amusement and recreation activities	0.0	1.1	1.1	0.00	0.02	0.01	76	89	94
Activities of other membership organizations	53.5	60.2	113.6	1.53	0.90	1.12	16	27	20
Repair of computers and communication equipment	4.6	27.2	31.8	0.13	0.41	0.31	48	49	50
Repair of personal and household goods	56.5	130.9	187.4	1.61	1.96	1.84	15	15	17
Other personal service activities	290.3	227.7	518.0	8.30	3.41	5.09	3	8	5
Activities of households as employers of domestic personnel	44.8	305.2	350.1	1.28	4.57	3.44	19	5	9
Service Sector Total (Million)	3.5	6.7	10.2	100	100	100			

Odisha

Non-manufacturing Sector

Besides the construction subsectors, non-manufacturing employment generation in Odisha is also driven by mining of coal and iron ores; quarrying of stone, sand and clay; and electric power generation, transmission and distribution. However, the share of employment in these sectors are slightly different between rural and urban Odisha (see Table 8a).

In *rural* Odisha the subsectors driving non-manufacturing employment are: construction of buildings (64 percent), construction of roads and railways (21.2 percent), demolition and site preparation (6.6 percent), quarrying of stone, sand and clay (2.5 percent), mining of coal and iron ores (1.3 percent) and electric power generation, transmission and distribution (1.2 percent).

In *urban* Odisha, on the other hand, the subsectors driving jobs are: construction of buildings (65.2 percent), electric power generation, transmission and distribution (8.2 percent), construction of roads and railways (7 percent), mining of coal and iron ores (6 percent), water collection, treatment and supply (4 percent), and construction of utility projects, civil engineering projects, demolition and site preparation, and building completion and finishing etc. together have contributed about (7 percent) of the total non-manufacturing employment.

The skill requirements of the non-manufacturing sector in Odisha are therefore unlike that of either Andhra Pradesh or Tamil Nadu. With huge untapped resources but sub optimal productive exploitation in mining, quarrying and electricity generation sector, the scope of employment generation in these sectors is very high.

Table 8a: Employment Generating Sectors in Non-manufacturing Sectors Odisha, 2011-12

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Mining of hard coal	16.0	12.4	28.4	0.81	4.16	1.25	8	4	6
Mining of iron ores	10.1	5.3	15.4	0.51	1.78	0.68	10	7	11
Quarrying of stone, sand and clay	49.9	0.0	49.9	2.52	0.00	2.19	4	16	4
Mining and quarrying n.e.c.	0.6	0.0	0.6	0.03	0.00	0.03	14	16	16
Support activities for other mining and quarrying	0.0	2.3	2.3	0.00	0.76	0.10	15	11	13
Electric power generation, transmission and distribution	23.3	24.4	47.7	1.18	8.18	2.10	5	2	5
Manufacture of gas; distribution of gaseous fuels through mains	0.7	0.1	0.8	0.04	0.04	0.04	13	15	15
Steam and air conditioning supply	0.0	0.6	0.6	0.00	0.19	0.03	15	14	17
Water collection, treatment and supply	8.7	11.9	20.7	0.44	4.00	0.91	11	5	8
Waste collection	0.0	1.8	1.8	0.00	0.61	0.08	15	12	14
Construction of buildings	1261.1	194.5	1455.5	63.83	65.20	64.01	1	1	1
Construction of roads and railways	418.6	23.1	441.7	21.19	7.74	19.43	2	3	2
Construction of utility projects	6.2	4.9	11.1	0.31	1.65	0.49	12	8	12
Construction of other civil engineering projects	14.8	3.7	18.5	0.75	1.23	0.81	9	9	9
Demolition and site preparation	130.1	3.6	133.7	6.58	1.20	5.88	3	10	3
Electrical, plumbing and other construction installation activities	17.1	0.9	18.0	0.87	0.29	0.79	7	13	10
Building completion and finishing	18.4	8.8	27.2	0.93	2.96	1.20	6	6	7
Non-manufacturing Sector Total (Million)	2.0	0.3	2.3	100	100	100			

Manufacturing Sector

The sub-sectoral composition of manufacturing employment in rural Odisha is different than that of urban Odisha. In rural areas, the top job generating subsectors are labour intensive in nature (with the exception of non-metallic mineral products). In urban areas capital intensive sectors like manufacture of basic iron and steel, manufacture of basic precious and other non-ferrous metals, and casting of metals are among the top subsectors. Moreover, among the labour intensive sectors, processing and preserving of fish, crustaceans and molluscs etc., manufacture of wearing apparel (except fur apparel), and manufacture of furniture are the leading subsectors (see Table 8b).

In *rural* areas, manufacture of products of wood, cork, straw and plaiting materials (33 percent), manufacture of non-metallic mineral products (12 percent), manufacture of wearing apparel, except fur apparel (11 percent), manufacture of furniture (8 percent), and manufacture of tobacco products (7.5 percent) are the top employment generating subsectors.

In the *urban* areas, labour intensive subsectors include: processing and preserving of fish, crustaceans and molluscs etc. (23 percent), manufacture of wearing apparel except fur apparel (12 percent), and manufacture of furniture are the leading subsectors (8 percent) generated major share of employment. Moreover, the capital intensive sectors like manufacture of basic iron and steel (7.5 percent), manufacture of basic precious and other non-ferrous metals (7.5 percent), and casting of metals (3.5 percent) are also among the top employment generating subsectors.

Table 8b: Employment Generating Sectors in Manufacturing Sectors Odisha, 2011-12

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Processing and preserving of meat	5.9	1.6	7.6	0.41	0.65	0.45	16	21	20
Processing and preserving of fish, crustaceans and molluscs	1.6	59.0	60.5	0.11	23.38	3.59	27	1	8
Processing and preserving of fruit and vegetables	2.5	0.0	2.5	0.18	0.00	0.15	24	28	31
Manufacture of vegetable and animal oils and fats	8.4	0.7	9.1	0.59	0.26	0.54	14	25	18
Manufacture of dairy products	2.3	0.0	2.3	0.16	0.00	0.14	25	28	33
Manufacture of grain mill products, starches and starch products	81.7	0.8	82.4	5.69	0.30	4.89	7	24	7
Manufacture of other food products	2.8	2.3	5.2	0.20	0.93	0.31	23	15	24
Manufacture of prepared animal feeds	2.1	0.0	2.1	0.14	0.00	0.12	26	28	34
Manufacture of beverages	24.8	0.0	24.8	1.73	0.00	1.47	12	28	14
Manufacture of tobacco products	106.5	0.3	106.8	7.43	0.12	6.33	5	27	6
Spinning, weaving and finishing of textiles	34.1	0.0	34.1	2.37	0.00	2.02	8	28	10
Manufacture of other textiles	7.0	0.0	7.0	0.49	0.00	0.42	15	28	21
Manufacture of wearing apparel, except fur apparel	157.5	29.8	187.3	10.98	11.81	11.11	3	2	3
Sawmilling and planing of wood	0.0	3.8	3.8	0.00	1.51	0.23	33	12	27
Manufacture of products of wood, cork, straw and plaiting materials	477.2	1.9	479.2	33.27	0.76	28.41	1	19	1
Manufacture of paper and paper products	4.3	2.0	6.3	0.30	0.79	0.38	18	17	22
Printing and service activities related to printing	0.0	4.3	4.3	0.00	1.69	0.25	33	11	26
Manufacture of coke oven products	0.0	2.4	2.4	0.00	0.94	0.14	33	14	32
Manufacture of refined petroleum products	13.6	0.0	13.6	0.95	0.00	0.80	13	28	15
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	3.4	0.0	3.4	0.23	0.00	0.20	22	28	28
Manufacture of other chemical products	0.0	2.9	2.9	0.00	1.14	0.17	33	13	29
Manufacture of rubber products	1.4	0.5	1.9	0.10	0.21	0.12	29	26	35
Manufacture of plastics products	1.2	1.4	2.6	0.09	0.56	0.16	30	22	30
Manufacture of non-metallic mineral products n.e.c.	169.1	18.4	187.5	11.79	7.30	11.12	2	6	2

Manufacture of basic iron and steel	97.6	28.0	125.6	6.80	11.10	7.44	6	3	5
Manufacture of basic precious and other non-ferrous metals	3.7	25.6	29.3	0.26	10.16	1.74	21	4	13
Casting of metals	0.8	8.4	9.2	0.06	3.35	0.55	32	9	17
Manufacture of structural metal products, tanks, reservoirs and steam generators	4.0	4.5	8.5	0.28	1.78	0.51	19	10	19
Manufacture of other fabricated metal products; metalworking service activities	31.7	2.0	33.6	2.21	0.79	1.99	10	18	11
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	1.5	0.0	1.5	0.10	0.00	0.09	28	28	36
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	5.1	0.0	5.1	0.35	0.00	0.30	17	28	25
Manufacture of domestic appliances	0.0	11.9	11.9	0.00	4.70	0.70	33	8	16
Manufacture of general purpose machinery	3.8	2.3	6.0	0.26	0.90	0.36	20	16	23
Building of ships and boats	0.8	0.0	0.8	0.06	0.00	0.05	31	28	38
Manufacture of furniture	114.7	22.4	137.1	8.00	8.89	8.13	4	5	4
Manufacture of jewellery, bijouterie and related articles	33.7	12.4	46.0	2.35	4.91	2.73	9	7	9
Other manufacturing n.e.c.	0.0	1.0	1.0	0.00	0.38	0.06	33	23	37
Repair of fabricated metal products, machinery and equipment	29.7	1.7	31.4	2.07	0.68	1.86	11	20	12
Manufacturing Sector Total (Million)	1.4	0.3	1.7	100	100	100			

Service Sectors

Both traditional and modern service subsectors drive service sector employment in Odisha. The comparison of rural and urban areas shows that the share of employment of traditional services is relatively higher in rural areas, whereas in urban areas modern services thrive (see Table 8c).

In *rural* areas, traditional service subsectors including retail sale of food, beverages and tobacco in specialized stores (19.2 percent), land transport (14.5 percent), primary, secondary and higher education services (14 percent) accounted for the major share of service sector employment.

Among the modern services in rural areas the sub-sectors like mobile food service activities, beverage servicing, event catering and other food service activities (6.5 percent), monetary intermediation, and insurance (4 percent), administration of the state (3.5 percent), and telecommunication (2.5 percent) etc. have contributed to the growth of modern services employment in rural Odisha.

In *urban* Odisha, traditional service subsectors like retail sale of other goods in specialized stores (17 percent), land transport (11.2 percent), primary, secondary and higher education (9.5 percent), and repair of personal and household goods, and domestic personnel (8 percent) have created a major share of services employment.

Furthermore, modern services have generated a large share of employment in the service sector: like administration of the state and community social services (7.8 percent), restaurants, mobile food service activities, event catering, and beverage serving activities (7.5 percent), monetary intermediation, insurance, and other financial service activities, except insurance and pension funding activities (3.5 percent), telecommunications, computer programming, consultancy and related activities (3.5 percent), and hospital activities (2 percent), and creative, arts and entertainment activities (1.5 percent) etc.

In Odisha, like in the other two states, the growing share of employment in the modern services suggests that modern services would drive employment growth in coming years. Hence the *assessment of the skill requirements of these modern service sectors like telecommunication, financial services, information and technology (IT), hotel trade, transportation, consultancy and business administration* etc. is important.

Table 8c: Employment Generating Sectors in Service Sectors Odisha, 2011-12

Name of the sectors	Total Employment (in, 000)			Share (%) of Employment			Top Employment generating sectors (Ranks)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Sale of motor vehicles	0.0	0.8	0.8	0.00	0.05	0.02	61	65	73
Maintenance and repair of motor vehicles	1.8	36.7	38.5	0.08	2.46	1.01	50	12	18
Sale of motor vehicle parts and accessories	0.4	5.8	6.3	0.02	0.39	0.17	58	37	49
Sale, maintenance and repair of motorcycles and related parts and accessories	17.3	0.6	17.8	0.75	0.04	0.47	19	69	32
Wholesale on a fee or contract basis	0.5	5.4	5.9	0.02	0.36	0.16	56	39	51
Wholesale of agricultural raw materials and live animals	12.3	3.4	15.6	0.53	0.22	0.41	25	48	34
Wholesale of food, beverages and tobacco	20.0	15.3	35.3	0.87	1.02	0.93	17	23	20
Wholesale of household goods	0.0	20.9	20.9	0.00	1.40	0.55	61	19	29
Wholesale of machinery, equipment and supplies	0.0	4.0	4.0	0.00	0.26	0.10	61	46	61
Other specialized wholesale	0.7	9.4	10.2	0.03	0.63	0.27	55	30	44
Non-specialized wholesale trade	0.0	1.5	1.5	0.00	0.10	0.04	61	59	69
Retail sale in non-specialized stores	134.0	23.1	157.1	5.82	1.55	4.14	7	18	8
Retail sale of food, beverages and tobacco in specialized stores	442.4	252.8	695.2	19.21	16.91	18.31	1	1	1
Retail sale of automotive fuel in specialized stores	4.0	0.0	4.0	0.17	0.00	0.11	43	73	60
Retail sale of information and communications equipment in specialized stores	11.2	4.5	15.6	0.48	0.30	0.41	26	43	35
Retail sale of other household equipment in specialized stores	80.7	38.3	119.0	3.50	2.56	3.13	9	11	10
Retail sale of cultural and recreation goods in specialized stores	3.3	8.6	11.9	0.14	0.58	0.31	46	32	41
Retail sale of other goods in specialized stores	137.5	85.7	223.2	5.97	5.73	5.88	5	5	5
Retail sale via stalls and markets	9.1	2.3	11.4	0.39	0.16	0.30	31	53	43
Retail trade not in stores, stalls or markets	34.1	1.1	35.2	1.48	0.07	0.93	13	64	21
Transport via railways	4.5	19.5	24.0	0.19	1.30	0.63	39	20	26
Other land transport	331.2	167.0	498.1	14.38	11.17	13.12	2	2	2
Transport via pipeline	0.0	2.9	2.9	0.00	0.19	0.08	61	52	63
Sea and coastal water transport	0.0	5.7	5.7	0.00	0.38	0.15	61	38	52
Warehousing and storage	4.3	0.0	4.3	0.19	0.00	0.11	41	73	59
Support activities for transportation	10.8	25.2	36.1	0.47	1.69	0.95	27	17	19
Postal activities	19.3	3.1	22.4	0.84	0.21	0.59	18	50	27

Short term accommodation activities	15.8	5.4	21.2	0.69	0.36	0.56	21	40	28
Other accommodation	4.0	0.7	4.8	0.17	0.05	0.13	42	67	56
Restaurants and mobile food service activities	141.1	92.8	233.9	6.13	6.21	6.16	4	4	4
Event catering and other food service activities	4.4	8.1	12.5	0.19	0.54	0.33	40	33	39
Beverage serving activities	5.5	1.9	7.4	0.24	0.13	0.20	37	55	47
Publishing of books, periodicals and other publishing activities	0.0	9.4	9.4	0.00	0.63	0.25	61	29	46
Radio broadcasting	0.0	1.2	1.2	0.00	0.08	0.03	61	63	71
Wired telecommunications activities	2.8	35.7	38.5	0.12	2.39	1.01	48	14	17
Wireless telecommunications activities	0.0	1.9	1.9	0.00	0.13	0.05	61	56	67
Satellite telecommunications activities	0.0	0.8	0.8	0.00	0.05	0.02	61	65	73
Other telecommunications activities	0.0	11.7	11.7	0.00	0.78	0.31	61	26	42
Data processing, hosting and related activities; web portals	0.0	1.3	1.3	0.00	0.08	0.03	61	61	70
Other information service activities	0.0	3.1	3.1	0.00	0.21	0.08	61	51	62
Monetary intermediation	9.3	41.7	51.1	0.41	2.79	1.35	30	9	15
Other financial service activities, except insurance and pension funding activities	0.4	1.8	2.2	0.02	0.12	0.06	59	57	66
Insurance	9.6	14.9	24.4	0.42	0.99	0.64	29	24	25
Activities auxiliary to financial service activities, except insurance and pension funding	0.0	4.4	4.4	0.00	0.29	0.12	61	44	58
Activities auxiliary to insurance and pension funding	14.2	5.2	19.4	0.62	0.35	0.51	23	41	31
Real estate activities with own or leased property	1.7	3.1	4.8	0.07	0.21	0.13	51	49	55
Real estate activities on a fee or contract basis	0.0	2.3	2.3	0.00	0.15	0.06	61	54	65
Legal activities	7.1	9.5	16.6	0.31	0.64	0.44	33	28	33
Accounting, bookkeeping and auditing activities; tax consultancy	0.5	0.0	0.5	0.02	0.00	0.01	57	73	76
Architectural and engineering activities and related technical consultancy	0.0	1.6	1.6	0.00	0.11	0.04	61	58	68
Market research and public opinion polling	0.0	0.6	0.6	0.00	0.04	0.02	61	68	75
Photographic activities	2.2	4.1	6.3	0.10	0.27	0.17	49	45	50
Veterinary activities	6.4	7.1	13.5	0.28	0.48	0.35	36	34	38
Renting and leasing of motor vehicles	1.1	0.0	1.1	0.05	0.00	0.03	54	73	72
Renting and leasing of personal and household goods	14.8	0.0	14.8	0.64	0.00	0.39	22	73	37
Private security activities	7.0	4.9	11.9	0.30	0.33	0.31	34	42	40
Cleaning activities	6.7	0.3	7.0	0.29	0.02	0.18	35	70	48
Office administrative and support activities	4.7	0.0	4.7	0.21	0.00	0.13	38	73	57
Administration of the State and the economic and social policy of the community	62.7	107.3	170.0	2.72	7.18	4.48	12	3	7

Provision of services to the community as a whole	16.2	30.9	47.1	0.70	2.06	1.24	20	15	16
Compulsory social security activities	0.1	0.0	0.1	0.01	0.00	0.00	60	73	77
Primary education	187.3	58.1	245.3	8.13	3.89	6.46	3	6	3
Secondary education	102.4	48.0	150.4	4.45	3.21	3.96	8	7	9
Higher education	24.2	36.6	60.7	1.05	2.45	1.60	14	13	13
Other education	22.6	8.9	31.5	0.98	0.60	0.83	16	31	22
Educational support services	1.7	3.4	5.0	0.07	0.23	0.13	52	47	54
Hospital activities	10.1	10.1	20.3	0.44	0.68	0.53	28	27	30
Medical and dental practice activities	3.4	6.7	10.0	0.15	0.45	0.26	45	35	45
Other human health activities	23.5	5.9	29.4	1.02	0.40	0.78	15	36	23
Nursing care facilities	3.0	11.9	14.9	0.13	0.79	0.39	47	25	36
Other social work activities without accommodation n.e.c.	3.9	1.2	5.2	0.17	0.08	0.14	44	62	53
Creative, arts and entertainment activities	13.6	42.8	56.4	0.59	2.86	1.49	24	8	14
Other amusement and recreation activities	0.0	0.0	0.0	0.00	0.00	0.00	61	72	79
Activities of business, employers and professional membership organizations	0.0	0.1	0.1	0.00	0.01	0.00	61	71	78
Activities of other membership organizations	77.7	16.5	94.2	3.38	1.10	2.48	10	22	11
Repair of computers and communication equipment	1.1	1.4	2.5	0.05	0.09	0.07	53	60	64
Repair of personal and household goods	65.8	26.9	92.7	2.86	1.80	2.44	11	16	12
Other personal service activities	135.7	40.2	175.8	5.89	2.69	4.63	6	10	6
Activities of households as employers of domestic personnel	8.7	18.6	27.3	0.38	1.25	0.72	32	21	24
Service Sector Total (Million)	2.3	1.5	3.8	100	100	100			

To *sum up*, it can be stated that due to development of the ECEC, employment opportunities in construction would grow first, as civil construction (including roads, buildings, flyovers etc.) projects are to be undertaken. However, in later years, other subsectors of non-manufacturing sector including mining and quarrying, electricity generation and transmission, water and gas supply etc., are also likely to increase.

In the manufacturing sector both labour and capital intensive sectors are crucial for employment generation. The subsectors of manufacturing sector including food processing, textiles and apparel, non-metallic mineral products, basic iron and steel, other non-ferrous metals, furniture, pharmaceuticals, manufacturing of tobacco, chemicals and fertilizer, plastics and synthetic rubber etc. are the major sectors that would generate employment opportunities in the states like AP, TN and Odisha.

In service sector, however, the growth of modern services like hotel trade, transport services, telecom, finance, insurance, information and technology (IT), healthcare, and education etc. would play a crucial role in generating employment in these three states.

In this context, an assessment of the existing skill gap and future skill requirements of these three broad sectors are important. In the next section we have estimated at sub-sectoral level a skill gap index for each of these three sectors and analyzed them with reference to the future skill needs of these three states.

