A Labour Market and Skills Analysis for India:

Labour Force and Skills Required Projections to 2019-20

Santosh Mehrotra, Prof of Econ, Jawaharlal Nehru University, New Delhi

In India since 2004-05 structural shifts in employment, significant increase in rural wages, increase in per capita consumption expenditure and therefore a sharp decline in absolute numbers of the poor as demonstrated by the National Sample Surveys of 2009-10 and 2011-12 have initiated an underlying process that has promoted inclusive growth. Post 2004-05, when a revised (Tendulkar) poverty line raised the absolute and relative poverty estimates, the absolute number of poor fell from 407 million in 2004-05 to 356 million in 2009-10[1] and further to 269 million in 2011 (a total fall of 138 million)[2]. What is of concern is that there is a diverging trend between the structure of output and the structure of employment in the last decade, particularly when GDP growth rate has increased significantly. This paper attempts to explain this and other trends in employment in the Indian economy over the past two decades, all the way upto 2015-16 (which is the only analysis of the labour market up until this date that is publicly available so far in the literature).[3]

This analysis will be supplemented by an examination of skill gaps in the Indian economy.

The paper is organized as follows. Section 1 discusses employment trends since 1993-4 over the next two decades. The reason for this choice of period is that the 1990s saw a significant increase in GDP growth rate in India[4], in addition to very significant reforms. India had been a overly regulated and relatively closed economy till 1990. India entered a new phase of development with major economic reforms liberalizing the domestic economy and opening up the economy to the trade and investment in unprecedented manner in 1991. India's GDP growth rate increased to 8% pa over 2003-4 and 2013-14, despite a global economic crisis.

Section 2 turns to an explanation of the underlying economic and social forces that were driving these employment trends discussed in the previous section.

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[1]The fall between 2004-5 and 2009-10 seems misleadingly low because 2009-10 was a drought year, and hence, despite rapid agricultural and overall GDP growth, incomes/consumption expenditure could not have increased much. Meanwhile, by 2011-12 agricultural and GDP growth had bounced back up.

[2] The incidence of poverty in this period declined from 37.2 percent in 2004-05 to 21.9 percent in 2011-12.

[3] The analysis upto 2015-16 is made possible by our analysis of unit level household data published by the Labour Bureau of the Government of India, which has a sample size the same as the National Sample Survey. The NSS labour force survey (called the Employment-Unemployment Round) has been conducting only once in five years.

[4] India's GDP growth rate had been only 3.5% pa between 1950 and 1980, which had increased till 5.4% pa over the 1980s. After that it has been consistently higher.

Section 3 examines the skills situation, the overall skill gaps in the economy as a whole and the TVET ecosystem in India. Section 4 makes more detailed labour market projections and skill gap analysis upto the financial year 2019-20.

1. Employment trends

The labour force increased from 381 in 1993-94 to 485 million in 2011-12, according to principal and subsidiary status taken together or on an average by 5.5 million per annum.[5] However, the labour force increased by 61 million between 2000 and 2005 and this led everyone to believe that every year 12 million people will join the labour force in the future as well (which has not been the case at all). Between 2005 and 2012, merely 2 million people joined the labour force per annum. The slowdown in the pace of growth of labour force is attributed to changes in the demographic profile of the young population, raising enrolments in elementary and secondary schooling due to the efforts of Sarva Shiksha Abhiyan (or the Programme to Universalize Elementary education till class 8)) and Right to Education (to class 8) (on which see Mehrotra et al, 2005; Mehrotra, 2006), declining child labour, mechanization in agriculture, withdrawal of women and their increasing participation in household activities.

Structural shift in employment beginning 2004-5

Total employment increased by 25.5 million between 1993-4 and 1999-2000, of which 5.1 million was in agriculture. Over the five-year period 2000 to 2005, there was an addition of 22 million in agriculture – clearly a retrograde development, especially at a time when agricultural output was growing slowly. In other words, there was no structural shift taking place (which involves workers moving out of agriculture) until 2004-5, underlining low productivity in agriculture as a whole, and in the economy.

However, post 2005, structural change in employment has been significant. for the first time in India's post-independence economic history - in the five year period, 2005 to 2010 as many as 23.7 million of India's agricultural workforce abandoned agriculture, or nearly 10 per cent of the total workforce in agriculture (see Table 1). In fact, non-agricultural employment grew by 25 million, which is how total employment grew only by 1.1 million. Since 2010, non-agricultural employment increased sharply – a 27 million increase in absolute terms, while at the same time the numbers in agriculture fell by 13 million in a matter of two years. This is a historically unprecedented development in India's economic history.