5. Education and skill distribution of secondary and tertiary workforce in India and three eastern states

5.1. Sectoral employment by level of skill

The general level of education of the population has been consistently improving across the country. This is evident from the fact that in 2007 (the same year that India became a low-middle income country, from being a low-income country), the primary net enrolment rate reached 97%. Since then there has been a sharp rise in enrolments at all levels of education, on account of the upward pressure of this universalization of primary education. In fact, as we noted earlier, not only did the gross enrolment rate (GER) at upper primary level rise to over 90%, the secondary GER rose very sharply from 58% in 2010 to 85% in 2015 (U-DISE database, NUEPA, 2016).

Education and skills in Agriculture

As this better educated youth joined the labour force, the level of general education even in agriculture rose sharply. Thus, in 2004-5, 137 of 265 million workers in agriculture were illiterate. By 2011-12 that number fell from 137 million to 97 million, and then further to 64 million in 2015-16; the percentage of such workers among all agricultural workers also halved (see Table 9A). Similarly, at the all India level, the absolute number of those in agriculture with below primary education fell from 31 million in 2004-5 to 24.6 million in 2015-16. The share of those in agriculture with secondary and higher secondary education doubled over a decade, with their share rising to 14.7% and 9.4% respectively by 2015-16.

However, the fact that those with greater levels of education are remaining in agriculture suggests that jobs in the rest of the economy, i.e. in industry and services, are not growing fast enough.

While the share of those with rising levels of general academic education in agriculture growing is a positive phenomenon for the future productivity of agriculture, but the problem is that those in agriculture with any technical education or vocational training is abysmally low. Table 9A shows that those with technical education in agriculture was negligible out of the total workforce of 266 million in 2004-5; just under 265 million were without any technical education. It is notable that 10 years later the number of those with no technical education in agriculture had fallen remarkably to 222 million, but that is merely because of millions of migrating illiterates (who obviously had no technical education) who left to do unskilled work in non-agriculture. The share of those workers in agriculture with NO technical education barely fell at all over the last 10 years period, from 99.5% to 98.8% in 2015 16. Thus barely any of the workers in agriculture had technical education.

Vocational training in fields related to agriculture is not widely available in India. The result is evident in table 9A. Thus the number of workers in agriculture with no

vocational training in fields related to agriculture actually rose from 180 million in 2004-5 to 213 million by 2015-16. It is of course true that some vocational training in agriculture was being provided on a formal basis and many of them did join agriculture. Thus the number of those who had received formal training *and* work in agriculture rose from half a million in 2004-5 to 2.37 million 10 years later. Over this period there was also an increase of students who were receiving training on a formal basis in agriculture (from 0.22 million to 0.77 million over that same period).

What is notable from table 9B is that the share of those with no vocational training in agriculture rose sharply from 68% in 2004-5 to 95% of the total agricultural labour force by 2015-16. This is consistent with the fact that millions who had very little education of any kind, whether general academic or vocational, were migrating in their millions to non-farm work. The share of those in agriculture who had either received formal training or were receiving it hardly showed a rise at all over that same 10 year period.

In the three states under consideration - Tamil Nadu, Andhra Pradesh and Odisha – the level of general education prevailing among those in agricultural and allied sector workers is remarkably similar to that in the rest of India. Both in absolute as well as relative terms the trends are exactly the same.

Absolutely the same observation would hold in respect of all the 3 states in respect of technical education levels of the agricultural workforce. Similarly the agricultural workforce in all 3 states had no formal vocational training.

Table 9A: Agriculture and allied sector employment by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Absolute number of workers (in million)											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015-16
Level of General education												
Illiterate	7.19	4.50	2.98	15.39	12.50	10.49	5.57	3.86	1.95	137.05	96.80	64.31
Below Primary	2.17	1.67	1.37	2.20	2.28	2.14	1.86	1.57	1.27	30.90	28.33	24.56
Primary	2.74	1.81	1.73	2.06	1.72	3.10	1.01	1.03	1.68	35.01	31.06	32.02
Middle	1.79	1.83	1.98	1.81	1.99	2.68	1.45	2.31	1.72	35.26	35.26	40.41
Secondary	0.71	1.09	1.81	1.05	1.85	2.97	0.36	0.61	0.80	15.90	22.34	33.08
Higher Secondary	0.28	0.47	1.06	0.26	0.46	1.37	0.11	0.25	0.39	7.22	10.88	21.19
Graduate	0.11	0.10	0.23	0.20	0.19	0.34	0.10	0.11	0.13	2.97	4.08	4.98
Graduate & above	0.02	0.01	0.22	0.02	0.01	0.32	0.01	0.00	0.03	0.57	0.76	1.87
Total	15.00	11.47	11.38	22.98	20.99	23.40	10.46	9.74	7.98	264.88	229.52	222.43
Level of Technical education												
No Technical Education	14.99	11.47	11.38	22.99	20.99	23.40	10.47	9.74	7.98	264.63	229.53	222.43
Below graduate	0.07	0.07	0.28	0.06	0.07	0.25	0.01	0.00	0.07	0.86	0.69	2.09
Graduate level	0.01	0.01	0.10	0.01	0.00	0.14	0.00	0.00	0.00	0.09	0.07	0.33
Post-graduate & above	0.03	0.00	0.04	0.02	0.01	0.05	0.01	0.00	0.00	0.28	0.14	0.18
Total	15.11	11.55	11.80	23.08	21.07	23.83	10.49	9.74	8.06	265.86	230.43	225.02
Vocational training												
No vocational training	11.43	11.00	11.34	15.13	18.58	23.30	6.82	6.92	7.93	180.12	207.26	213.02
Received formal training	0.04	0.06	0.18	0.03	0.03	0.15	0.01	0.01	0.04	0.50	1.04	2.37
Received in-formal training	3.61	0.45	0.23	7.91	2.41	0.31	3.66	2.80	0.06	85.39	21.78	8.86
Receiving formal training	0.02	0.03	0.04	0.01	0.05	0.06	0.00	0.01	0.03	0.22	0.36	0.77
Total	15.11	11.55	11.80	23.08	21.07	23.83	10.50	9.74	8.06	266.23	230.45	225.02

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 9B: Agriculture and allied sector employment (%) by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Percentage of Agricultural and Allied sector workers											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	47.6	39.0	25.3	66.7	59.3	44.0	53.1	39.6	24.2	51.5	42.0	28.6
Below Primary	14.4	14.5	11.6	9.5	10.8	9.0	17.7	16.1	15.8	11.6	12.3	10.9
Primary	18.1	15.7	14.7	8.9	8.2	13.0	9.6	10.6	20.8	13.2	13.5	14.2
Middle	11.8	15.8	16.8	7.8	9.4	11.2	13.8	23.7	21.3	13.3	15.3	18.0
Secondary	4.7	9.4	15.3	4.5	8.8	12.5	3.4	6.3	9.9	6.0	9.7	14.7
Higher Secondary	1.9	4.1	9.0	1.1	2.2	5.7	1.0	2.6	4.8	2.7	4.7	9.4
Graduate	0.7	0.9	1.9	0.9	0.9	1.4	1.0	1.1	1.6	1.1	1.8	2.2
Graduate & above	0.1	0.1	1.9	0.1	0.0	1.3	0.1	0.0	0.4	0.2	0.3	0.8
Total	99.2	99.3	96.4	99.6	99.6	98.2	99.8	100.0	99.0	99.5	99.6	98.8
Level of Technical education												
No Technical Education	99.2	99.3	96.4	99.6	99.6	98.2	99.8	100.0	99.0	99.5	99.6	98.8
Below graduate	0.5	0.6	2.4	0.3	0.3	1.0	0.1	0.0	0.9	0.3	0.3	0.9
Graduate level	0.1	0.1	0.8	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.1
Post-graduate & above	0.2	0.0	0.3	0.1	0.0	0.2	0.1	0.0	0.0	0.1	0.1	0.1
Total	100	100	100	100	100	100	100	100	100	100	100	100
Vocational training												
No vocational training	75.6	95.2	96.1	65.6	88.2	97.8	65.0	71.0	98.4	67.7	89.9	94.7
Received formal training	0.3	0.5	1.5	0.1	0.1	0.6	0.1	0.1	0.5	0.2	0.5	1.1
Received in-formal training	23.9	3.9	1.9	34.3	11.4	1.3	34.9	28.7	0.7	32.1	9.5	3.9
Receiving formal training	0.1	0.3	0.3	0.0	0.2	0.3	0.0	0.1	0.4	0.1	0.2	0.3
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Education and skill levels in manufacturing

Tables 10A and 10B show that the level of general education of the entire workforce in India has been improving and the same applies to the 3 states under consideration. The share in the total workforce employed in manufacturing which was either illiterate or had a level of education below primary level has fallen from 38% in 2004-5 to some 24% in 2015-16 (Table 10B). What is notable is that even in a relatively developed state like Tamil Nadu the share of illiterate and those with below primary education working in manufacturing was not much different than in the rest of the country. In Andhra Pradesh and Odisha the share of illiterate and below primary education in manufacturing was much higher than the national average.

What is noticeable is that the share of those with Secondary and Higher secondary education among manufacturing sector workers has risen from just 15% in 2004-5 to 32% in 2015-16. A similar growing trend is noticeable in Tamil Nadu, Andhra Pradesh and also Odisha. What is equally noticeable is that those with general academic education up to graduate or above graduate level in manufacturing has barely changed at all, either in the country as a whole or in the three states over the 10 year period under consideration.

What is remarkable is that the workers that had technical education in manufacturing has also barely improved at all. Those with *no* Technical Education working in manufacturing fell in 2004-5 from 51 million to only 48 million over that 10 year period. More worrying is that there was an absolute decline in India in the number of workers with any Technical Education below graduate or above graduate level. The result is that there is a natural decline in the shares of those with below or above graduate level Technical Education working in manufacturing from just over 2% to under 2% of India's total manufacturing workforce. This is despite the fact that there has been an expansion of technical education in the country from 2004-5 and 2015-16.

In the 3 states under consideration there has been a similar fall in the *share* of workers with technical education which has been accompanied with an overall decline in the *numbers* of those in manufacturing who have no Technical Education at all.

We noted earlier that the total number of workers in the manufacturing sector had risen between 2004-5 and 2011-12 by approximately 5 million, after which it had actually fallen very sharply by 8 million. What is most remarkable is that *those with no vocational training who are working in manufacturing in the country grows from 30.6 to just over 44 million*. The result was that in relative terms those working in manufacturing show a phenomenal increase in the share of workers with no vocational training from 57.6% in 2004-5 to 88.7% in 2015-16. This apparently counterintuitive phenomenon is entirely explained by the fact that the numbers of those with Secondary and Higher Secondary Education entering manufacturing employment is rising at a very rapid rate. The outcome is that the absolute number and relative share of those with *no* vocational training or Technical Education automatically rises, just as the share of those with general academic education increases. This is because they are one and the same set of people.

The phenomenon that we observe in the country as a whole is also to be found in the three states under consideration - Tamil Nadu, Andhra Pradesh and Odisha.

Education and Skill levels of workers in non-manufacturing

In non-manufacturing (which mainly consists of construction workers), the share of workers who are illiterate, or below primary education or with primary education has been systematically falling across the country (see Table 11A). At the same time the share of those with middle, secondary, or Higher Secondary Education has systematically been rising. The largest proportional increase is found in those with Secondary and Higher Secondary education (see Table 11B). We also show that there has been a marginal increase in the share of workers in non-manufacturing who have either graduate or have more than graduate level of education. There have been similar increases in the absolute number of workers with secondary, higher secondary and graduate and above level of education in the country as a whole in the non-manufacturing sector. This is not surprising at all since the sector that has had the highest employment elasticity of output across all sectors has been construction, so that as more youth get educated they gravitate increasingly towards this activity.

What is more remarkable is the fact that while there has been a *relative* decline in the proportion of all non-manufacturing sector workers who are illiterate, below primary or primary level education there is still occurring an *absolute* rise in the number of illiterates/below primary level workers in the sector.

Table 10A: Manufacturing employment by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Absolute number of workers (in million)											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	1.11	0.79	0.77	1.56	1.13	0.86	0.85	0.61	0.16	14.11	12.75	7.92
Below Primary	0.76	0.87	0.51	0.50	0.46	0.25	0.27	0.23	0.13	6.08	6.59	4.07
Primary	1.58	1.31	0.96	0.75	0.48	0.52	0.19	0.16	0.24	9.49	9.40	7.04
Middle	1.37	1.33	0.96	0.63	0.70	0.49	0.35	0.40	0.31	10.71	11.72	9.60
Secondary	0.70	0.90	1.01	0.42	0.64	0.82	0.09	0.12	0.23	5.68	7.94	9.13
Higher Secondary	0.30	0.57	0.75	0.11	0.24	0.36	0.04	0.07	0.11	2.52	4.38	6.75
Graduate	0.14	0.30	0.19	0.12	0.16	0.10	0.03	0.04	0.02	1.92	2.66	2.10
Graduate & above	0.04	0.05	0.20	0.01	0.02	0.13	0.01	0.00	0.02	0.36	0.58	1.42
Total	6.00	6.12	5.34	4.09	3.82	3.53	1.84	1.65	1.22	50.86	56.03	48.03
Level of Technical education												
No Technical Education	6.00	6.12	5.34	4.09	3.82	3.53	1.83	1.65	1.22	50.82	56.03	48.03
Below graduate	0.27	0.33	0.29	0.10	0.13	0.06	0.02	0.03	0.03	1.56	1.99	1.11
Graduate level	0.04	0.03	0.13	0.00	0.02	0.03	0.00	0.01	0.01	0.29	0.35	0.45
Post-graduate & above	0.04	0.05	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.42	0.56	0.19
Total	6.34	6.53	5.81	4.22	3.99	3.63	1.86	1.69	1.27	53.09	58.92	49.78
Vocational training												
No vocational training	3.78	4.26	5.42	2.35	2.49	3.22	1.12	1.06	1.16	30.61	38.99	44.17
Received formal training	0.10	0.31	0.14	0.06	0.13	0.07	0.01	0.02	0.03	0.90	2.44	1.18
Received in-formal training	2.44	1.89	0.23	1.79	1.34	0.31	0.73	0.58	0.06	21.40	16.86	4.11
Receiving formal training	0.03	0.07	0.03	0.02	0.04	0.03	0.01	0.03	0.01	0.23	0.63	0.31
Total	6.34	6.53	5.81	4.22	3.99	3.63	1.87	1.69	1.27	53.14	58.92	49.78

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 10B: Manufacturing employment by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Percentage of manufacturing sector workers											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	17.51	12.10	13.25	36.97	28.32	23.69	45.70	36.09	12.60	26.58	21.64	15.91
Below Primary	11.99	13.32	8.78	11.85	11.53	6.89	14.52	13.61	10.24	11.45	11.18	8.18
Primary	24.92	20.06	16.52	17.77	12.03	14.33	10.22	9.47	18.90	17.88	15.95	14.14
Middle	21.61	20.37	16.52	14.93	17.54	13.50	18.82	23.67	24.41	20.17	19.89	19.28
Secondary	11.04	13.78	17.38	9.95	16.04	22.59	4.84	7.10	18.11	10.70	13.48	18.34
Higher Secondary	4.73	8.73	12.91	2.61	6.02	9.92	2.15	4.14	8.66	4.75	7.43	13.56
Graduate	2.21	4.59	3.27	2.84	4.01	2.75	1.61	2.37	1.57	3.62	4.51	4.22
Graduate & above	0.63	0.77	3.44	0.24	0.50	3.58	0.54	0.00	1.57	0.68	0.98	2.85
Total	94.64	93.72	91.91	96.92	95.74	97.25	98.92	97.63	96.06	95.80	95.10	96.48
Level of Technical education												
No Technical Education	94.64	93.72	91.91	96.92	95.74	97.25	98.39	97.63	96.06	95.72	95.10	96.48
Below graduate	4.26	5.05	4.99	2.37	3.26	1.65	1.08	1.78	2.36	2.94	3.38	2.23
Graduate level	0.63	0.46	2.24	0.00	0.50	0.83	0.00	0.59	0.79	0.55	0.59	0.90
Post-graduate & above	0.63	0.77	0.86	0.71	0.50	0.28	0.54	0.00	0.00	0.79	0.95	0.38
Total	100	100	100	100	100	100	100	100	100	100	100	100
Vocational training												
No vocational training	59.62	65.24	93.29	55.69	62.41	88.71	59.89	62.72	91.34	57.60	66.17	88.73
Received formal training	1.58	4.75	2.41	1.42	3.26	1.93	0.53	1.18	2.36	1.69	4.14	2.37
Received in-formal training	38.49	28.94	3.96	42.42	33.58	8.54	39.04	34.32	4.72	40.27	28.62	8.26
Receiving formal training	0.47	1.07	0.52	0.47	1.00	0.83	0.53	1.78	0.79	0.43	1.07	0.62
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 11A: Non-manufacturing employment by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Absolute number of workers (in million)											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	0.54	1.51	1.07	1.10	1.71	1.28	0.59	0.82	0.44	10.94	18.95	16.32
Below Primary	0.40	0.60	0.40	0.24	0.39	0.31	0.22	0.45	0.44	3.85	7.05	6.44
Primary	0.51	0.79	0.81	0.27	0.42	0.57	0.08	0.24	0.62	5.00	9.02	8.95
Middle	0.38	0.80	0.97	0.40	0.37	0.59	0.19	0.45	0.72	5.44	10.00	11.87
Secondary	0.17	0.47	0.92	0.16	0.53	0.69	0.05	0.15	0.30	2.11	5.45	8.34
Higher Secondary	0.04	0.16	0.47	0.02	0.11	0.33	0.01	0.06	0.12	0.83	2.18	5.09
Graduate	0.05	0.07	0.11	0.04	0.12	0.05	0.02	0.06	0.04	0.50	1.11	1.11
Graduate & above	0.01	0.03	0.09	0.00	0.02	0.08	0.01	0.00	0.02	0.10	0.23	0.60
Total	2.11	4.43	4.82	2.25	3.66	3.90	1.17	2.25	2.69	28.76	53.98	58.72
Level of Technical education												
No Technical Education	2.11	4.43	4.82	2.25	3.66	3.90	1.16	2.25	2.69	28.72	53.98	58.72
Below graduate	0.07	0.10	0.17	0.03	0.07	0.06	0.02	0.02	0.03	0.56	0.83	0.63
Graduate level	0.01	0.02	0.05	0.00	0.01	0.01	0.00	0.00	0.00	0.13	0.18	0.16
Post-graduate & above	0.01	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.15	0.19	0.06
Total	2.20	4.58	5.06	2.29	3.75	3.98	1.18	2.27	2.73	29.57	55.18	59.56
Vocational training												
No vocational training	1.36	3.86	4.80	1.25	3.08	3.80	0.78	1.59	2.64	17.95	47.39	56.38
Received formal training	0.04	0.12	0.11	0.01	0.06	0.02	0.00	0.02	0.01	0.22	0.93	0.66
Received in-formal training	0.80	0.56	0.13	1.03	0.60	0.10	0.40	0.65	0.06	11.38	6.64	2.26
Receiving formal training	0.00	0.03	0.01	0.01	0.02	0.05	0.01	0.02	0.02	0.06	0.25	0.27
Total	2.20	4.58	5.06	2.29	3.75	3.98	1.18	2.27	2.73	29.60	55.21	59.56

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 11B: Non-manufacturing employment (%) by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Percentage of Non-manufacturing sector workers											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	24.55	32.97	21.15	48.03	45.60	32.16	50.00	36.12	16.12	37.00	34.34	27.40
Below Primary	18.18	13.10	7.91	10.48	10.40	7.79	18.64	19.82	16.12	13.02	12.78	10.81
Primary	23.18	17.25	16.01	11.79	11.20	14.32	6.78	10.57	22.71	16.91	16.35	15.03
Middle	17.27	17.47	19.17	17.47	9.87	14.82	16.10	19.82	26.37	18.40	18.12	19.93
Secondary	7.73	10.26	18.18	6.99	14.13	17.34	4.24	6.61	10.99	7.14	9.88	14.00
Higher Secondary	1.82	3.49	9.29	0.87	2.93	8.29	0.85	2.64	4.40	2.81	3.95	8.55
Graduate	2.27	1.53	2.17	1.75	3.20	1.26	1.69	2.64	1.47	1.69	2.01	1.86
Graduate & above	0.45	0.66	1.78	0.00	0.53	2.01	0.85	0.00	0.73	0.34	0.42	1.01
Total	95.91	96.72	95.26	98.25	97.60	97.99	99.15	99.12	98.53	97.26	97.83	98.59
Level of Technical education												
No Technical Education	95.91	96.72	95.26	98.25	97.60	97.99	98.31	99.12	98.53	97.13	97.83	98.59
Below graduate	3.18	2.18	3.36	1.31	1.87	1.51	1.69	0.88	1.10	1.89	1.50	1.06
Graduate level	0.45	0.44	0.99	0.00	0.27	0.25	0.00	0.00	0.00	0.44	0.33	0.27
Post-graduate & above	0.45	0.44	0.20	0.44	0.27	0.00	0.00	0.00	0.00	0.51	0.34	0.10
Total	100	100	100	100	100	100	100	100	100	100	100	100
Vocational training												
No vocational training	61.82	84.28	94.86	54.59	82.13	95.48	66.10	70.04	96.70	60.64	85.84	94.66
Received formal training	1.82	2.62	2.17	0.44	1.60	0.50	0.00	0.88	0.37	0.74	1.68	1.11
Received in-formal training	36.36	12.23	2.57	44.98	16.00	2.51	33.90	28.63	2.20	38.45	12.03	3.79
Receiving formal training	0.00	0.66	0.20	0.44	0.53	1.26	0.85	0.88	0.73	0.20	0.45	0.45
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Education and Skill levels in the services

As with manufacturing there has been a sharp decline in the number of workers that are illiterate or below primary levels of education in the service sector. Simultaneously there been a significant increase in the absolute numbers of those with middle, Secondary and Higher Secondary Education. There has been a small rise in the share of graduates over the 10 year period who are in the service sectors and also those who have above graduate education. The relative weights of the three groups (primary education, below primary and illiterate, those with middle level, Secondary and Higher Secondary Education, and finally those with graduate and higher than graduate level of education) has shown a similar trend as the absolute numbers of these three groups (see Table 12a).

Just as the share of those with greater levels of education of a general-academic nature in the service sector has increased, simultaneously the share of those with no technical education has increased because they are one and the same group. The same observation applies in the case of those with no vocational training. The absolute number as well as the relative share of those with no vocational training in services has grown precisely because there is a rising share of those with middle/secondary/higher secondary education (see Table 12b).

What is equally distressing is that the absolute number and the relative weight of those with any Technical Education or any vocational training that has been formally received has risen at an extremely slow pace. This does not inspire confidence at all in the future competencies of a technical and vocational nature in the service sector workforce.

Table 12a: Service sector employment by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Absolute number of workers (in million)											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	1.25	0.90	1.25	2.79	2.34	2.18	0.47	0.43	0.27	18.44	16.14	15.30
Below Primary	0.73	0.85	0.53	0.86	0.80	0.51	0.45	0.42	0.38	9.24	8.85	8.38
Primary	1.34	1.13	1.37	1.08	0.92	1.05	0.26	0.34	0.79	13.10	13.00	13.72
Middle	1.47	1.57	1.64	1.26	1.39	1.18	0.69	0.99	1.21	18.78	20.83	22.32
Secondary	1.25	1.72	2.10	1.26	1.84	2.09	0.43	0.55	0.94	14.98	20.39	26.87
Higher Secondary	0.77	1.20	1.50	0.64	0.98	1.34	0.23	0.32	0.61	10.45	15.49	24.63
Graduate	0.84	1.15	0.59	0.67	1.35	0.66	0.34	0.50	0.49	10.83	16.82	11.94
Graduate & above	0.33	0.56	1.04	0.22	0.67	0.86	0.07	0.13	0.20	3.94	6.91	10.77
Total	7.98	9.09	10.03	8.79	10.28	9.87	2.94	3.67	4.88	99.74	118.43	133.92
Level of Technical education												
No Technical Education	7.97	9.09	10.03	8.79	10.28	9.87	2.94	3.67	4.88	99.63	118.42	133.92
Below graduate	0.60	0.69	0.55	0.35	0.36	0.23	0.08	0.06	0.25	4.29	4.33	3.75
Graduate level	0.12	0.09	0.29	0.10	0.21	0.07	0.01	0.02	0.01	1.10	1.75	1.64
Post-graduate & above	0.22	0.31	0.18	0.21	0.26	0.14	0.06	0.05	0.01	2.34	2.72	1.52
Total	8.92	10.18	11.05	9.46	11.11	10.32	3.08	3.80	5.16	107.36	127.22	140.83
Vocational training												
No vocational training	6.34	7.93	10.44	6.13	8.88	9.69	2.15	2.92	4.91	72.78	104.42	130.78
Received formal training	0.29	0.84	0.38	0.20	0.31	0.21	0.03	0.12	0.11	2.42	7.03	4.84
Received in-formal training	2.21	1.20	0.21	3.08	1.72	0.33	0.91	0.71	0.11	31.70	13.97	4.52
Receiving formal training	0.08	0.21	0.03	0.04	0.21	0.08	0.01	0.05	0.03	0.63	1.83	0.71
Total	8.92	10.18	11.05	9.46	11.11	10.32	3.09	3.80	5.16	107.54	127.25	140.83

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

Table 12b: Service sector employment (%) by level of skills in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2015

Skill Levels	Percentage of Service sector workers											
	Tamil Nadu			Andhra Pradesh			Odisha			All India		
	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015	2004-05	2011-12	2015
Level of General education												
Illiterate	14.01	8.84	11.31	29.49	21.06	21.12	15.26	11.32	5.23	17.18	12.69	10.86
Below Primary	8.18	8.35	4.80	9.09	7.20	4.94	14.61	11.05	7.36	8.61	6.96	5.95
Primary	15.02	11.10	12.40	11.42	8.28	10.17	8.44	8.95	15.31	12.20	10.22	9.74
Middle	16.48	15.42	14.84	13.32	12.51	11.43	22.40	26.05	23.45	17.49	16.37	15.85
Secondary	14.01	16.90	19.00	13.32	16.56	20.25	13.96	14.47	18.22	13.95	16.03	19.08
Higher Secondary	8.63	11.79	13.57	6.77	8.82	12.98	7.47	8.42	11.82	9.73	12.18	17.49
Graduate	9.42	11.30	5.34	7.08	12.15	6.40	11.04	13.16	9.50	10.09	13.22	8.48
Graduate & above	3.70	5.50	9.41	2.33	6.03	8.33	2.27	3.42	3.88	3.67	5.43	7.65
Total	89.46	89.29	90.77	92.92	92.53	95.64	95.45	96.58	94.57	92.90	93.09	95.09
Level of Technical education												
No Technical Education	89.35	89.29	90.77	92.92	92.53	95.64	95.45	96.58	94.57	92.80	93.08	95.09
Below graduate	6.73	6.78	4.98	3.70	3.24	2.23	2.60	1.58	4.84	4.00	3.40	2.66
Graduate level	1.35	0.88	2.62	1.06	1.89	0.68	0.32	0.53	0.19	1.02	1.38	1.16
Post-graduate & above	2.47	3.05	1.63	2.22	2.34	1.36	1.95	1.32	0.19	2.18	2.14	1.08
Total	100	100	100	100	100	100	100	100	100	100	100	100
Vocational training												
No vocational training	71.08	77.90	94.48	64.80	79.93	93.90	69.58	76.84	95.16	67.68	82.06	92.86
Received formal training	3.25	8.25	3.44	2.11	2.79	2.03	0.97	3.16	2.13	2.25	5.52	3.44
Received in-formal training	24.78	11.79	1.90	32.56	15.48	3.20	29.45	18.68	2.13	29.48	10.98	3.21
Receiving formal training	0.90	2.06	0.27	0.42	1.89	0.78	0.32	1.32	0.58	0.59	1.44	0.50
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' estimation based on NSS (61st (2004-05) and 68th (2011-12) rounds) and LB (5th annual survey, 2015-16) unit level data.

5.2. Education and skill levels in manufacturing sub-sectors

In the set of tables 13 A to D we look at the three states and India as a whole, and analyse the distribution of workers by skill level for the major sub-sectors within manufacturing. The reason for undertaking a detailed examination of skill levels within the manufacturing is because this is the sector with the most potential for growth in the East coast economic corridor.

Tamil Nadu is one of the most industrialized of India's states. However despite its relatively higher access to education historically (Mehrotra, 2006) the share of workers who are illiterate or educated only up to the middle level is still very high regardless of manufacturing sub-sector, whether it is labour intensive or capital intensive. However, it is clear that the relatively labour intensive sectors like food and beverages, tobacco products, textiles, wearing apparel, leather products and wood products have an extremely high share of those with low levels of education. This is only as expected. But it is equally remarkable that even sub sectors like coke and petroleum products, chemical products, machinery equipment and fabricated metals have a high share of those with low levels of general education.

The only sectors with a respectable share of workers with below or above graduate level *technical education* are printing media, fabricated metal, machinery and equipment, electronic computing machinery, electrical machinery, medical instruments, motor vehicles and other transport. However, remarkably even motor vehicles manufacturing has a tiny share of those with above graduate technical education. The only sub sector in manufacturing which has a really high share of above graduate technical education is petroleum products.

As indicated above the share of the manufacturing workforce that has any *vocational training* on an average in India is only 7 percent or less. In fact what is clear from table 11a is that regardless of whether a sector is labour intensive or capital intensive the share of those with vocational training is almost never above 10% of the total workforce in the sub sector.

Table 12b shows that for Andhra Pradesh the share of manufacturing sector workers who are illiterate is 23%, even higher than that in Tamil Nadu. The share of manufacturing workers that have middle level education only is 35% in Andhra Pradesh while in Tamil Nadu it is higher at 42%. In the labour intensive sectors of manufacturing in Andhra the share of illiterate workers or those with middle level of education is higher than that in Tamil Nadu.

The share of those in Tamil Nadu who had technical education in manufacturing either below or above the graduate level was slightly higher than in Andhra Pradesh. This share was 4.8% and 3% in Tamil Nadu while it was lower at 1.7 and 1% respectively in Andhra Pradesh.

Tamil Nadu is slightly worse off than Andhra Pradesh in respect of those with vocational

training. The share of those without any vocational training is 93% in Tamil Nadu but 89% in Andhra Pradesh. However it is notable that in both States the share of those in manufacturing who had received or receiving *formal* vocational training was abysmally and equally low.

As we have discussed above Odisha is one of the least industrialized states of India. It is also one of the states with the lowest per capita income. It is not surprising therefore that it has a very high share of workers in manufacturing who are either illiterate (12.9%) or only with middle level of education (56% of all manufacturing workers).

The share of those with technical education in Odisha (relatively small manufacturing sector) is as low as it is in Tamil Nadu or Andhra Pradesh, with 2.1% of all manufacturing workers in Odisha having below Graduate Level technical education and another 2.4% of those workers have above Graduate Level technical education.

As in the other states of India, the three states under consideration have over 90% of manufacturing sector workers with no vocational education. In fact the share of manufacturing workers who have either received or are receiving vocational training in Odisha on a formal basis is equally small as in the other two States.

In the country (see Table 13d) as a whole 16% of all manufacturing sector workers are illiterate and an additional 42% have a middle level of education. This is clearly a reflection of the fact that a very significant proportion of the total workforce is in micro Enterprises or the unorganised sector employing less than 10 workers.

Less than 10% of all manufacturing sector workers have any Technical Education (below or above the graduate level). The situation is somewhat different in respect of some sectors like motor vehicles and other transport, medical instruments, electrical machinery, electronics computing machinery. Not even the machinery and equipment sector has a share of workers with technical education which exceeds 10%.

The situation is not much different in respect of the share of the manufacturing sector workforce which has any vocational training. Workers who have any vocational training received formally constitute no more than 8.4% of the total workforce in manufacturing. The sectors where workers who have received or are receiving formal vocational training are: motor vehicles, medical instruments, electrical machinery, electronics computing machinery, fabricated metals, and machinery and equipment. However even in these sub-sectors the share of workers who received formal vocational training does not in any case exceed 10% of all workers in the sub sector.

Table 13a: Sub-sector wise Manufacturing Employment by level of skills (%) in Tamil Nadu during 2015-16

Sub-sectors	General and technical education								Vocational Training				
	<i>Illiterates</i>	<i>Up to middle</i>	<i>Secondary</i>	<i>Higher Secondary</i>	<i>Graduate & above</i>	<i>Tech-below Graduate</i>	<i>Tech-Graduate & above</i>	<i>total</i>	<i>No Vocational training</i>	<i>Received formal training</i>	<i>Received informal training</i>	<i>Receiving Vocational training</i>	<i>total</i>
Food & Beverages	13.2	40.7	16.5	11.0	11.2	3.9	3.6	100	95.2	2.0	1.2	1.6	100
Tobacco Products	13.3	53.7	15.4	12.0	5.2	0.4	0.0	100	97.2	0.5	2.3	0.0	100
Textiles	17.6	45.7	16.3	9.5	5.6	2.5	2.7	100	91.3	0.5	7.7	0.5	100
Wearing Apparel	9.6	50.2	17.2	15.4	3.0	2.1	2.6	100	89.9	2.3	7.5	0.3	100
Leather Products	15.8	33.0	25.5	17.0	4.2	2.8	1.7	100	97.5	0.5	1.5	0.5	100
Wood Products	11.8	47.7	14.8	15.4	2.6	5.6	2.2	100	94.9	4.4	0.6	0.0	100
Paper Products	2.7	51.9	4.4	26.6	4.7	0.0	9.7	100	98.8	0.6	0.1	0.6	100
Printing media	11.2	19.4	29.3	24.1	0.2	12.7	3.1	100	100	0.0	0.0	0.0	100
Coke and Petroleum Products	3.1	34.4	0.0	0.0	15.7	0.0	46.9	100	100	0.0	0.0	0.0	100
Chemical Products	14.1	52.7	12.7	9.8	6.2	2.6	1.9	100	97.4	2.6	0.0	0.0	100
Rubber & Plastics	23.8	24.3	9.5	10.1	19.8	2.2	10.3	100	95.9	3.6	0.0	0.4	100
Non-metallic Products	25.0	39.3	14.8	12.7	6.2	1.1	0.9	100	99.7	0.0	0.0	0.3	100
Basic metals	8.2	25.7	28.7	16.1	11.0	4.7	5.6	100	93.3	5.6	1.2	0.0	100
Fabricated Metals	6.0	39.0	18.7	14.0	8.1	14.1	0.0	100	88.3	9.7	2.0	0.0	100
Machinery and Equipment	17.2	33.0	11.3	17.4	8.3	11.0	1.8	100	100	0.0	0.0	0.0	100
Electronics machinery	0.4	13.2	24.8	8.3	8.1	29.1	16.1	100	98.0	2.0	0.0	0.0	100
Electrical machinery	13.7	26.0	19.4	10.5	8.2	16.3	5.8	100	89.6	6.5	3.9	0.0	100
Medical instruments	7.5	34.0	7.8	29.0	16.2	0.0	5.5	100	88.9	11.1	0.0	0.0	100
Motor vehicles	9.2	37.4	13.8	9.1	14.8	11.7	4.0	100	91.0	8.8	0.2	0.0	100
Other Transports	7.0	9.5	20.6	25.0	9.5	16.7	11.6	100	100	0.0	0.0	0.0	100
Furniture	5.8	53.3	16.2	12.8	2.2	0.8	8.8	100	86.0	0.0	14.0	0.0	100
Jewellery & Sports	8.9	42.2	23.1	14.1	3.0	8.1	0.5	100	96.7	1.9	1.0	0.4	100
Recycling	13.5	24.7	24.3	10.8	9.0	14.4	3.3	100	93.7	1.0	3.2	2.1	100
Total	13.4	42.0	17.5	12.7	6.5	4.8	3.0	100	93.3	2.3	4.0	0.4	100

Source: Authors' estimation based on LB 5th annual survey (2015-16) unit level data.

Table 13b: Sub-sector wise Manufacturing Employment by level of skills (%) in Andhra Pradesh during 2015-16

Sub-sectors	General and technical education								Vocational Training				
	<i>Illiterates</i>	<i>Up to middle</i>	<i>Secondary</i>	<i>Higher Secondary</i>	<i>Graduate & above</i>	<i>Tech-below Graduate</i>	<i>Tech-Graduate & above</i>	<i>total</i>	<i>No Vocational training</i>	<i>Received formal training</i>	<i>Received informal training</i>	<i>Receiving Vocational training</i>	<i>total</i>
Food & Beverages	23.2	22.7	28.4	15.8	9.0	0.9	0.1	100	90.6	0.9	8.5	0.0	100
Tobacco Products	33.1	50.5	14.5	2.0	0.0	0.0	0.0	100	95.9	0.0	4.1	0.0	100
Textiles	31.7	31.1	29.8	4.7	1.9	0.8	0.0	100	91.5	0.0	7.8	0.7	100
Wearing Apparel	16.9	48.1	19.2	11.0	3.7	1.1	0.0	100	81.4	3.6	15.0	0.0	100
Leather Products	50.2	0.0	49.8	0.0	0.0	0.0	0.0	100	100.0	0.0	0.0	0.0	100
Wood Products	32.0	31.3	26.6	5.5	4.6	0.0	0.0	100	87.0	0.0	13.0	0.0	100
Paper Products	0.0	39.4	34.2	26.4	0.0	0.0	0.0	100	100.0	0.0	0.0	0.0	100
Printing media	0.4	60.4	22.9	7.7	6.0	0.9	1.7	100	88	12.4	0.0	0.0	100
Coke and Petroleum Products	0.0	0.0	77.1	0.0	22.9	0.0	0.0	100	100	0.0	0.0	0.0	100
Chemical Products	31.8	11.1	38.3	1.7	16.6	0.5	0.0	100	100.0	0.0	0.0	0.0	100
Rubber & Plastics	9.3	53.8	12.6	0.0	24.4	0.0	0.0	100	94.7	5.3	0.0	0.0	100
Non-metallic Products	41.5	19.4	13.7	18.4	5.8	0.3	0.9	100	98.5	0.0	1.5	0.0	100
Basic metals	27.0	15.5	25.0	14.2	6.5	6.5	5.2	100	100.0	0.0	0.0	0.0	100
Fabricated Metals	26.6	31.4	23.5	0.0	7.3	2.1	9.1	100	95.3	2.9	1.8	0.0	100
Machinery and Equipment	0.0	0.0	38.4	19.7	35.4	6.5	0.0	100	100	0.0	0.0	0.0	100
Electronics machinery	0.0	0.0	12.1	44.2	31.6	0.0	12.1	100	100.0	0.0	0.0	0.0	100
Electrical machinery	10.5	41.5	25.9	7.6	0.8	6.4	7.4	100	99.2	0.0	0.8	0.0	100
Medical instruments	8.7	45.0	0.2	22.4	16.7	1.0	6.0	100	99.0	1.0	0.0	0.0	100
Motor vehicles	45.6	4.3	2.3	0.0	47.8	0.0	0.0	100	97.9	0.0	2.1	0.0	100
Other Transports	13.9	57.5	0.0	5.3	3.1	0.0	20.2	100	100	0.0	0.0	0.0	100
Furniture	36.2	51.5	8.8	0.7	0.0	2.8	0.0	100	85.8	3.2	11.0	0.0	100
Jewellery & Sports	15.0	41.9	27.6	6.8	7.7	0.3	0.7	100	79.1	7.5	13.3	0.0	100
Recycling	7.4	40.2	15.8	11.5	6.5	18.4	0.3	100	88.7	5.9	0.4	5.0	100
Total	23.3	35.2	23.0	10.1	5.7	1.7	1.0	100	89.0	2.1	8.6	0.3	100

Source: Authors' estimation based on LB 5th annual survey (2015-16) unit level data.