This structural shift, well evident from the employment elasticity (Mehrotra et al, 2014) of output by major economic sectors, is precisely the kind of progressive structural change in employment that should accompany a structural change in output between the primary, secondary and tertiary sectors in any developing economy. However, in the preceding decade, the opposite had been occurring between 1993-4 and 2004-5.

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[5] Principal status of employment is defined (by the NSS) as those who are working for more than 182 days in the last 365 days (the 365 days, which is the reference period of labour force survey); subsidiary status of employment is defined as those working >30 but <182 days in the last 365 days. The labour force consists of those who belong both the principal as well as subsidiary status of employment.

Non-agricultural jobs grew by 7.5 million per annum on average both during 1999-2000 to 2004-05, but this growth in employment was not rapid enough to absorb the 12 million that were joining the labour force per annum over that period. Between 2004-05 and 2011-12 too the number of non-agricultural jobs grew by 7.5 million per annum. But this time the youth joining the labour force was only 2 mn pa. One implication of this was that the labour market tightened, and as a result real wages rose since 2004-5 all the way to 2011-12.

Sub-Sectors driving employment trends

The shift in the employment structure in the economy away from agriculture (which has hastened within the last decade) is very significant with sharp changes within sub-sectors. Increase in non-agricultural employment is due to the expansion of labour intensive subsectors (see Table 2). Employment in *construction* increased by 8.5 million between 1999-2000 and 2004-05, but by over twice as much in the next five years (18.5 million); it increased by a further 6 million in two years (2009-10 to 2011-12). Thus while total employment in construction stood at 26 million in 2004-5, it had actually doubled to 52 million by 2011-12. It has been a factor pulling workers away from agriculture in large numbers.

Within the *manufacturing* sector, wearing apparel, textiles, furniture, non-metallic mineral products and wood products, mostly the labour-intensive sub-sectors are the ones that really account for the fluctuations in employment in this sector. However, the share of output in these sectors in total manufacturing value-added has been stagnant. This implies that it is the low-productivity small scale enterprises that are driving employment in these sectors. Small scale enterprises produce low-end products which are consumed by the lower income quintiles of the population. There is a remarkable change in the consumption basket with increasing share in clothing and bedding, footwear and miscellaneous (which includes education and medical care) among the 4 bottom fractiles in a total of 12 commodities[6].

Every sub-sector within *services* has seen an increase in employment over the period 1999-2000 to 2011-12 (except public administration and defence). Employment increased in education, health, real estate, and business and telecommunications. Teledensity, which is an important indicator of telecom penetration, increased from 18.2 per cent in March 2007 to 73.3 per cent as on 31 December 2012, with urban teledensity at 149.5 per cent and rural at 39.9 per cent (Ministry of Finance, 2012-13), and hence has been an important source of job growth; this will only increase as India goes forward.

Gender and the labour market

India, like other South Asian countries[7], has low female labour force participation rate (LFPR), which is clearly one indicator of the low level of autonomy enjoyed by women in society at large, and their capability deprivation (Nussbaum, 2000) However, in the first part of the decade (the 2000s), employment of women rose significantly – 14 million on account

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[6]For the 4 bottom fractiles, share of clothing increased from 17% in 2004-05 to 26% in 2011-12; footwear increased from 18% to 30%, medical expenditure increased from 27 to 33% in the above mentioned period in rural areas. In urban India too, share of clothing, footwear, medical expenditures have increased during this period.

[7]The female LFPR is below 40 per cent in all countries in the region except in the Maldives and Nepal.

of principal status and 10 million on subsidiary status. In fact, the 22 million rise in agricultural employment during this period comprised of 14 million rural women. However, this increase in employment in agriculture cannot be seen as a progressive development, either for the autonomy of women nor from the perspective of structural change in employment in the economy as a whole. Working on the family farm for women is part of their double burden, and cannot be perceived as a source of either independent income or working outside the home, which are the real sources of empowerment for women.

In complete contrast to the first half of the decade, during 2005-2010 there was an absolute withdrawal of around 21 million women workers (19.8 million from rural areas), thus contributing significantly to the decline in the agricultural and the aggregate work force in the period 2005-2010. The fall in women workers in rural India continued even during 2010 to 2012[8]. Various factors have contributed to this decline. From the demand side, there was shrinkage in labour demand mainly due to increasing rural wages, and growing mechanisation in agriculture (Himanshu, 2011; Thomas, 2012; and World Bank, 2012). In addition, in urban areas there was growing capital intensity in the manufacturing sector. On the supply side, factors like attending educational institutions (Kannan and Raveendran, 2012; and Rangarajan et al., 2011; and Thomas, 2012) and increasing household incomes are factors contributing to this decline.