Table 13c: Sub-sector wise Manufacturing *Employment* by level of skills (%) in Odisha during 2015-16

Sub-sectors	General and technical education								Vocational Training				
	<i>Illiterate s</i>	<i>Up to mi ddle</i>	<i>Second ary</i>	<i>Higher Se condary</i>	<i>Graduat e & abov e</i>	<i>Tech-below Graduate</i>	<i>Tech- Gradu ate & above</i>	<i>total</i>	<i>No Vocation al training</i>	<i>Received formal tr aining</i>	<i>Received i nformal tr aining</i>	<i>Receiving Vo cational trai ning</i>	<i>total</i>
Food & Beverages	10.6	47.0	23.3	12.8	1.9	4.4	0.0	100	98.3	0.0	1.7	0.0	100
Tobacco Products	13.4	60.7	15.4	5.8	4.7	0.0	0.0	100	98.0	0.0	2.0	0.0	100
Textiles	14.2	63.2	15.1	5.4	0.0	2.1	0.0	100	84.5	7.4	8.0	0.0	100
Wearing Apparel	9.3	57.5	21.3	5.0	1.8	3.1	2.0	100	81.4	2.5	15.7	0.4	100
Leather Products	0.0	69.7	10.6	19.6	0.0	0.0	0.0	100	100.0	0.0	0.0	0.0	100
Wood Products	23.9	54.3	9.2	11.8	0.6	0.2	0.0	100	95.9	0.0	3.2	1.0	100
Paper Products	23.9	73.3	2.8	0.0	0.0	0.0	0.0	100	89.4	0.0	0.0	10.6	100
Printing media	0.0	40.5	52.9	6.6	0.0	0.0	0.0	100	100	0.0	0.0	0.0	100
Coke and Petroleum Products	79.7	20.3	0.0	0.0	0.0	0.0	0.0	100	100	0.0	0.0	0.0	100
Chemical Products	0.0	72.0	0.0	28.0	0.0	0.0	0.0	100	72.0	0.0	28.0	0.0	100
Rubber & Plastics	0.0	72.2	21.9	0.0	5.9	0.0	0.0	100	78.1	0.0	0.0	21.9	100
Non-metallic Products	36.6	49.9	6.6	4.8	2.1	0.0	0.0	100	97.1	2.1	0.7	0.0	100
Basic metals	3.5	62.1	24.0	3.4	3.9	0.5	2.5	100	96.6	1.3	2.0	0.1	100
Fabricated Metals	0.0	30.0	34.4	19.1	4.6	12.0	0.0	100	86.1	0.0	13.9	0.0	100
Machinery and Equipment	0.0	98.4	0.0	0.0	1.6	0.0	0.0	100	100	0.0	0.0	0.0	100
Electronics machinery	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100	100.0	0.0	0.0	0.0	100
Electrical machinery	29.9	64.6	0.0	5.5	0.0	0.0	0.0	100	88.9	0.0	11.1	0.0	100
Medical instruments	0.0	0.0	0.0	52.2	47.8	0.0	0.0	100	100.0	0.0	0.0	0.0	100
Motor vehicles	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100	100.0	0.0	0.0	0.0	100
Other Transports	0.0	67.3	0.0	0.0	32.7	0.0	0.0	100	100	0.0	0.0	0.0	100
Furniture	7.2	50.8	20.9	20.8	0.0	0.3	0.0	100	94.1	0.0	5.9	0.0	100
Jewellery & Sports	2.7	48.6	20.9	7.7	3.7	16.5	0.0	100	95.1	0.0	0.0	4.9	100
Recycling	0.0	64.5	11.1	22.2	2.2	0.0	0.0	100	74.5	25.5	0.0	0.0	100
Total	12.9	56.1	17.5	8.3	2.1	2.4	0.6	100	91.2	2.6	5.4	0.8	100

Source: Authors' estimation based on LB 5th annual survey (2015-16) unit level data.

Table 13d: Sub-sector wise Manufacturing Employment by level of skills (%) in India during 2015-16

Sub-sectors	General and technical education								Vocational Training				
	<i>Illiterates</i>	<i>Up to middle</i>	<i>Secondary</i>	<i>Higher Secondary</i>	<i>Graduate & above</i>	<i>Tech-below Graduate</i>	<i>Tech- Graduate & above</i>	<i>total</i>	<i>No Vocational training</i>	<i>Received formal training</i>	<i>Received informal training</i>	<i>Receiving Vocational training</i>	<i>total</i>
Food & Beverages	14.4	40.1	19.8	15.8	7.4	1.5	1.0	100	93.6	1.2	4.6	0.6	100
Tobacco Products	24.2	50.8	14.1	7.2	2.7	0.7	0.2	100	88.7	1.2	9.9	0.2	100
Textiles	17.6	47.9	17.5	9.9	4.9	1.3	0.8	100	88.1	1.1	10.0	0.8	100
Wearing Apparel	13.6	44.1	19.8	14.6	5.3	1.9	0.7	100	83.0	2.9	13.4	0.7	100
Leather Products	19.5	41.4	19.7	13.3	3.8	1.7	0.6	100	92.1	0.8	6.5	0.6	100
Wood Products	22.9	43.5	17.1	9.6	5.3	1.2	0.4	100	86.8	2.2	10.7	0.3	100
Paper Products	11.4	38.5	17.7	14.8	14.0	0.7	2.9	100	94.5	0.6	3.0	1.9	100
Printing media	4.7	24.0	23.7	30.2	12.0	4.3	1.3	100	93	3.1	3.7	0.3	100
Coke and Petroleum Products	9.0	33.3	19.3	19.2	11.9	0.9	6.4	100	88	10.0	1.6	0.0	100
Chemical Products	14.2	39.5	18.2	12.4	12.1	2.1	1.5	100	94.0	3.7	2.0	0.3	100
Rubber & Plastics	12.0	35.0	19.0	17.8	11.1	2.6	2.5	100	96.4	2.0	0.9	0.7	100
Non-metallic Products	33.7	41.0	10.6	9.0	4.7	0.6	0.4	100	93.3	0.7	5.9	0.2	100
Basic metals	12.5	40.0	20.8	13.6	9.2	2.3	1.6	100	92.2	3.0	4.3	0.5	100
Fabricated Metals	10.3	43.0	19.9	12.9	6.8	6.2	0.9	100	84.9	4.8	8.9	1.3	100
Machinery and Equipment	12.5	34.5	15.7	17.5	11.4	4.3	4.1	100	91	2.6	5.9	0.0	100
Electronics machinery	3.4	15.1	19.0	20.6	26.2	8.1	7.6	100	93.0	5.1	1.9	0.0	100
Electrical machinery	12.4	24.9	20.5	15.3	15.1	6.2	5.6	100	89.3	7.8	2.7	0.2	100
Medical instruments	5.6	22.8	17.2	19.0	25.1	1.5	8.8	100	94.8	3.7	1.5	0.0	100
Motor vehicles	8.3	30.2	17.0	18.3	15.8	7.1	3.4	100	89.4	7.8	2.6	0.2	100
Other Transports	6.0	18.5	18.8	20.8	16.0	10.6	9.3	100	92	4.4	2.9	0.3	100
Furniture	15.2	47.7	19.1	12.2	3.7	1.5	0.6	100	87.8	1.0	10.4	0.8	100
Jewellery & Sports	10.0	43.3	21.1	15.4	7.6	2.1	0.6	100	84.5	1.8	12.9	0.9	100
Recycling	15.4	34.7	20.4	15.4	6.7	5.9	1.4	100	87.4	6.3	5.0	1.3	100
Total	16.1	42.1	18.4	13.3	6.9	2.1	1.2	100	88.7	2.3	8.4	0.6	100

Source: Authors' estimation based on LB 5th annual survey (2015-16) unit level data.

5.3. Quality of employment generated

We analyse the size distribution of enterprises by 4 categories: Enterprises that employed more than 20 workers, those which employed between 10 and 19 workers, enterprises that have less than 10 workers but at least 2, and a final category consists of those in the unorganised sector who are own account self-employed workers. This last category consists of those who are single member enterprises or effectively own account workers. The first two category of workers are recognised as belonging to the organised sector while the remaining two are seen as belonging to the unorganised sector.

Using the definition of enterprises that employ more than 10 workers are organised, Table 10 shows that 28% of all enterprises in manufacturing are employing more than 20 workers while an additional 7% employ between 10 and 20 workers in the manufacturing sector in the year 2015. *So the share of all manufacturing enterprises that are in the organised sector constitutes only 35%.*

There is a concentration of workers engaged in manufacturing who are also *self-employed own account workers*. *They account for 33% of the total manufacturing work force*. What is noticeable is that the unorganised segment predominates in the labour intensive sectors like food and beverages, tobacco, textiles, wearing apparel, leather products, wood products, paper products and even printing media. In fact in many of these labour intensive sectors the self-employed share among all manufacturing sector workers is even higher than that of the remaining micro enterprises who employ 2-9 workers.

However the situation changes quite dramatically when we examine products groups which employ some degree of machinery. In manufacturing sub sectors that are relatively capital-intensive the enterprises employing more than 20 workers is predominant. The following sectors are those where firms employ more than 20 workers, and such firms have a dominant share of sub-sectoral employment: petroleum products, chemical products, rubber and plastic, non-metallic products, basic metals, fabricated metal, machinery and equipment, electronics computing machinery, electrical machinery, medical instruments, motor vehicles and other transport (see Table 14).

The overall picture by state in the three states under consideration reveals the following. The least industrialized state Odisha is characterized by an extremely high share of the self-employed own account workers in manufacturing. In fact in labour intensive manufacturing in Odisha most of the enterprises are in the unorganised sector. While this is true even in Andhra Pradesh and Tamil Nadu it is also true that own account self-employed workers in labour intensive manufacturing are not as dominant as they are in Odisha. The unorganised sector enterprises employing between 2 and 9 workers still form the predominant share of all enterprises in manufacturing that are engaged in relatively labour intensive activities.

Nevertheless in all states the share of enterprises employing over 20 workers predominates among the relatively capital intensive products in manufacturing.

Table 14: Distribution of Employment by Size Class of Enterprise (%) in Manufacturing sub-sectors, Tamil Nadu, 2011-12

Sub-sectors	Tamil Nadu				Andhra Pradesh				Odisha				All India			
	Self-employed	Employers hired less than 10 total	Employers hired 10 to 19 total workers	Employers hired 20 or more total	Self-employed	Employers hired less than 10 total	Employers hired 10 to 19 total workers	Employers hired 20 or more total	Self-employed	Employers hired less than 10 total	Employers hired 10 to 19 total workers	Employers hired 20 or more total	Self-employed	Employers hired less than 10 total	Employers hired 10 to 19 total workers	Employers hired 20 or more total workers
Food & Beverages	28	30	9	33	21	51	6	22	26	53	3	19	26	38	7	29
Tobacco Products	72	18	5	5	68	21	0	11	66	17	0	17	71	22	1	6
Textiles	23	48	11	19	30	57	2	11	50	48	0	2	33	40	9	19
Wearing Apparel	37	27	6	30	79	19	1	1	63	36	2	0	54	30	4	13
Leather Products	5	10	12	74	8	22	0	70					11	21	15	52
Wood Products	27	70	2	1	54	41	1	4	46	53	1	0	43	50	3	4
Paper Products	21	15	18	46	32	28	2	38	69	0	0	31	18	23	17	42
Printing media	9	80	6	6	23	34	2	41	0	70	0	30	18	58	3	22
Coke and Petroleum Products	0	0	52	48	0	0	0	100	0	0	0	100	2	12	4	83
Chemical Products	14	16	9	61	4	9	7	80	0	0	46	54	9	18	8	65
Rubber & Plastics	9	27	17	47	16	24	0	61	49	20	0	31	7	27	12	55
Non-metallic Products	4	61	26	10	8	54	7	31	21	56	9	14	9	29	13	49
Basic metals	13	26	8	54	1	14	5	81	1	7	8	84	6	14	5	75
Fabricated Metals	8	63	13	17	7	54	14	25	35	42	0	23	21	43	10	26
Machinery and Equipment	0	28	12	60	0	9	31	60	0	38	62	0	5	16	11	68
Electronics Computing machinery	0	9	2	90	0	57	0	43	0	0	0	100	5	14	6	76
Electrical machinery	10	11	35	44	0	3	5	92	0	30	0	70	6	12	14	68
Medical instruments	0	67	12	21	2	12	0	86					1	8	3	88
Motor vehicles	1	26	5	68	0	14	0	86					1	16	4	79
Other Transports	0	33	0	68	0	3	0	97	0	0	100	0	2	10	0	89
Furniture	34	43	18	5	61	39	0	0	73	27	0	0	48	43	5	4
Jewellery & Sports	34	40	6	21	74	24	1	1	52	49	0	0	34	34	8	24
Recycling	22	51	5	23	62	38	0	0	73	27	0	0	46	29	11	13
Total	25	38	9	27	45	33	3	19	41	40	3	16	33	32	7	28

Source: Authors' estimation based on NSS (68th round, 2011-12) unit level data.

6. Rising skill gap and youth unemployment rates

Though the growth of non-farm sector output in India and in states under consideration (except Odisha) is quite high (See Table 15) the employment generation in the non-farm sector is not up to the mark. Furthermore, the declining absolute employment in manufacturing sector at all India level and across these states should be a cause for concern. This needs immediate policy attention.

The unemployment rate among educated youths is very high (See Figure 5 through Figure 8), and it is increasing over the years between 2004-5 and 2015-6. At all India level, the unemployment rate among youth with secondary education increased from 2.6 to 3.2 percent, with higher secondary education increased from 3.3 to 4.4 percent, with graduate degrees (general) from 5.8 to 8.4 percent, and with post graduate degrees (general) from 5.7 to 8.5 percent (See Figure 5). Though the overall unemployment rate among the population below graduate level technical education declined from 8.5 to 5.5 percent (which is a good sign), the unemployment rate among youth with graduate level technical education increased from 5.5 to 11 percent. This should be a cause for concern as the government of India has most recently been focusing on skill development.

At state level the unemployment scenario reflects a similar phenomenon. In Tamil Nadu, unemployment among youth with graduate and post graduate degrees in general education and with technical education is very high (see Figure 6). In Andhra Pradesh also, the unemployment rate among these educated group of youths has continuously been increasing since 2004-05 (see Figure 7). *In these two states and at all India level, it is mainly due to falling employment elasticities and rising capital intensity in manufacturing sector.* This rising capital intensity might be due to rising skill gaps i.e. the gap between actual skill level of job seekers and the skill demand of employers. However, in the case of Odisha the unemployment rate among these categories of youth is declining (see Figure 8). This might be happening partly because of large scale out-migration in recent years from relatively poorer Odisha to other states where employment opportunities are greater.

We have examined the sectoral skill gaps by calculating a skill gaps index (SGI). While calculating SGI, we examine three kinds of education imparted in the Indian education system: general, technical (mostly at post-higher secondary level) and vocational education (at levels lower than tertiary level). In general education secondary (i.e. classes 9-10) and above level of education is taken as belonging to the skilled category, while in the case of technical and vocational education both “no technical education” and “no vocational training” are excluded. A value of SGI less than or equal to 0.3 implies a low skill gap, while the value of SGI greater than 0.3 and less than 0.60 implies a moderate skill gap, and a value for SGI above 0.6 implies high degree of skill gap.

The overall state-wise comparison reveals that SGI is relatively higher in Odisha and in Andhra Pradesh as compared to Tamil Nadu (see Table 13). While the comparison of manufacturing and service sectors reveals that it is very high in manufacturing, it is moderate in the service sectors. This growing skill gap (between skill demand and supply) could be the major reason for declining manufacturing sector employment and growing capital intensity in India.

At all India level, manufacturing sector *skill gap index (SGI)* increased from 0.858 to 0.872 during 2004-05 and 2015-16, though it declined slightly (0.834) during 2011-12. In Tamil Nadu, the

manufacturing sector SGI was 0.821 (very high) during 2004-05, it declined marginally to 0.811 by 2015-16, but it is still very high. Manufacturing sector SGI in Andhra Pradesh remained constant at 0.884 during 2004-05 and 2015-16. In Odisha, the manufacturing sector SGI was 0.907 (very high) during 2004-05, which declined to 0.865 during 2011-12 and further to 0.856 during 2015-16, but again it is very high. This high and rising skill gap might be one reason for the slowing down and then declining manufacturing employment in India since 2004-05. Hence, addressing this problem should be the top most priority of the government.

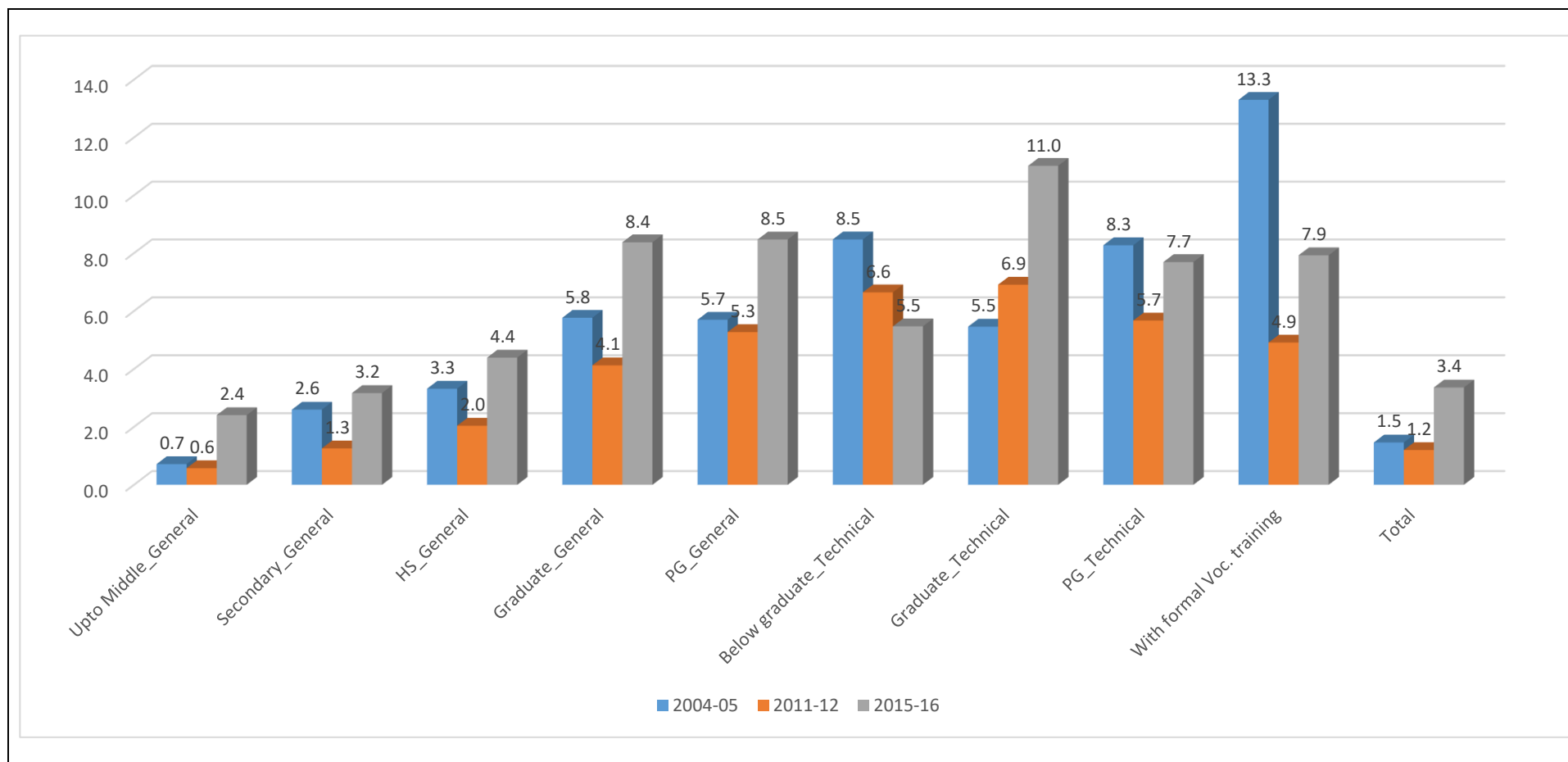
Skill gaps are lower in services generally than in manufacturing. The value of the skill gap index in services as a whole (later we examine sub-sectoral SGI within the services) increased from 0.491 to 0.527 during 2004-05 and 2015-16. The state-wise comparison reveals that SGI is relatively higher in Andhra Pradesh and Tamil Nadu as compared to Odisha. In Tamil Nadu, the service sector SGI was 0.461 (moderate) during 2004-05, but it increased to 0.581 by 2015-16. The services SGI in Andhra Pradesh increased from moderate to high . It increased from 0.439 to 0.603 during 2004-05 and 2015-16. In Odisha, however, the service sector SGI declined from 0.568 during 2004-05 to 0.519 during 2011-12. Though this services sector SGI is moderate and relatively lower as compared to manufacturing sector, it needs to be addressed at the earliest. Unless this gap is addressed through timely measures it is likely to influence productivity growth of service sectors and hence employment growth would not sustain over the long run in this sector.

Table 15: Sector-wise Compound Annual Growth Rates in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2016.

States	Compound Annual Growth Rates of Sctoral and overall Output										
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Agriculture Sector GSDP and GDP growth rates											
Andhra Pradesh	-3.0	3.2	19.5	-2.7	8.6	-4.5	0.5	1.0	15.3	1.3	-2.2
Odisha	3.5	1.6	5.3	1.7	9.5	2.3	-1.2	23.2	-9.0	12.1	-22.5
Tamil Nadu	11.5	15.4	-4.7	-2.7	6.6	7.7	11.0	-21.5	19.8	6.2	-3.5
All India	5.1	4.2	5.8	0.1	0.8	8.6	5.0	1.5	5.6	-0.2	0.7
Manufacturing Sector GSDP and GDP growth rates											
Andhra Pradesh	-0.4	7.3	15.9	2.9	5.5	4.4	26.0	-20.7	-4.0	8.0	10.7
Odisha	2.5	26.6	33.0	13.4	-6.7	5.3	0.9	-2.8	20.0	10.4	4.2
Tamil Nadu	15.1	18.8	0.6	-1.3	29.2	12.3	1.4	12.1	-1.2	1.8	7.1
All India	10.1	14.3	10.3	4.3	11.3	8.9	7.4	5.5	5.0	8.3	10.8
Construction Sector GSDP and GDP growth rates											
Andhra Pradesh	21.4	10.9	14.0	12.9	2.2	-5.8	3.5	-3.9	4.2	7.1	9.3
Odisha	2.6	15.2	8.8	2.3	4.2	14.6	13.8	-2.4	6.7	0.1	4.0
Tamil Nadu	16.2	4.4	18.6	5.3	5.2	22.5	9.2	0.3	8.5	3.3	8.4
All India	12.8	10.3	10.8	5.3	6.7	5.7	10.8	0.3	2.7	4.7	5.0
Service Sector GSDP and GDP growth rates											
Andhra Pradesh	8.9	11.9	9.8	5.5	9.0	12.4	4.9	8.9	7.8	11.2	11.1
Odisha	9.4	12.1	8.6	12.6	9.2	10.4	6.0	6.9	7.1	8.1	10.9
Tamil Nadu	14.0	16.6	9.3	10.6	6.9	12.8	8.8	6.1	7.5	8.6	10.2
All India	10.9	10.1	10.3	10.0	10.5	9.7	6.6	7.0	6.9	8.9	9.1
Overall GSDP and GDP growth rates											
Andhra Pradesh	6.7	8.3	14.8	4.6	6.3	1.6	8.7	-3.7	5.8	6.9	7.2
Odisha	4.5	13.9	14.0	7.5	4.0	8.2	4.9	6.2	6.2	7.7	-0.9
Tamil Nadu	14.2	13.8	6.0	3.0	12.0	13.8	7.6	-0.8	8.7	5.0	5.6
All India	9.7	9.7	9.3	4.9	7.3	8.2	7.5	3.6	5.0	5.4	6.4

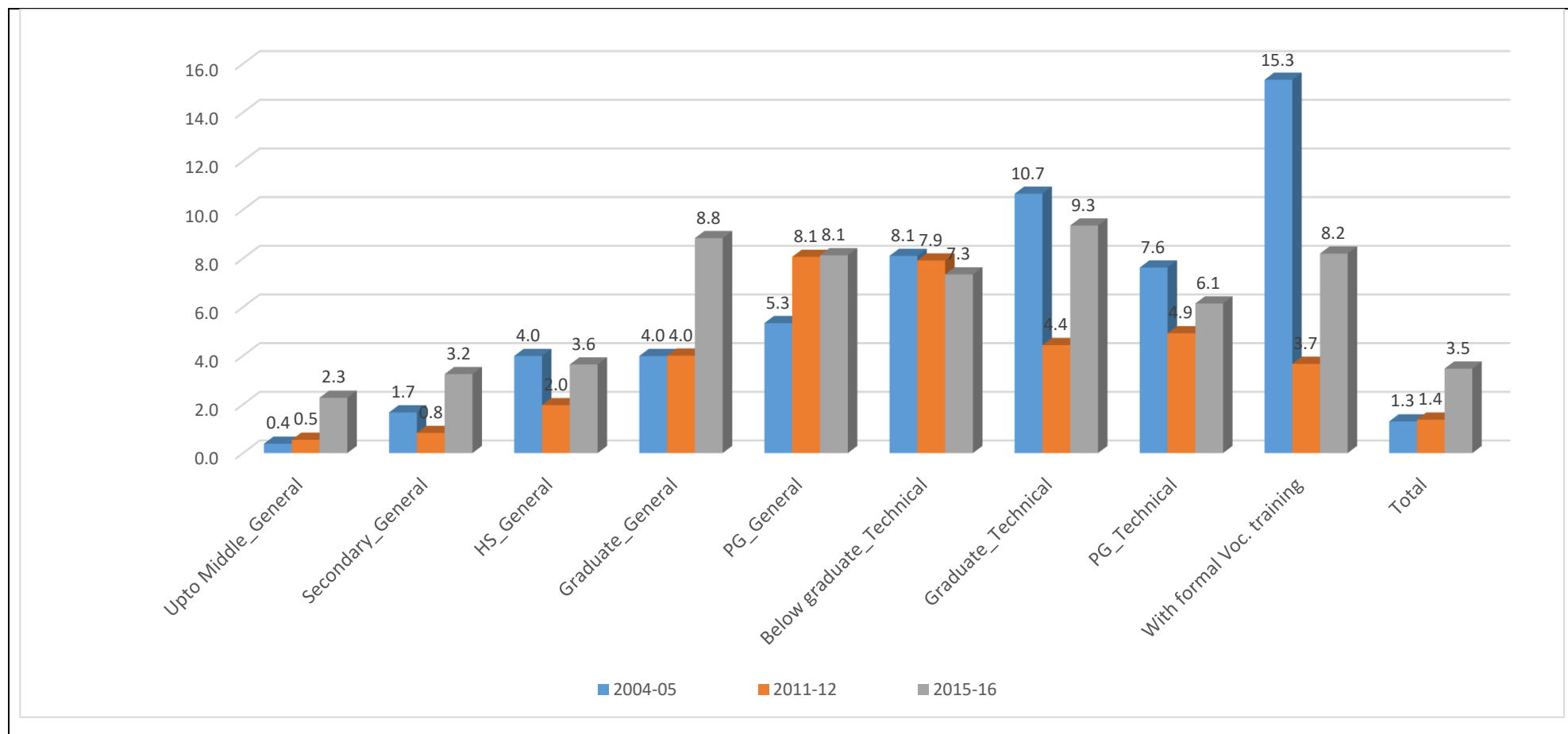
Source: Authors' calculation using GDP and GSDP data from RBI "Handbook of statistics on Indian states" (base years converted to 2011-12).

Figure 5: Trends of un-employment rate (open) by level of skills in India, 2005-2016



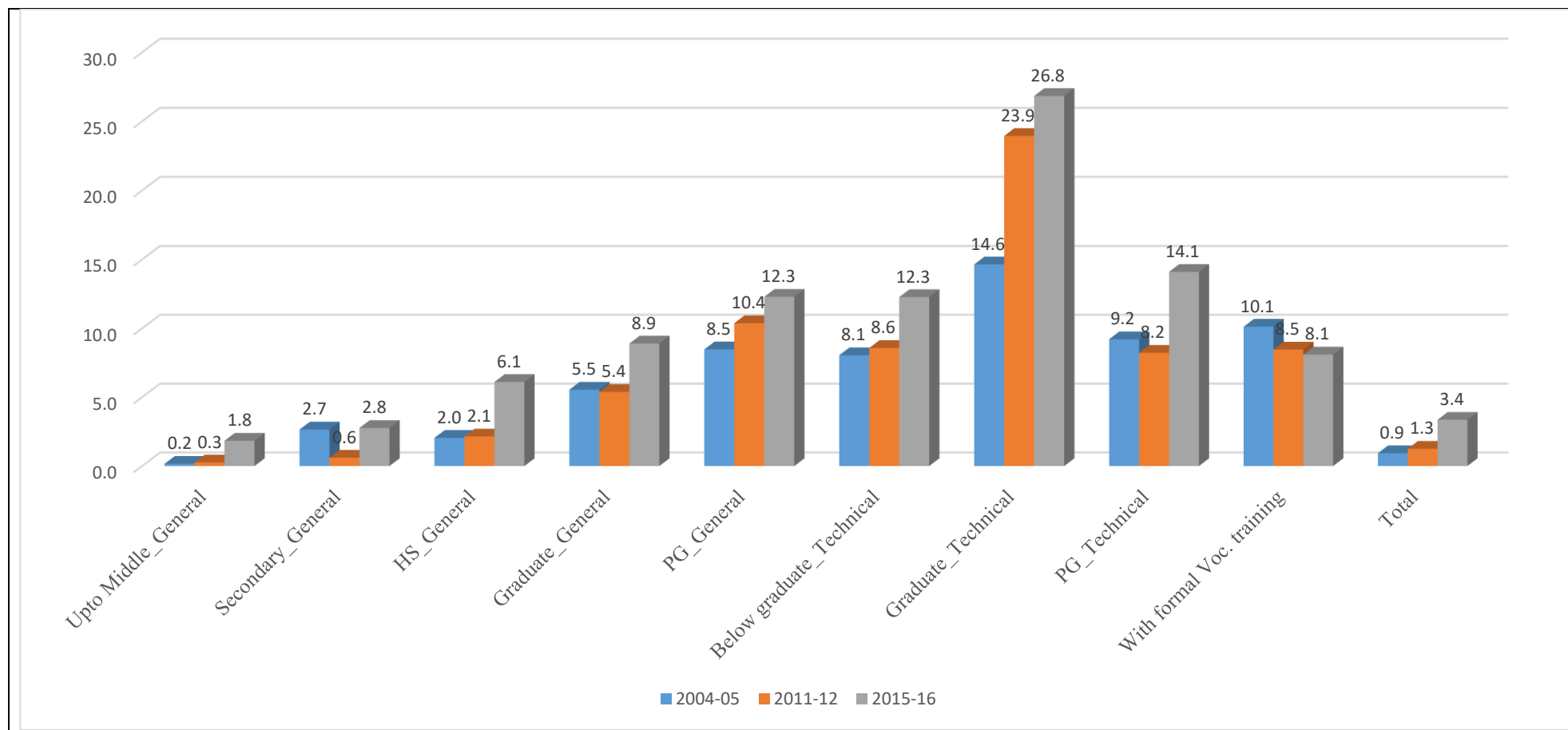
Source: Authors' calculation based on NSS (61st and 68th rounds) and LB (5th annual survey) unit level data.

Figure 6: Trends of un-employment rate (open) by level of skills in Tamil Nadu, 2005-2016



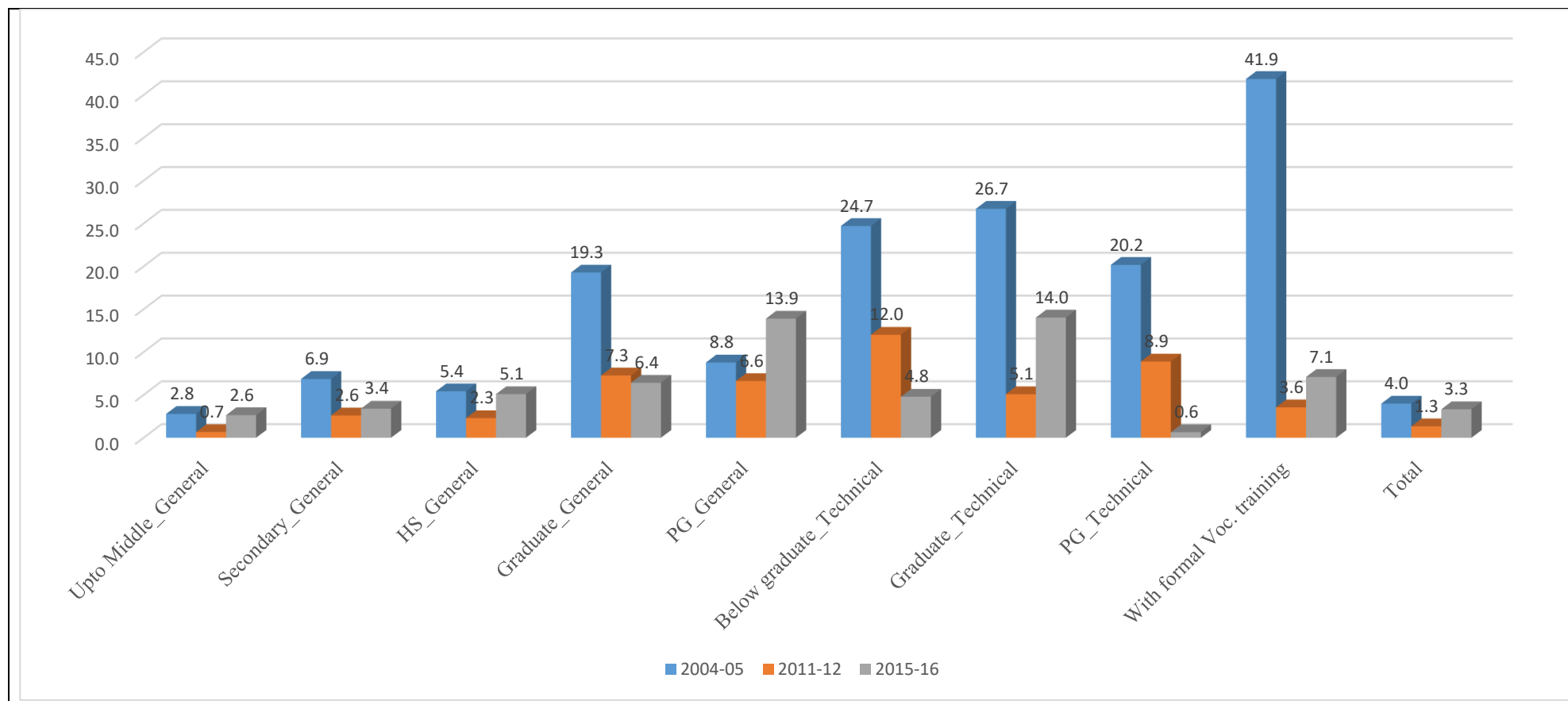
Source: Authors' calculation based on NSS (61st and 68th rounds) and LB (5th annual survey) unit level data.

Figure 7: Trends of un-employment rate (open) by level of skills in Andhra Pradesh, 2005-2016



Source: Authors' calculation based on NSS (61st and 68th rounds) and LB (5th annual survey) unit level data.

Figure 8: Trends of un-employment rate (open) by level of skills in Odisha, 2005-2016



Source: Authors' calculation based on NSS (61st and 68th rounds) and LB (5th annual survey) unit level data.

Table 16: Sector-wise skill gaps in nonfarm sectors in Tamil Nadu, Andhra Pradesh, Odisha and India, 2005-2016.

Sub-sectors	Skill Gap Index (SGI)								
	Manufacturing			Service			Overall (Non-farm sectors)		
	<i>2004-05</i>	<i>2011-12</i>	<i>2015-16</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015-16</i>	<i>2004-05</i>	<i>2011-12</i>	<i>2015-16</i>
Tamil Nadu	0.821	0.783	0.811	0.461	0.441	0.581	0.745	0.714	0.761
Andhra Pradesh	0.884	0.875	0.884	0.439	0.432	0.603	0.761	0.747	0.803
Odisha	0.907	0.865	0.856	0.568	0.461	0.519	0.809	0.746	0.755
All India	0.858	0.834	0.872	0.491	0.46	0.527	0.767	0.741	0.775

Note: This skill gap index ranges from zero to one. Zero implies no skill gap and one implies a situations of 100% skill gap

Source: Authors' calculation based on Equation 2, data and method section, using NSS (61st and 68th rounds) and LB (5th annual survey) unit level data.

6. Skill Gaps by industrial and service sub-sectors

Before we discuss the skill gap index results, we should ask: first, how is this skill gap index (SGI) calculated; and secondly, how can it be interpreted? The answer to these questions is the following. This is a qualitative measure of skill gap, which considers both demand and supply side information. On the supply side, we have used the size of the labour force by various levels of education. On the demand side, we have used two important pieces of information viz., (i) total number of workers in a particular sector (or subsector) by their level of education, and for each level of education, the share of workers employed in that particular sectors (subsectors).

Finally, using the formula (Equation 2) given in the data and method section (Section 2), we have calculated this Skill Gap Index (SGI). The range of this SGI is from zero to one. While a SGI value zero implies no skill gap, a value equal to unity implies a very severe skill gap. Moreover, for purposes of analysis, we classify values into four ranges. A SGI range from 0 to 0.25 implies a low skill gap; a value between 0.26 to 0.5 implies moderate skill gap; while SGI between 0.51 to 0.75 implies high skill gap; and SGI greater than 0.75 implies severe skill gap.

This SGI value also reflects the employer's choice and preference pattern for a particular skill category of workers. For example, a low value of SGI could imply employer's preference for low skilled workers is high and vice versa.

The SGI is computed for each of the subsectors of non-manufacturing, manufacturing and service, by five levels of education or skills. Education categories labelled as either up to middle (including primary and upper primary) and illiterate are considered as low skill; a secondary level of education is considered as medium skill, and those having graduate and above level of education (either general or technical), and with vocational qualification are considered as relatively skilled workers.

We have analyzed the sub-sectoral SGI results calculated for each of these selected states viz., Andhra Pradesh, Tamil Nadu and Odisha below:

Andhra Pradesh

In Andhra Pradesh, the overall skill gap index for the non-manufacturing sector is severe (overall SGI value is 0.797). This implies that employers of non-manufacturing workers are not preferring the available skilled workers. This could be due to the mismatch between employers' expectation and the actual skill endowment of the job seekers.

A comparison of subsectors among the non-manufacturing sector reveals that in labour intensive subsectors like construction, quarrying of stone and clay, and waste collection etc., employers prefer to hire low skilled workers. This is as expected as these sectors are mostly labour intensive in nature. On the other hand, in the subsectors like iron ore and coal mining, electricity and gas generation and transmission, and plumbing and construction installation etc., SGI of low skilled workers is high.

Furthermore, it is notable that among low skilled workers SGI is relatively lower (0.75 for illiterate, and 0.77 for up to secondary school passouts), as compared to the medium (0.82 among secondary school pass-outs) and relatively skilled (0.88 among graduates and post graduates) workers (See Table 17a). This implies the fact that those having better level of education, who happen to be looking for jobs in the non-manufacturing sector (in its various subsectors) are less likely to get such jobs. Employers do not prefer these skilled workers because they do not need such skill.

The skill gap in manufacturing sector is also severe in Andhra Pradesh as the SGI value is either 0.798 or above across the subsectors (see Table 17b). As expected the SGI value in labour intensive subsectors like food processing, textiles and apparel, is relatively lower than that of the capital intensive counterparts (manufacture of motor vehicles, engineering goods, metallic and non-metallic mineral products etc.). It is also notable that in most subsectors and overall the SGI value increases with an increasing level of education (skills). This is a very worrying fact, because a high level of SGI would compel employers in manufacturing to use more machines in Andhra Pradesh.

Furthermore, we have found that the skill gap in service is also quite high, but it is relatively lower than that in manufacturing (see Table 17c). We have observed that the SGI value in traditional service subsectors are relatively lower than that of the modern service sectors. This is a clear indication of the fact that, those who are coming out (pass-outs) of their education institution either lack basic or soft skills, and hence they fail to fulfill the skill requirement of the employers in these sectors.

Table 17a: Skill Gap Index in Non-manufacturing Sectors Andhra Pradesh, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Mining of hard coal	0.749	0.844	0.700	0.876	0.820	0.798
Mining of lignite	0.985	0.985	0.985	0.062	0.985	0.800
Mining of iron ores	0.889	0.889	0.889	0.889	0.445	0.800
Quarrying of stone, sand and clay	0.501	0.819	0.748	0.983	0.931	0.796
Support activities for petroleum and natural gas mining	0.851	0.723	0.851	0.851	0.723	0.800
Electric power generation, transmission and distribution	0.980	0.959	0.756	0.865	0.423	0.797
Manufacture of gas; distribution of gaseous fuels through mains	0.995	0.612	0.995	0.785	0.611	0.800
Water collection, treatment and supply	0.474	0.927	0.866	0.866	0.866	0.800
Waste collection	0.206	0.857	0.993	0.992	0.952	0.800
Materials recovery	0.774	0.659	0.954	0.954	0.658	0.800
Construction of buildings	0.546	0.660	0.839	0.960	0.810	0.763
Construction of roads and railways	0.547	0.798	0.873	0.886	0.874	0.796
Construction of utility projects	0.371	0.814	0.866	0.989	0.938	0.795
Construction of other civil engineering projects	0.851	0.702	0.992	0.994	0.460	0.800
Demolition and site preparation	0.986	0.211	0.850	0.998	0.952	0.799
Electrical, plumbing and other construction installation activities	0.984	0.826	0.693	0.959	0.524	0.797
Building completion and finishing	0.848	0.589	0.851	0.955	0.738	0.796
Other specialized construction activities	0.985	0.985	0.060	0.985	0.985	0.800
Total	0.751	0.770	0.820	0.881	0.761	0.797

Table 17b: Skill Gap Index in Manufacturing Sectors Andhra Pradesh, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Processing and preserving of meat	0.524	0.577	0.933	0.999	0.961	0.799
Processing and preserving of fish, crustaceans and molluscs	0.761	0.859	0.761	0.761	0.859	0.800
Processing and preserving of fruit and vegetables	0.994	0.547	0.470	0.994	0.994	0.800
Manufacture of vegetable and animal oils and fats	0.731	0.402	0.915	0.991	0.960	0.800
Manufacture of dairy products	0.979	0.543	0.822	0.961	0.693	0.800
Manufacture of grain mill products, starches and starch products	0.672	0.618	0.840	0.968	0.887	0.797
Manufacture of other food products	0.730	0.635	0.904	0.930	0.779	0.796
Manufacture of prepared animal feeds	0.980	0.082	0.980	0.979	0.980	0.800
Manufacture of beverages	0.892	0.843	0.591	0.998	0.672	0.799
Manufacture of tobacco products	0.607	0.638	0.880	0.987	0.838	0.790
Spinning, weaving and finishing of textiles	0.913	0.723	0.816	0.860	0.651	0.792
Manufacture of other textiles	0.843	0.723	0.854	0.902	0.664	0.797
Manufacture of wearing apparel, except fur apparel	0.898	0.625	0.789	0.997	0.589	0.780
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	0.753	0.996	0.643	0.976	0.630	0.800
Manufacture of footwear	0.995	0.432	0.995	0.995	0.581	0.800
Sawmilling and planing of wood	0.563	0.990	0.733	0.991	0.723	0.800
Manufacture of products of wood, cork, straw and plaiting materials	0.712	0.719	0.901	0.989	0.645	0.793
Manufacture of paper and paper products	0.519	0.852	0.893	0.904	0.824	0.799
Printing and service activities related to printing	0.892	0.806	0.856	0.616	0.824	0.799
Manufacture of refined petroleum products	0.972	0.972	0.972	0.112	0.972	0.800
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	0.928	0.695	0.754	0.942	0.678	0.799
Manufacture of other chemical products	0.875	0.818	0.668	0.886	0.750	0.799
Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.930	0.687	0.758	0.821	0.787	0.797

Manufacture of rubber products	0.964	0.144	0.964	0.964	0.964	0.800
Manufacture of plastics products	0.491	0.796	0.959	0.990	0.763	0.800
Manufacture of glass and glass products	0.890	0.890	0.835	0.494	0.890	0.800
Manufacture of non-metallic mineral products n.e.c.	0.658	0.743	0.713	0.992	0.874	0.796
Manufacture of basic iron and steel	0.864	0.638	0.760	0.993	0.741	0.799
Manufacture of basic precious and other non-ferrous metals	0.985	0.523	0.523	0.985	0.985	0.800
Casting of metals	0.484	0.951	0.592	0.986	0.986	0.800
Manufacture of structural metal products, tanks, reservoirs and steam generators	0.999	0.862	0.693	0.997	0.442	0.799
Manufacture of weapons and ammunition	0.998	0.998	0.990	0.975	0.040	0.800
Manufacture of other fabricated metal products; metalworking service activities	0.767	0.692	0.989	0.951	0.589	0.798
Manufacture of electronic components	0.993	0.993	0.993	0.510	0.511	0.800
Manufacture of communication equipment	0.989	0.989	0.096	0.936	0.989	0.800
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	0.963	0.963	0.963	0.148	0.963	0.800
Manufacture of optical instruments and equipment	0.957	0.788	0.339	0.957	0.957	0.800
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	0.771	0.960	0.508	0.989	0.771	0.800
Manufacture of wiring and wiring devices	0.986	0.986	0.986	0.055	0.986	0.800
Manufacture of domestic appliances	0.987	0.855	0.883	0.288	0.987	0.800
Manufacture of general purpose machinery	0.996	0.630	0.995	0.997	0.381	0.800
Manufacture of special-purpose machinery	0.977	0.977	0.977	0.977	0.092	0.800
Manufacture of motor vehicles	0.964	0.964	0.555	0.964	0.555	0.800
Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	0.979	0.979	0.979	0.979	0.085	0.800
Building of ships and boats	0.997	0.753	0.911	0.870	0.465	0.799
Manufacture of railway locomotives and rolling stock	0.998	0.998	0.581	0.970	0.447	0.799
Manufacture of furniture	0.832	0.759	0.785	0.999	0.610	0.797
Manufacture of jewellery, bijouterie and related articles	0.806	0.782	0.869	0.923	0.605	0.797

Manufacture of games and toys	0.906	0.818	0.510	0.987	0.777	0.800
Manufacture of medical and dental instruments and supplies	0.949	0.949	0.949	0.202	0.949	0.800
Other manufacturing n.e.c.	0.600	0.667	0.940	0.998	0.792	0.799
Repair of fabricated metal products, machinery and equipment	0.768	0.737	0.873	0.999	0.617	0.799
Total	0.850	0.761	0.797	0.858	0.726	0.798

Table 17c: Skill Gap Index in Services Sectors Andhra Pradesh, 2011-12

Subsectors	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Sale of motor vehicles	0.821	0.939	0.905	0.741	0.593	0.800
Maintenance and repair of motor vehicles	0.817	0.847	0.737	0.999	0.583	0.797
Sale of motor vehicle parts and accessories	0.900	0.806	0.917	0.384	0.992	0.800
Sale, maintenance and repair of motorcycles and related parts and accessories	0.860	0.736	0.786	0.950	0.661	0.799
Wholesale on a fee or contract basis	0.549	0.799	0.741	0.918	0.989	0.799
Wholesale of agricultural raw materials and live animals	0.942	0.748	0.532	0.965	0.809	0.799
Wholesale of food, beverages and tobacco	0.846	0.602	0.626	0.972	0.948	0.799
Wholesale of household goods	0.887	0.911	0.639	0.600	0.954	0.798
Wholesale of machinery, equipment and supplies	0.996	0.963	0.771	0.320	0.948	0.799
Other specialized wholesale	0.886	0.267	0.937	0.977	0.928	0.799
Non-specialized wholesale trade	0.315	0.871	0.972	0.972	0.871	0.800
Retail sale in non-specialized stores	0.828	0.583	0.692	0.896	0.959	0.792

Retail sale of food, beverages and tobacco in specialized stores	0.669	0.620	0.720	0.914	0.966	0.778
Retail sale of automotive fuel in specialized stores	0.998	0.818	0.285	0.948	0.949	0.799
Retail sale of information and communications equipment in specialized stores	0.930	0.973	0.548	0.621	0.920	0.799
Retail sale of other household equipment in specialized stores	0.870	0.599	0.684	0.866	0.949	0.794
Retail sale of cultural and recreation goods in specialized stores	0.854	0.636	0.622	0.884	0.998	0.799
Retail sale of other goods in specialized stores	0.869	0.701	0.593	0.846	0.951	0.792
Retail sale via stalls and markets	0.618	0.792	0.635	0.959	0.993	0.799
Retail trade not in stores, stalls or markets	0.563	0.614	0.852	0.999	0.964	0.798
Transport via railways	0.924	0.920	0.545	0.991	0.614	0.799
Other land transport	0.836	0.670	0.723	0.975	0.563	0.753
Sea and coastal water transport	0.995	0.621	0.695	0.692	0.995	0.800
Passenger air transport	0.951	0.951	0.951	0.196	0.951	0.800
Warehousing and storage	0.993	0.993	0.963	0.058	0.993	0.800
Support activities for transportation	0.812	0.765	0.756	0.673	0.983	0.798
Postal activities	0.995	0.995	0.689	0.326	0.993	0.800
Short term accommodation activities	0.855	0.678	0.703	0.845	0.917	0.799
Other accommodation	0.758	0.506	0.834	0.984	0.917	0.800
Restaurants and mobile food service activities	0.702	0.655	0.801	0.942	0.860	0.792
Event catering and other food service activities	0.759	0.595	0.867	0.998	0.777	0.799
Beverage serving activities	0.387	0.805	0.879	0.997	0.926	0.799
Publishing of books, periodicals and other publishing activities	0.998	0.623	0.943	0.672	0.759	0.799
Software publishing	0.992	0.992	0.992	0.512	0.512	0.800
Motion picture, video and television programme activities	0.955	0.955	0.693	0.838	0.556	0.799
Radio broadcasting	0.060	0.985	0.985	0.985	0.985	0.800
Television programming and broadcasting activities	0.986	0.986	0.314	0.986	0.729	0.800
Wired telecommunications activities	0.997	0.827	0.636	0.724	0.800	0.797

Wireless telecommunications activities	0.993	0.993	0.268	0.915	0.830	0.800
Computer programming, consultancy and related activities	0.999	0.923	0.986	0.153	0.929	0.798
Data processing, hosting and related activities; web portals	0.996	0.996	0.794	0.622	0.589	0.799
Other information service activities	0.993	0.993	0.515	0.546	0.951	0.800
Monetary intermediation	0.999	0.982	0.833	0.263	0.908	0.797
Trusts, funds and other financial vehicles	0.910	0.910	0.360	0.910	0.910	0.800
Other financial service activities, except insurance and pension funding activities	0.999	0.911	0.757	0.426	0.893	0.797
Insurance	0.996	0.991	0.898	0.494	0.616	0.799
Activities auxiliary to financial service activities, except insurance and pension funding	0.994	0.994	0.875	0.136	1.000	0.800
Activities auxiliary to insurance and pension funding	0.996	0.996	0.960	0.050	0.996	0.800
Fund management activities	0.972	0.260	0.823	0.972	0.972	0.800
Real estate activities with own or leased property	0.997	0.997	0.640	0.365	0.997	0.799
Real estate activities on a fee or contract basis	0.749	0.762	0.677	0.809	0.997	0.799
Legal activities	0.996	0.996	0.365	0.643	0.996	0.799
Accounting, bookkeeping and auditing activities; tax consultancy	0.998	0.940	0.998	0.647	0.411	0.799
Activities of head offices	0.924	0.777	0.924	0.451	0.924	0.800
Architectural and engineering activities and related technical consultancy	0.993	0.993	0.993	1.000	0.021	0.800
Technical testing and analysis	0.794	0.794	0.794	0.825	0.794	0.800
Research and experimental development on natural sciences and engineering	0.990	0.990	0.990	0.635	0.393	0.800
Advertising	0.943	0.943	0.943	0.585	0.585	0.800
Specialized design activities	0.993	0.760	0.935	0.807	0.503	0.800
Photographic activities	0.999	0.649	0.800	0.912	0.630	0.798
Other professional, scientific and technical activities n.e.c.	0.972	0.972	0.972	0.113	0.972	0.800
Veterinary activities	0.993	0.985	0.750	0.855	0.416	0.800
Renting and leasing of personal and household goods	0.895	0.857	0.624	0.996	0.625	0.800
Leasing of nonfinancial intangible assets	0.892	0.892	0.431	0.892	0.892	0.800

Temporary employment agency activities	0.987	0.987	0.987	0.987	0.051	0.800
Travel agency and tour operator activities	0.999	0.937	0.952	0.110	0.999	0.799
Private security activities	0.950	0.725	0.493	0.884	0.945	0.799
Security systems service activities	0.989	0.989	0.462	0.570	0.989	0.800
Cleaning activities	0.855	0.506	0.938	0.973	0.728	0.800
Office administrative and support activities	0.997	0.997	0.466	0.687	0.848	0.799
Activities of call centres	0.997	0.997	0.997	0.190	0.818	0.800
Business support service activities n.e.c.	0.545	0.610	0.945	0.997	0.900	0.799
Administration of the State and the economic and social policy of the community	0.770	0.841	0.707	0.696	0.930	0.789
Provision of services to the community as a whole	0.996	0.998	0.676	0.325	0.975	0.794
Compulsory social security activities	0.927	0.292	0.927	0.927	0.927	0.800
Primary education	0.974	0.938	0.817	0.363	0.862	0.791
Secondary education	0.982	0.951	0.902	0.296	0.809	0.788
Higher education	0.963	0.941	0.935	0.293	0.848	0.796
Other education	0.998	0.910	0.730	0.572	0.783	0.799
Educational support services	0.991	0.991	0.991	0.212	0.812	0.800
Hospital activities	0.946	0.912	0.718	0.734	0.667	0.795
Medical and dental practice activities	0.999	0.987	0.725	0.752	0.520	0.797
Other human health activities	0.998	0.869	0.700	0.902	0.523	0.799
Residential care activities for the elderly and disabled	0.579	0.947	0.947	0.947	0.579	0.800
Other residential care activities n.e.c.	0.647	0.875	0.492	0.993	0.993	0.800
Other social work activities without accommodation n.e.c.	0.801	0.958	0.726	0.517	0.995	0.800
Creative, arts and entertainment activities	0.917	0.839	0.791	0.840	0.607	0.799
Libraries, archives, museums and other cultural activities	0.871	0.871	0.518	0.871	0.871	0.800
Gambling and betting activities	0.994	0.904	0.466	0.639	0.994	0.800
Sports activities	0.113	0.996	0.948	0.996	0.948	0.800

Other amusement and recreation activities	0.596	0.936	0.936	0.936	0.595	0.800
Activities of other membership organizations	0.820	0.644	0.675	0.909	0.940	0.798
Repair of computers and communication equipment	0.995	0.772	0.832	0.795	0.604	0.800
Repair of personal and household goods	0.935	0.690	0.735	0.980	0.637	0.796
Other personal service activities	0.523	0.750	0.959	0.959	0.752	0.789
Activities of households as employers of domestic personnel	0.494	0.637	0.931	0.999	0.920	0.796
Total	0.866	0.831	0.761	0.719	0.811	0.798

Tamil Nadu

In Tamil Nadu, the overall skill gap index for *non-manufacturing* jobs is severe (SGI value is 0.795). A comparison of the subsectors among non-manufacturing sector reveals that, SGI is relatively low in the construction of buildings (0.75 overall and about 0.49 for those having up to middle level of general education). Also, the SGI value in most subsectors and the overall value increases with increasing level of education (skills). Among low skilled workers SGI it is relatively lower (0.702 and 0.67), as compared to the medium (0.882) and relatively skilled (0.887) workers (See Table 18a). This implies that those having better education, if they are looking for jobs in the non-manufacturing sector in Tamil Nadu are less likely to get such jobs.

The skill gap in *manufacturing* in Tamil Nadu also reflects a similar situation. The overall SGI value is 0.798 (see Table 18b). The SGI value in labour intensive subsectors is relatively lower than that of the capital intensive counterparts across the subsectors. It is also important to note that in most subsectors the overall SGI value increases with increasing level of education (skills). This high SGI is partly a cause of a low rate of manufacturing wages in Tamil Nadu, and hence the problem of high rate of youth unemployment in Tamil Nadu.

Furthermore, the skill gap in *services* is also quite high, but it is relatively lower than that of the manufacturing sector (see Table 18c). Furthermore, we have observed that the SGI value in traditional service subsectors is relatively lower than that of the modern service sectors. Hence in this context, basic and soft skill training would be very helpful.

Table 18a: Skill Gap Index in Non-manufacturing Sectors Tamil Nadu, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Quarrying of stone, sand and clay	0.542	0.713	0.886	0.917	0.923	0.796
Mining and quarrying n.e.c.	0.868	0.762	0.621	0.988	0.761	0.800
Electric power generation, transmission and distribution	0.947	0.824	0.896	0.666	0.645	0.795
Manufacture of gas; distribution of gaseous fuels through mains	0.993	0.993	0.993	0.028	0.993	0.800
Water collection, treatment and supply	0.993	0.201	0.989	0.823	0.993	0.800
Sewerage	0.790	0.790	0.807	0.807	0.807	0.800
Waste collection	0.417	0.600	0.994	0.994	0.994	0.800
Waste treatment and disposal	0.021	0.995	0.995	0.995	0.995	0.800
Materials recovery	0.393	0.728	0.994	0.994	0.891	0.800
Construction of buildings	0.764	0.491	0.817	0.971	0.734	0.755
Construction of roads and railways	0.452	0.668	0.936	0.990	0.929	0.795
Construction of utility projects	0.450	0.566	0.929	0.995	0.987	0.785
Construction of other civil engineering projects	0.456	0.633	0.972	0.964	0.972	0.799
Demolition and site preparation	0.991	0.822	0.800	0.991	0.392	0.799
Electrical, plumbing and other construction installation activities	0.950	0.721	0.723	0.994	0.600	0.798
Building completion and finishing	0.938	0.495	0.664	0.994	0.894	0.797
Other specialized construction activities	0.973	0.540	0.973	0.973	0.540	0.800
Total	0.702	0.679	0.882	0.887	0.826	0.795

Table 18b: Skill Gap Index in Manufacturing Sectors Tamil Nadu, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI

Processing and preserving of meat	0.973	0.200	0.939	0.983	0.901	0.799
Processing and preserving of fish, crustaceans and molluscs	0.605	0.418	0.990	0.997	0.988	0.800
Processing and preserving of fruit and vegetables	0.538	0.975	0.975	0.975	0.538	0.800
Manufacture of vegetable and animal oils and fats	0.984	0.984	0.553	0.672	0.807	0.800
Manufacture of dairy products	0.972	0.825	0.803	0.582	0.815	0.799
Manufacture of grain mill products, starches and starch products	0.899	0.525	0.790	0.983	0.795	0.798
Manufacture of other food products	0.904	0.543	0.805	0.965	0.749	0.793
Manufacture of prepared animal feeds	0.476	0.881	0.881	0.881	0.881	0.800
Manufacture of beverages	0.998	0.540	0.778	0.967	0.712	0.799
Manufacture of tobacco products	0.853	0.571	0.927	0.998	0.593	0.788
Spinning, weaving and finishing of textiles	0.865	0.498	0.831	0.959	0.681	0.767
Manufacture of other textiles	0.933	0.586	0.864	0.979	0.616	0.796
Manufacture of wearing apparel, except fur apparel	0.969	0.634	0.764	0.944	0.593	0.781
Manufacture of articles of fur	0.991	0.034	0.991	0.991	0.991	0.800
Manufacture of knitted and crocheted apparel	0.970	0.749	0.717	0.793	0.727	0.791
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	0.901	0.622	0.526	0.975	0.967	0.798
Manufacture of footwear	0.792	0.581	0.762	0.941	0.908	0.797
Sawmilling and planing of wood	0.997	0.389	0.869	0.997	0.745	0.799
Manufacture of products of wood, cork, straw and plaiting materials	0.795	0.666	0.868	0.992	0.638	0.792
Manufacture of paper and paper products	0.982	0.565	0.894	0.887	0.662	0.798
Printing and service activities related to printing	0.999	0.693	0.535	0.945	0.819	0.798
Manufacture of refined petroleum products	0.983	0.791	0.889	0.668	0.668	0.800
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	0.999	0.642	0.852	0.873	0.626	0.798
Manufacture of other chemical products	0.802	0.319	0.937	0.982	0.949	0.798
Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.997	0.997	0.962	0.562	0.478	0.799

Manufacture of rubber products	0.953	0.833	0.532	0.753	0.921	0.798
Manufacture of plastics products	0.947	0.671	0.857	0.797	0.719	0.798
Manufacture of glass and glass products	0.995	0.697	0.726	0.932	0.648	0.800
Manufacture of non-metallic mineral products n.e.c.	0.716	0.628	0.750	0.982	0.903	0.796
Manufacture of basic iron and steel	0.996	0.996	0.589	0.996	0.420	0.800
Manufacture of basic precious and other non-ferrous metals	0.997	0.506	0.590	0.997	0.907	0.799
Casting of metals	0.764	0.359	0.971	0.995	0.910	0.800
Manufacture of structural metal products, tanks, reservoirs and steam generators	0.913	0.750	0.638	0.971	0.697	0.794
Manufacture of other fabricated metal products; metalworking service activities	0.963	0.625	0.855	0.910	0.629	0.796
Manufacture of electronic components	0.789	0.995	0.875	0.995	0.344	0.800
Manufacture of computers and peripheral equipment	0.989	0.989	0.989	0.044	0.989	0.800
Manufacture of communication equipment	0.977	0.977	0.751	0.977	0.317	0.800
Manufacture of consumer electronics	0.990	0.990	0.990	0.119	0.912	0.800
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	0.997	0.997	0.867	0.600	0.535	0.799
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	0.990	0.921	0.483	0.616	0.990	0.800
Manufacture of batteries and accumulators	0.967	0.967	0.967	0.132	0.967	0.800
Manufacture of wiring and wiring devices	0.970	0.970	0.120	0.970	0.970	0.800
Manufacture of electric lighting equipment	0.968	0.968	0.205	0.968	0.892	0.800
Manufacture of domestic appliances	0.995	0.336	0.814	0.995	0.859	0.800
Manufacture of other electrical equipment	0.992	0.992	0.992	0.843	0.181	0.800
Manufacture of general purpose machinery	0.997	0.893	0.759	0.700	0.646	0.799
Manufacture of special-purpose machinery	0.999	0.723	0.828	0.794	0.644	0.798
Manufacture of motor vehicles	0.992	0.962	0.995	0.919	0.127	0.799
Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	0.724	0.957	0.797	0.997	0.521	0.799

Manufacture of parts and accessories for motor vehicles	0.999	0.648	0.903	0.981	0.462	0.799
Manufacture of railway locomotives and rolling stock	0.930	0.930	0.281	0.930	0.930	0.800
Manufacture of military fighting vehicles	0.985	0.985	0.985	0.522	0.522	0.800
Manufacture of transport equipment n.e.c.	0.998	0.773	0.898	0.959	0.369	0.799
Manufacture of furniture	0.969	0.540	0.836	0.822	0.819	0.797
Manufacture of jewellery, bijouterie and related articles	0.999	0.496	0.825	0.954	0.708	0.796
Manufacture of musical instruments	0.919	0.919	0.919	0.622	0.622	0.800
Manufacture of sports goods	0.842	0.737	0.737	0.842	0.842	0.800
Manufacture of games and toys	0.716	0.772	0.997	0.997	0.516	0.799
Other manufacturing n.e.c.	0.901	0.236	0.906	0.990	0.959	0.798
Repair of fabricated metal products, machinery and equipment	0.999	0.445	0.834	0.999	0.714	0.798
Total	0.917	0.707	0.796	0.852	0.716	0.798

Table 18c: Skill Gap Index in Services Sectors Tamil Nadu, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Sale of motor vehicles	0.897	0.956	0.876	0.562	0.701	0.798
Maintenance and repair of motor vehicles	0.942	0.631	0.824	0.973	0.601	0.794
Sale of motor vehicle parts and accessories	0.997	0.860	0.414	0.926	0.800	0.799
Sale, maintenance and repair of motorcycles and related parts and accessories	0.988	0.634	0.748	0.923	0.697	0.798
Wholesale on a fee or contract basis	0.944	0.739	0.735	0.726	0.846	0.798
Wholesale of agricultural raw materials and live animals	0.859	0.561	0.831	0.892	0.852	0.799
Wholesale of food, beverages and tobacco	0.868	0.864	0.413	0.912	0.935	0.799
Wholesale of household goods	0.998	0.689	0.729	0.804	0.774	0.799

Wholesale of machinery, equipment and supplies	0.674	0.973	0.798	0.581	0.973	0.800
Other specialized wholesale	0.946	0.699	0.629	0.840	0.876	0.798
Retail sale in non-specialized stores	0.799	0.584	0.728	0.920	0.944	0.795
Retail sale of food, beverages and tobacco in specialized stores	0.896	0.498	0.678	0.937	0.901	0.782
Retail sale of automotive fuel in specialized stores	0.996	0.620	0.764	0.738	0.879	0.799
Retail sale of information and communications equipment in specialized stores	0.999	0.971	0.690	0.838	0.492	0.798
Retail sale of other household equipment in specialized stores	0.968	0.739	0.669	0.830	0.740	0.789
Retail sale of cultural and recreation goods in specialized stores	0.998	0.969	0.786	0.940	0.303	0.799
Retail sale of other goods in specialized stores	0.885	0.749	0.589	0.882	0.824	0.786
Retail sale via stalls and markets	0.654	0.591	0.771	0.991	0.991	0.800
Retail trade not in stores, stalls or markets	0.779	0.555	0.862	0.942	0.838	0.795
Transport via railways	0.998	0.654	0.545	0.903	0.894	0.799
Other land transport	0.962	0.618	0.643	0.962	0.646	0.766
Transport via pipeline	0.966	0.966	0.135	0.966	0.966	0.800
Sea and coastal water transport	0.997	0.997	0.852	0.647	0.501	0.799
Passenger air transport	0.967	0.967	0.967	0.133	0.967	0.800
Warehousing and storage	0.978	0.088	0.978	0.978	0.978	0.800
Support activities for transportation	0.965	0.557	0.741	0.889	0.836	0.798
Postal activities	0.992	0.955	0.450	0.609	0.992	0.800
Courier activities	0.996	0.996	0.163	0.935	0.909	0.800
Short term accommodation activities	0.924	0.735	0.778	0.564	0.992	0.798
Other accommodation	0.862	0.416	0.987	0.815	0.918	0.800
Restaurants and mobile food service activities	0.883	0.518	0.819	0.930	0.788	0.788
Event catering and other food service activities	0.844	0.470	0.941	0.948	0.788	0.798
Beverage serving activities	0.737	0.589	0.757	0.999	0.900	0.796
Publishing of books, periodicals and other publishing activities	0.997	0.841	0.819	0.850	0.490	0.799

Software publishing	0.996	0.996	0.996	0.659	0.351	0.799
Motion picture, video and television programme activities	0.997	0.679	0.632	0.855	0.832	0.799
Radio broadcasting	0.992	0.992	0.992	0.510	0.511	0.800
Television programming and broadcasting activities	0.958	0.958	0.958	0.958	0.169	0.800
Wired telecommunications activities	0.999	0.904	0.706	0.518	0.862	0.798
Wireless telecommunications activities	0.996	0.996	0.845	0.996	0.167	0.800
Satellite telecommunications activities	0.948	0.207	0.948	0.948	0.948	0.800
Computer programming, consultancy and related activities	0.996	1.000	0.953	0.354	0.665	0.793
Data processing, hosting and related activities; web portals	0.998	0.998	0.872	0.512	0.612	0.798
Other information service activities	0.998	0.998	0.871	0.565	0.562	0.799
Monetary intermediation	0.996	0.939	0.836	0.429	0.755	0.791
Trusts, funds and other financial vehicles	0.848	0.848	0.609	0.848	0.848	0.800
Other financial service activities, except insurance and pension funding activities	0.923	0.961	0.641	0.715	0.743	0.797
Insurance	0.999	0.999	0.843	0.587	0.554	0.796
Activities auxiliary to financial service activities, except insurance and pension funding	0.995	0.718	0.744	0.619	0.922	0.799
Activities auxiliary to insurance and pension funding	0.995	0.995	0.473	0.565	0.968	0.799
Fund management activities	0.965	0.965	0.965	0.138	0.965	0.800
Real estate activities with own or leased property	0.998	0.746	0.798	0.617	0.830	0.798
Real estate activities on a fee or contract basis	0.820	0.810	0.448	0.924	0.993	0.799
Legal activities	0.997	0.997	0.963	0.074	0.967	0.800
Accounting, bookkeeping and auditing activities; tax consultancy	0.995	0.995	0.677	0.391	0.938	0.799
Management consultancy activities	0.989	0.989	0.989	0.989	0.044	0.800
Architectural and engineering activities and related technical consultancy	0.892	0.892	0.892	0.721	0.603	0.800
Specialized design activities	0.984	0.293	0.984	0.984	0.753	0.800
Photographic activities	0.998	0.968	0.775	0.943	0.313	0.799

Other professional, scientific and technical activities n.e.c.	0.960	0.960	0.160	0.960	0.960	0.800
Veterinary activities	0.997	0.664	0.877	0.676	0.782	0.799
Renting and leasing of motor vehicles	0.971	0.971	0.971	0.116	0.971	0.800
Renting and leasing of personal and household goods	0.686	0.641	0.854	0.940	0.874	0.799
Renting and leasing of other machinery, equipment and tangible goods n.e.c.	0.903	0.903	0.387	0.903	0.903	0.800
Activities of employment placement agencies	0.986	0.986	0.986	0.056	0.986	0.800
Temporary employment agency activities	0.953	0.953	0.985	0.123	0.985	0.800
Human resources provision and management of human resources functions	0.983	0.983	0.983	0.066	0.983	0.800
Travel agency and tour operator activities	0.996	0.750	0.322	0.996	0.934	0.800
Other reservation service activities	0.963	0.963	0.149	0.963	0.963	0.800
Private security activities	0.996	0.404	0.685	0.917	0.996	0.800
Security systems service activities	0.830	0.830	0.680	0.830	0.830	0.800
Combined facilities support activities	0.920	0.771	0.542	0.994	0.771	0.800
Cleaning activities	0.972	0.409	0.824	0.972	0.824	0.800
Office administrative and support activities	0.998	0.993	0.522	0.904	0.578	0.799
Activities of call centres	0.999	0.962	0.858	0.596	0.570	0.797
Business support service activities n.e.c.	0.989	0.805	0.228	0.989	0.989	0.800
Administration of the State and the economic and social policy of the community	0.956	0.785	0.797	0.578	0.826	0.789
Provision of services to the community as a whole	0.999	0.883	0.569	0.727	0.812	0.798
Compulsory social security activities	0.965	0.596	0.965	0.510	0.965	0.800
Primary education	0.980	0.953	0.673	0.521	0.838	0.793
Secondary education	0.975	0.952	0.879	0.410	0.719	0.787
Higher education	0.999	0.980	0.929	0.272	0.805	0.797
Other education	0.999	0.969	0.889	0.513	0.620	0.798
Educational support services	0.634	0.507	0.895	0.982	0.982	0.800

Hospital activities	0.968	0.887	0.695	0.875	0.552	0.795
Medical and dental practice activities	0.998	0.953	0.998	0.569	0.477	0.799
Other human health activities	0.997	0.883	0.961	0.638	0.516	0.799
Nursing care facilities	0.982	0.527	0.982	0.982	0.527	0.800
Residential care activities for the elderly and disabled	0.987	0.052	0.987	0.987	0.987	0.800
Other residential care activities n.e.c.	0.956	0.956	0.710	0.420	0.956	0.800
Social work activities without accommodation for the elderly and disabled	0.924	0.304	0.924	0.924	0.924	0.800
Other social work activities without accommodation n.e.c.	0.827	0.771	0.533	0.881	0.984	0.799
Creative, arts and entertainment activities	0.918	0.580	0.932	0.615	0.947	0.798
Libraries, archives, museums and other cultural activities	0.985	0.985	0.985	0.061	0.985	0.800
Other amusement and recreation activities	0.929	0.286	0.929	0.929	0.929	0.800
Activities of other membership organizations	0.984	0.543	0.823	0.955	0.682	0.798
Repair of computers and communication equipment	0.997	0.997	0.713	0.852	0.436	0.799
Repair of personal and household goods	0.878	0.637	0.717	0.975	0.775	0.796
Other personal service activities	0.827	0.491	0.834	0.965	0.835	0.790
Activities of households as employers of domestic personnel	0.677	0.542	0.865	0.999	0.887	0.794
Total	0.939	0.771	0.757	0.738	0.783	0.798

Odisha

In Odisha, the overall skill gap index for non-manufacturing industry jobs is severe (SGI value is 0.795). However, among illiterates the SGI is high (0.83), but among low skilled (up to middle school educated) workers it is the least (0.725) and it is again high among middle and relatively skilled workers. This means for employers of non-manufacturing industry in Odisha low skilled youth who are middle school educated are the best choice (See Table 19a). This implies that those with better level of education, if they are looking for jobs in non-manufacturing (in its various subsectors) are less likely to get such jobs. And this sector is likely to absorb relatively low skilled workers.

The skill gap in manufacturing is severe in Odisha as the SGI value is either 0.798 or above across the subsectors (see Table 19c). We also observe that SGI values in labour intensive subsectors are relatively lower than in the capital intensive ones. In most of the manufacturing subsectors the overall SGI value increases with increasing level of education (skills). This is a very worrying fact. Because a high level of SGI would compel the employers of manufacturing sector to use more machines. Hence, unemployment among educated youth would rise further.

Likewise, we have found that the skill gap in services is also quite high, but it is relatively lower than that in manufacturing (see Table 19b). We have observed that the SGI value in traditional service subsectors is relatively lower than that in modern services. This is a clear indication of the fact that educated youth lack either foundational or soft skills, and hence they fail to fulfill the skill requirement of employers in these sectors.

To sum up it can be stated that the qualitative skill gap is very high and severe across the sectors in AP, TN and Odisha. The SGI in service sectors is relatively lower than that of either manufacturing or non-manufacturing industry. Although the SGI in the service sector is a bit lower, it needs to be addressed at the earliest so as to boost educated youth employment in modern services. Furthermore the skill gap in manufacturing needs immediate policy measures as this is going to encourage capital intensity in manufacturing.

Table 19a: Skill Gap Index in Non-manufacturing Sectors Odisha, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Overall SGI
Mining of hard coal	0.997	0.518	0.796	0.870	0.811	0.798
Mining of iron ores	0.993	0.703	0.360	0.949	0.993	0.799
Quarrying of stone, sand and clay	0.417	0.645	0.998	0.952	0.982	0.799
Mining and quarrying n.e.c.	0.927	0.927	0.927	0.610	0.610	0.800
Support activities for other mining and quarrying	0.959	0.959	0.959	0.959	0.165	0.800
Electric power generation, transmission and distribution	0.965	0.787	0.795	0.906	0.530	0.797
Manufacture of gas; distribution of gaseous fuels through mains	0.913	0.913	0.350	0.913	0.910	0.800
Steam and air conditioning supply	0.891	0.891	0.891	0.437	0.891	0.800
Water collection, treatment and supply	0.996	0.762	0.544	0.996	0.698	0.799
Waste collection	0.766	0.375	0.953	0.953	0.953	0.800
Construction of buildings	0.667	0.496	0.905	0.945	0.737	0.750
Construction of roads and railways	0.656	0.623	0.900	0.988	0.752	0.784
Construction of utility projects	0.879	0.713	0.627	0.941	0.838	0.799
Construction of other civil engineering projects	0.669	0.739	0.957	0.906	0.725	0.799
Demolition and site preparation	0.542	0.916	0.943	0.973	0.595	0.794
Electrical, plumbing and other construction installation activities	0.930	0.687	0.898	0.975	0.505	0.799
Building completion and finishing	0.943	0.665	0.789	0.997	0.598	0.799
Total	0.830	0.725	0.799	0.898	0.723	0.795

Table 19b: Skill Gap Index in Manufacturing Sectors Odisha, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Processing and preserving of meat	0.274	0.821	0.987	0.986	0.931	0.800
Processing and preserving of fish, crustaceans and molluscs	0.455	0.556	0.998	0.998	0.988	0.799
Processing and preserving of fruit and vegetables	0.681	0.840	0.979	0.979	0.521	0.800
Manufacture of vegetable and animal oils and fats	0.598	0.960	0.890	0.993	0.557	0.800
Manufacture of dairy products	0.970	0.720	0.970	0.669	0.669	0.800
Manufacture of grain mill products, starches and starch products	0.788	0.459	0.976	0.959	0.804	0.797
Manufacture of other food products	0.602	0.674	0.984	0.984	0.756	0.800
Manufacture of prepared animal feeds	0.956	0.956	0.956	0.177	0.956	0.800
Manufacture of beverages	0.678	0.725	0.995	0.599	0.995	0.799
Manufacture of tobacco products	0.837	0.517	0.999	0.994	0.635	0.797
Spinning, weaving and finishing of textiles	0.968	0.501	0.997	0.998	0.530	0.799
Manufacture of other textiles	0.989	0.310	0.989	0.989	0.722	0.800
Manufacture of wearing apparel, except fur apparel	0.942	0.562	0.849	0.959	0.642	0.791
Sawmilling and planing of wood	0.105	0.974	0.974	0.974	0.974	0.800
Manufacture of products of wood, cork, straw and plaiting materials	0.435	0.687	0.994	0.997	0.832	0.789
Manufacture of paper and paper products	0.983	0.349	0.983	0.983	0.701	0.800
Printing and service activities related to printing	0.986	0.728	0.986	0.733	0.565	0.800
Manufacture of coke oven products	0.820	0.966	0.966	0.966	0.281	0.800
Manufacture of refined petroleum products	0.992	0.032	0.992	0.992	0.992	0.800
Manufacture of basic chemicals, fertilizer and nitrogen compounds, plastics and synthetic rubber in primary forms	0.971	0.971	0.117	0.970	0.971	0.800
Manufacture of other chemical products	0.966	0.966	0.134	0.966	0.966	0.800
Manufacture of rubber products	0.960	0.960	0.308	0.960	0.811	0.800
Manufacture of plastics products	0.690	0.766	0.883	0.972	0.690	0.800

Manufacture of non-metallic mineral products n.e.c.	0.606	0.675	0.960	0.996	0.732	0.794
Manufacture of basic iron and steel	0.856	0.802	0.722	0.962	0.622	0.793
Manufacture of basic precious and other non-ferrous metals	0.998	0.732	0.911	0.792	0.555	0.798
Casting of metals	0.990	0.412	0.990	0.914	0.692	0.800
Manufacture of structural metal products, tanks, reservoirs and steam generators	0.906	0.801	0.782	0.930	0.578	0.799
Manufacture of other fabricated metal products; metalworking service activities	0.599	0.869	0.791	0.997	0.736	0.798
Manufacture of measuring, testing, navigating and control equipment; watches and clocks	0.965	0.965	0.965	0.551	0.552	0.800
Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	0.980	0.980	0.980	0.980	0.081	0.800
Manufacture of domestic appliances	0.991	0.991	0.036	0.991	0.991	0.800
Manufacture of general purpose machinery	0.991	0.815	0.991	0.691	0.509	0.799
Building of ships and boats	0.944	0.583	0.944	0.944	0.583	0.800
Manufacture of furniture	0.960	0.591	0.848	0.999	0.570	0.794
Manufacture of jewellery, bijouterie and related articles	0.991	0.682	0.688	0.932	0.692	0.797
Other manufacturing n.e.c.	0.920	0.320	0.920	0.920	0.920	0.800
Repair of fabricated metal products, machinery and equipment	0.279	0.878	0.997	0.996	0.847	0.799
Total	0.806	0.713	0.853	0.905	0.714	0.798

Table 19c: Skill Gap Index in Services Sectors Odisha, 2011-12

	Illiterate	Up to middle	Secondary	Graduate & above	Vocational training	Over All SGI
Sale of motor vehicles	0.912	0.912	0.912	0.353	0.912	0.800
Maintenance and repair of motor vehicles	0.998	0.393	0.934	0.998	0.670	0.799
Sale of motor vehicle parts and accessories	0.985	0.336	0.974	0.985	0.719	0.800

Sale, maintenance and repair of motorcycles and related parts and accessories	0.996	0.529	0.804	0.996	0.671	0.799
Wholesale on a fee or contract basis	0.982	0.335	0.718	0.982	0.982	0.800
Wholesale of agricultural raw materials and live animals	0.954	0.529	0.711	0.966	0.836	0.799
Wholesale of food, beverages and tobacco	0.953	0.676	0.719	0.791	0.849	0.798
Wholesale of household goods	0.996	0.996	0.647	0.646	0.704	0.798
Wholesale of machinery, equipment and supplies	0.974	0.974	0.960	0.118	0.974	0.800
Other specialized wholesale	0.992	0.675	0.755	0.864	0.710	0.799
Non-specialized wholesale trade	0.941	0.941	0.941	0.234	0.941	0.800
Retail sale in non-specialized stores	0.906	0.430	0.785	0.868	0.976	0.793
Retail sale of food, beverages and tobacco in specialized stores	0.830	0.515	0.751	0.941	0.816	0.771
Retail sale of automotive fuel in specialized stores	0.979	0.688	0.979	0.785	0.567	0.800
Retail sale of information and communications equipment in specialized stores	0.993	0.633	0.678	0.722	0.969	0.799
Retail sale of other household equipment in specialized stores	0.999	0.691	0.582	0.813	0.876	0.792
Retail sale of cultural and recreation goods in specialized stores	0.993	0.607	0.710	0.922	0.765	0.799
Retail sale of other goods in specialized stores	0.767	0.708	0.746	0.827	0.885	0.787
Retail sale via stalls and markets	0.993	0.391	0.909	0.940	0.765	0.800
Retail trade not in stores, stalls or markets	0.651	0.399	0.996	0.997	0.954	0.799
Transport via railways	0.996	0.836	0.621	0.590	0.948	0.798
Other land transport	0.874	0.515	0.849	0.960	0.696	0.779
Transport via pipeline	0.966	0.966	0.134	0.966	0.966	0.800
Sea and coastal water transport	0.983	0.854	0.759	0.505	0.897	0.800
Warehousing and storage	0.094	0.977	0.976	0.976	0.977	0.800
Support activities for transportation	0.874	0.369	0.997	0.915	0.838	0.799
Postal activities	0.996	0.666	0.606	0.860	0.865	0.799
Short term accommodation activities	0.987	0.857	0.476	0.978	0.697	0.799
Other accommodation	0.978	0.212	0.853	0.978	0.978	0.800

Restaurants and mobile food service activities	0.915	0.314	0.872	0.995	0.875	0.794
Event catering and other food service activities	0.993	0.620	0.655	0.993	0.735	0.799
Beverage serving activities	0.748	0.304	0.986	0.986	0.977	0.800
Publishing of books, periodicals and other publishing activities	0.989	0.859	0.226	0.986	0.939	0.800
Radio broadcasting	0.926	0.926	0.611	0.926	0.611	0.800
Wired telecommunications activities	0.998	0.956	0.694	0.706	0.631	0.797
Wireless telecommunications activities	0.950	0.575	0.950	0.950	0.575	0.800
Satellite telecommunications activities	0.912	0.912	0.912	0.353	0.912	0.800
Other telecommunications activities	0.991	0.991	0.991	0.037	0.991	0.800
Data processing, hosting and related activities; web portals	0.961	0.961	0.961	0.558	0.559	0.800
Other information service activities	0.983	0.983	0.525	0.983	0.526	0.800
Monetary intermediation	0.998	0.894	0.748	0.530	0.808	0.796
Other financial service activities, except insurance and pension funding activities	0.968	0.968	0.956	0.481	0.627	0.800
Insurance	0.996	0.978	0.568	0.598	0.849	0.798
Activities auxiliary to financial service activities, except insurance and pension funding	0.977	0.977	0.977	0.093	0.977	0.800
Activities auxiliary to insurance and pension funding	0.996	0.965	0.856	0.492	0.681	0.798
Real estate activities with own or leased property	0.983	0.750	0.983	0.531	0.750	0.800
Real estate activities on a fee or contract basis	0.959	0.166	0.959	0.958	0.959	0.800
Legal activities	0.995	0.958	0.960	0.297	0.784	0.799
Accounting, bookkeeping and auditing activities; tax consultancy	0.879	0.879	0.879	0.482	0.879	0.800
Architectural and engineering activities and related technical consultancy	0.946	0.946	0.946	0.216	0.946	0.800
Market research and public opinion polling	0.925	0.925	0.925	0.612	0.613	0.800
Photographic activities	0.987	0.652	0.606	0.987	0.767	0.800
Veterinary activities	0.993	0.443	0.920	0.756	0.884	0.799
Renting and leasing of motor vehicles	0.939	0.939	0.705	0.708	0.709	0.800
Renting and leasing of personal and household goods	0.897	0.763	0.448	0.993	0.897	0.799

Private security activities	0.991	0.669	0.444	0.950	0.944	0.800
Cleaning activities	0.989	0.989	0.513	0.992	0.514	0.800
Office administrative and support activities	0.883	0.570	0.924	0.849	0.773	0.800
Administration of the State and the economic and social policy of the community	0.970	0.816	0.734	0.595	0.814	0.786
Provision of services to the community as a whole	0.998	0.791	0.438	0.896	0.865	0.797
Compulsory social security activities	0.812	0.812	0.750	0.812	0.812	0.800
Primary education	0.987	0.814	0.757	0.497	0.849	0.781
Secondary education	0.999	0.878	0.837	0.348	0.885	0.789
Higher education	0.998	0.665	0.996	0.371	0.954	0.797
Other education	0.997	0.976	0.850	0.299	0.869	0.798
Educational support services	0.982	0.982	0.754	0.457	0.822	0.800
Hospital activities	0.996	0.777	0.770	0.844	0.604	0.798
Medical and dental practice activities	0.990	0.990	0.612	0.542	0.862	0.799
Other human health activities	0.998	0.756	0.891	0.870	0.476	0.798
Nursing care facilities	0.993	0.062	0.960	0.993	0.993	0.800
Other social work activities without accommodation n.e.c.	0.980	0.980	0.860	0.200	0.980	0.800
Creative, arts and entertainment activities	0.974	0.721	0.793	0.851	0.638	0.795
Other amusement and recreation activities	0.900	0.775	0.775	0.775	0.775	0.800
Activities of business, employers and professional membership organizations	0.811	0.811	0.811	0.754	0.811	0.800
Activities of other membership organizations	0.984	0.407	0.830	0.936	0.822	0.796
Repair of computers and communication equipment	0.971	0.857	0.487	0.971	0.714	0.800
Repair of personal and household goods	0.957	0.580	0.824	0.949	0.666	0.795
Other personal service activities	0.712	0.608	0.947	0.989	0.712	0.794
Activities of households as employers of domestic personnel	0.602	0.659	0.997	0.988	0.750	0.799
Total	0.934	0.724	0.783	0.739	0.807	0.797

6.2 Likely new entrants to the labour force by level of education and skills

In this section we have estimated the total workforce, unemployed (open), and the likely new entrants by their levels of education and skill (see Tables 20 A, B and C). The likely new entrants are calculated by multiplying education specific labour force participation rates (LFPR) with the number of students currently enrolled at different levels of education. The number of unemployed and the likely new entrants together constitute the future job aspirants. Hence, this number is useful from the skill training point of view for state governments.

In Andhra Pradesh, the total number of workers is about 41 million. About 1.5 million are openly unemployed during 2015-16, and about 2 million would be looking for a job (in the next five years). In other words, 3.5 mn over the next five years will need to be provided employment. Among these individuals: about 741 000 (325 000 unemployed and 416 000 new job seekers) would be illiterates, about 144 000 (32 000 unemployed and 112 000 new job seekers) would be with below primary level of education, about 273 000 (81 000 unemployed and 182 000 new job seekers) would be with primary education, about 330 000 (90 000 unemployed and 240 000 new job seekers) would be with middle school level of education, about 635 000 (187 000 unemployed and 448 000 new job seekers) would be with secondary education, about 606 000 (221 000 unemployed and 385 000 new job seekers) would be with higher secondary education, about 184 000 (111 400 unemployed and 71 500 new job seekers) would be general graduates, about 287 000 (194 000 unemployed and 93 000 new job seekers) would be general post graduates, about 121 000 (84 400 unemployed and 37 000 new job seekers) would be with below graduate technical education, about 128 000 (94 400 unemployed and 33 300 new job seekers) would be graduates with technical education, and about 45 000 (31 000 unemployed and 14 000 new job seekers) would be post graduates with technical education.

In Tamil Nadu, total number of workers is about 34 million. About 1.2 million are openly unemployed during 2015-16, and about 3.5 million would be looking for job (in next five years). Among these individuals: about 536 000 (125 500 unemployed and 410 000 new job seekers) would be illiterates, about 211 000 (51 400 unemployed and 159 000 new job seekers) would be with below primary education, about 573 000 (143 000 unemployed and 430 000 new job seekers) would be with primary level of education, about 607 000 (129 000 unemployed and 478 000 new job seekers) would be with middle school education, about 987 000 (196 000 unemployed and 792 000 new job seekers) would be with secondary education, about 821 000 (143 000 unemployed and 679 000 new job seekers) with higher secondary education, about 246 000 (108 000 unemployed and 138 000 new job seekers) would be general graduates, about 318 000 (137 000 unemployed and 181 000 new job seekers) would be general post graduates, about 251 000 (103 000 unemployed and 148 000 new job seekers) would be with below-graduate technical education, about 129 000 (59 000 unemployed and 70 000 new job seekers) would be graduates with technical education, and about 47 000 (18 000 unemployed and 29 000 new job seekers) would be post graduates with technical education.

In Odisha, total number of workers is about 17.2 million. About 0.6 million are openly unemployed during 2015-16, and 1.7 million would be looking for a job (in the next five years). A

mong these individuals: about 189 000 (47 000 unemployed and 142 000 new job seekers) would be illiterates, about 234 000 (79 000 unemployed and 156 000 new job seekers) would be with below primary education, about 347 000 (90 000 unemployed and 257 000 new job seekers) would be with primary level of education, about 477 000 (119 000 unemployed and 358 000 new job seekers) would be with middle school education, about 424 000 (80 000 unemployed and 344 000 new job seekers) would be with secondary education, about 315 000 (65 000 unemployed and 248 000 new job seekers) would be with higher secondary education, about 127 000 (47 000 unemployed and 80 000 new job seekers) would be general graduates, about 86 000 (43 000 unemployed and 43 000 new job seekers) would be general post graduates, about 98 000 (19.5 000 unemployed and 79 000 new job seekers) would be with below graduate-level technical education, about 7 000 (4.6 000 unemployed and 2.7 000 new job seekers) would be graduates with technical education, and about 3 000 would be with post graduate level technical education.

Table 20a: Estimating No. of Likely Job Aspirants in Andhra Pradesh, 2015-16

Level of Education	Actual Workforce(in, 000)			Open Unemployed (in, 000)			Likely New Entrants (in, 000)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Illiterate	5914.2	8867.5	14810.1	153.8	171.0	324.8	160.8	254.4	415.9
Below Primary	1608.7	1603.1	3212.0	16.7	15.0	31.7	64.8	47.5	111.7
Primary	2547.1	2684.3	5241.2	52.6	29.0	81.5	86.2	94.6	181.6
Middle	2685.2	2253.7	4941.0	55.5	34.7	90.2	109.6	127.7	240.4
Secondary	3808.7	2755.4	6564.2	127.9	58.9	186.7	268.2	180.7	448.5
Higher Secondary	2056.5	1331.9	3401.3	109.7	111.6	221.2	239.8	144.6	384.8
Graduate	872.4	278.1	1150.5	63.4	49.1	112.4	56.0	16.3	71.5
Graduate & above	940.4	441.9	1382.3	119.5	74.3	193.8	62.8	30.5	93.3
Below graduate_Tech	404.1	199.6	603.7	72.7	11.7	84.4	27.3	9.5	36.9
Graduate level_Tech	204.1	53.0	257.1	71.8	22.5	94.3	21.0	10.8	33.3
Post-graduate & above_tech	143.1	44.6	188.7	22.4	8.5	31.0	7.1	6.8	13.9
Total (million)	21.2	20.5	41.8	0.9	0.6	1.5	1.1	0.9	2.0

Source: Authors' Estimation based on Labour Bureau data, 2015-16

Table 20b: Estimating No. of Likely Job Aspirants in Tamil Nadu, 2015-16

Level of Education	Actual Workforce(in, 000)			Open Unemployed(in, 000)			Likely New Entrants (in, 000)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Illiterate	2062.6	4006.3	6076.8	41.8	83.7	125.5	131.6	277.6	410.0
Below Primary	1302.0	1503.6	2805.7	15.1	36.3	51.4	70.9	88.2	159.3
Primary	2464.4	2398.2	4864.3	95.3	47.5	142.8	194.3	235.7	430.6
Middle	2869.6	2667.5	5542.5	69.9	58.7	128.6	234.6	240.1	478.0
Secondary	3386.3	2446.6	5835.6	116.0	79.6	195.7	423.8	365.6	791.6
Higher Secondary	2007.6	1773.0	3780.6	69.4	73.4	142.8	356.9	321.8	678.6
Graduate	574.4	547.0	1121.4	54.5	54.0	108.6	65.8	72.3	137.7
Graduate & above	781.8	769.5	1551.2	77.1	60.2	137.2	86.2	93.9	180.6
Below graduate_Tech	977.3	316.4	1296.6	74.9	27.9	102.7	104.8	41.7	148.0
Graduate level_Tech	419.1	154.2	573.3	38.4	19.7	59.1	48.9	21.5	70.3
Post-graduate & above_tech	152.2	121.3	273.5	14.0	3.9	17.9	20.1	8.8	29.0
Total (million)	17.0	16.7	33.7	0.7	0.5	1.2	1.7	1.8	3.5

Source: Authors' Estimation based on Labour Bureau data, 2015-16

Table 20c: Estimating No. of Likely Job Aspirants in Odisha, 2015-16

Level of Education	Actual Workforce(in, 000)			Open Unemployed(in, 000)			Likely New Entrants (in, 000)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Illiterate	984.5	1841.6	2826.2	8.1	38.9	47.0	46.7	95.7	142.4
Below Primary	1009.9	1213.5	2223.4	24.1	54.8	78.8	66.1	89.2	155.6
Primary	1666.3	1652.7	3330.9	39.7	50.4	90.1	113.2	140.7	256.9
Middle	2223.5	1733.9	3962.8	67.0	51.6	118.6	176.7	181.0	358.1
Secondary	1312.3	958.3	2271.3	31.9	48.0	79.9	194.6	147.5	344.2
Higher Secondary	799.7	411.7	1213.9	32.6	32.5	65.1	177.6	73.2	249.7
Graduate	434.0	243.3	679.9	28.7	17.9	46.6	52.3	27.7	80.1
Graduate & above	195.1	69.9	265.0	29.1	13.7	42.8	32.1	10.5	42.7
Below graduate_Tech	266.7	121.8	388.4	15.5	4.1	19.5	39.7	39.5	78.8
Graduate level Tech	25.9	2.4	28.2	1.3	3.4	4.6	2.1	0.6	2.7
Post-graduate & above_tech	23.0	2.8	25.8	0.2	0.0	0.2	2.1	0.3	2.4
Total (million)	8.9	8.3	17.2	0.3	0.3	0.6	0.9	0.8	1.7

Source: Authors' Estimation based on Labour Bureau data, 2015-16

7. Summary of Findings

In this paper we have explored sectoral employment trends and identified the sectors that are likely to absorb the growing labour force in India and the three states of interest. We also identified skill gaps by sub sector within manufacturing, construction and services.

Labour market analysis: policy implications

While older members of the workforce are exiting the labour force, all *the increase in the LF is coming from young people leaving school and joining the LF*. In fact the older part of the LF should have declined by 30 million if the youthful part increased by 40 million since the overall increase is only 10 million workers over 2011-12 to 2015-16. In fact the increases in the overall size of the labour force in the 3 states is entirely explained by the rise in the young joining the labour force. The Industrial Corridor between Vizag and Chennai will need to play a major role in absorbing these young.

Given past employment trends (before 2011-12), it was expected that manufacturing, construction and service sectors would drive the growth of employment in India. This would have sustained the structural transformation that began since 2004-05. However, we found regressive trends, reflected in the young job aspirants with secondary and above level of education joining the agriculture sector in increasing numbers due to lack of jobs in non-agricultural sectors.

Most of those who leave agriculture tend to join construction work, as the latter requires low skilled labour; given that landless rural labour that is migrating in search of other means of livelihood has very little education, they tend to get absorbed in construction work. Such work had grown very sharply after 2004-5. While construction had seen a near doubling in its share in employment between 2004-5 and 2011-12, there is a decline in its share since then. However, construction employment will pick up as soon as the cycle of investment resumes. That means that skill development for the construction sector will remain a priority for a long time to come in all states, not just in VCIC states.

Furthermore, manufacturing employment is declining in absolute numbers since 2011-12. This is indeed a worrying fact.

All the *labour intensive* manufacturing sectors like food processing, tobacco, textiles, apparel, leather, wood and furniture have seen a decline at the all India level. The tobacco and textiles sub-sectors within manufacturing have seen a fall in their share of total manufacturing employment in India. The fall in the textiles' share requires policy attention, while the fall in tobacco is consistent with government policy to reduce tobacco consumption in the country.

There has been some absolute increase in employment across India in the relatively *capital intensive* sectors like chemicals, basic metals, electronics and electrical machinery, medical instruments and motor vehicles.

We have also identified potential job growth sectors for each state by rural and urban location

for each state under consideration (which could provide some guidance to policy-makers).

In Tamil Nadu a most important labour intensive sector is leather. While labour intensive manufacturing sectors have seen an absolute decline in manufacturing employment, the leather sector experienced some growth in employment. However it is disturbing that in Tamil Nadu, which is one of the relatively industrialized states of India, capital-intensive manufacturing has not shown employment growth.

The fact that labour intensive manufacturing like food processing, tobacco, textiles, apparel, leather, wood and furniture has registered falling absolute number of jobs is a very disturbing trend, since the number of young educated entrants into the labour force increased to 2.5 mn per annum over 2011-12 to 2015-16, from only 2 mn pa over 2004-5 to 2011-12. However, relatively capital-intensive sectors have shown increased number of workers. *If this trend is sustained, then these are the sectors will generate organized sector employment, and it is critical that vocational skill development is focused on these sectors if these capital-intensive sectors are not to turn to robotics and even greater capital-intensity, which will undermine job creation.* We have argued elsewhere (Mehrotra et al 2014) that if employers cant find enough workers with the right level of skills, then they simply turn to an easy way out by adopting improved technology rather than train people to prepare them for employment.

The only sector of the economy that has seen a significant increase in absorption of surplus labour especially of the young joining the labour force, is *services*, in which employment has jumped from 36 million in 2011-12 to nearly 52 million in 2015-16 for youth. While services employment across the board has increased it is clear that the traditional services (wholesale trade, retail trade) have been growing rather slowly as compared to the modern services. Modern services have shown the greatest dynamism over the entire period from 2004-5 to 2015-16. These modern service sub-sectors are sale/maintenance of motor vehicles, hotels and restaurants, air transport, posts and telecommunications, financial intermediation, insurance and pension funding, computers and related activities, and finally research and development. In addition public administration, education and health (though mainly in the private not public sector) have also seen a significant increase. Clearly, *these are again sectors that will need the attention of policy-makers to support skill development as these activities expand with the VC IC.*

Education and skill levels: policy implications

The rising share of those with higher levels of general academic education in agriculture could be a positive phenomenon for the future productivity of agriculture, but the problem is that those in agriculture with any technical education or vocational training is abysmally low. Also, the fact that there is a rising number (30 mn youth joined agriculture between 2011-12 and 2015-16) of youth, with reasonable levels of education, who are in agriculture suggests a retrogressive development, driven by the absence of non-agricultural jobs recently.

The share of those with Secondary and Higher secondary education among manufacturing sector workers has increased, while the share of workers with technical education did not

grow. In fact the number of workers with technical education working in manufacturing actually fell over that 10 year period from 5.3 million to under 5.0 million in India as a whole. But the fact that the rising share *in manufacturing of those with secondary/higher secondary education should enable more of them to be skilled at work, in-firm, in enterprise-based training*; less educated youth would have been more difficult to train for skilled or semi-skilled jobs.

We also examined open unemployment rates by level of education. These have a disturbingly growing trend between 2004-5 to 2011-12 and even further to 2015-16. In fact consistent with the fact that open unemployment rates increased sharply from 2.2% in 2011-12 to 3.4% in 2015-16 we also find that for each level of education, the open unemployment rate actually increased, quite sharply after 2011-12. In other words, *it is the educated that are finding it difficult to get jobs, just when a larger and larger number are getting educated*.

What is also clear from our skill gap analysis is that the level of skill gap is much higher in manufacturing than it is services. This is not surprising that most of those with education tend to join the services sectors, as that is where the jobs are more in absolute terms, and also growing faster (than both manufacturing and construction). But inevitably, there is a limit to the absorption capacity of services for educated youth; by definition, services are meant to provide services to productive sectors (i.e. agriculture, manufactured goods, hard infrastructure).

We also found that the qualitative skill gap is very high and severe across the sectors in AP, T N and Odisha. The SGI in service sectors is relatively lower than that of either manufacturing or non-manufacturing industry. Although *the SGI in the service sector is a bit lower, it needs to be addressed at the earliest so as to boost educated youth employment in modern services*. Furthermore the skill gap in manufacturing needs immediate policy measures as this is going to encourage capital intensity in manufacturing.

The numbers of those with Secondary and Higher Secondary Education entering manufacturing employment is rising at a very rapid rate. They may have no vocational education or training, but at least they have reasonable levels of education. They are much better prepared for vocational training than an earlier cohort of manufacturing sector workers. This is an both opportunity as well as a challenge for policy makers.

The share of the manufacturing workforce that has any *vocational training* on an average in India is only 7 percent or less. In fact what is clear is that regardless of whether a sector is labour intensive or capital intensive the share of those with vocational training is almost never above 10% of the total workforce in the sub sector. It is almost certain that a very large share of those with formally-acquired vocational training are likely to be found in organized manufacturing.

Meanwhile, the education level of those in the unorganized manufacturing remains a very serious challenge. Thus, in the country as a whole 16% of all manufacturing sector workers are illiterate and an additional 42% have a middle level of education. This is clearly a reflection of the fact that a very significant proportion of the total workforce is in micro enterprises or

the unorganised sector employing less than 10 workers. In fact, it is highly likely that these workers are mostly own account workers, or at best employed in the smallest segment of micro-enterprises (where 2-5 workers are engaged, including the employer himself).

The unemployment rate among educated youths is very high, and it is increasing over the years between 2004-5 and 2015-6. *In AP and TN and at all India level, it is mainly due to falling employment elasticities and rising capital intensity in manufacturing sector.* This rising capital intensity might be due to rising skill gaps i.e. the gap between actual skill level of job seekers and the skill demand of employers. However, in the case of Odisha the unemployment rate among these categories of youth is declining. This might be happening partly because of large scale out-migration in recent years from relatively poorer Odisha to other states where employment opportunities are greater.

At all India level, manufacturing sector *skill gap index (SGI)* increased from 0.858 to 0.872 during 2004-05 and 2015-16. This high and rising skill gap might be one reason for the slowing down and then declining manufacturing employment in India since 2004-05. Hence, addressing this problem should be the top most priority of the government.

Skill gaps are lower in services generally than in manufacturing. The value of the skill gap index in services as a whole increased from 0.491 to 0.527 during 2004-05 and 2015-16. The state-wise comparison reveals that SGI is relatively higher in Andhra Pradesh and Tamil Nadu as compared to Odisha. Though this services sector SGI is moderate and relatively lower as compared to manufacturing sector, it needs to be addressed at the earliest. Unless this gap is addressed through timely measures it is likely to influence productivity growth of service sectors and hence employment growth would not sustain over the long run in this sector. We also identified skill gaps by sub-sector, within manufacturing and services. We also identified the number of likely entrants to the labour force in the near future by their level of education/skills, so that state governments can plan for skill development measures for the different cohorts.

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