Quality of employment

Fifty three per cent of all workers in India are *self-employed*, while the remainder are wage employees (spread between casual and regular workers). The majority of self-employed are in agriculture or in traditional services provided on an own-account basis (petty street vendors, domestic servants, etc).

The majority of *casual* workers, who have no regular employment tend to be either landless labour in rural areas, or casual construction workers in urban/rural areas. The decline in agricultural employment in the latter half of the decade came from growing non-agricultural work. The presence of alternative employment opportunities in construction at relatively higher wages induced a move out of agriculture, which shows itself in an increase in casual labour in non-manufacturing. The rise in construction employment is reflected, partly, in the boom in rural male casual workers - 16 million new jobs for them.

Around 10 million new workers found *regular* salaried employment in the non-agricultural sector during 2000 and 2005, or about 2 million per annum. Another 7 million obtained regular jobs during 2005-10 and then another 12.8 million more regular salaried jobs were created during 2010 and 2012; or nearly 3 million per annum between 2004-5 to 2011-12. This rise in regular work is a reflection of the very rapid GDP growth that occurred between 2003-4 and 2011-12 of 8.4 per cent per annum. The fact that organized sector (defined as those enterprises that employ more than 10 workers) employment has been rising throughout the

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[8]The decline was among women who considered such rural employment as their principal work (while women's engagement in subsidiary status employment rose i.e. on a part-time basis, or fewer number of days i.e. less than 180 days though more than 30 days in the year). Between 2005-10 women's engagement in agricultural activity even as subsidiary work had fallen, but such work rose between 2009-10 and 2011-12.

period of rapid economic growth is similarly reflected in the continuous increase in regular work.

Jobs in organized or unorganized segment enterprises?

The key driver of the increase in employment during 2000 to 2005 had been the unorganized sector enterprises (as per NCEUS definition[9]). Of the 60 million new jobs generated during that period, 52 million were created in the unorganized segment of enterprises (Mehrotra et al 2014). Agriculture (in which employment grew by 20 million) accounted for nearly 40 per cent of this increase, which, as we noted earlier, was a retrogressive development from a perspective of the structural transformation of the economy.

Since 2000, organized manufacturing employment has consistently increased, albeit slowly, all the way upto 2011-12. Similarly, employment in unorganized services and non-manufacturing industry (most of which is in construction) consistently and monotonically rose since 2000. It is only manufacturing employment that has shown fluctuations, and all the fluctuation in manufacturing employment since 2000 is accounted for by the unorganized segment of manufacturing (not organized segment). When manufacturing employment rose most of the rise was in the unorganized segment, and when it fell it was again in the unorganized segment.

There is an important improvement that has occurred even in the construction sector. Given the increase in infrastructure (airports, national highways) investment by the public as well as private sector, there has been a sharp rise in organized segment employment in the construction sector of non-manufacturing industry. In fact, in 2011-12, nearly 40 per cent of total construction employment was in the organized segment.

Employment generated: Formal or informal?

Though there had been increase in employment opportunities in the organized sector, it is mainly for informal[10] workers. Their share rose from 32 per cent in 1999-2000 to 54 per cent in 2004-05 to 67 per cent in 2011-12(Table 4). This is worrying as workers in the unorganized sector and informal workers in the organized sector are more vulnerable with more risk of retrenchment in case of the slightest economic shock. At the same time, labour laws will need to be re-examined by state governments if this trend towards informal employment is to be stemmed.

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[9]"The informal sector consists of all unincorporated private enterprises owned by individuals or households engaged in the sale and production of goods and services operated on a proprietary or partnership basis and with less than ten total workers"

[10]As per National Commission for Enterprises in the Unorganized Sector (NCEUS) definition, "Informal workers consist of those working in the informal sector or households, excluding regular workers with social security benefits provided by the employers and the workers in the formal sector without any employment and social security benefits provided by the employers". This definition is consistent with that of ILO.

Size class of enterprises by number of workers: the nearly missing middle

The distribution of workers by the size class of enterprises shows that it is highly skewed towards micro and small enterprises (enterprises with employment size less than 10 workers). Post 2010, out of the total 27.1 million increase in non-agricultural employment, 24 million had been in the micro and small enterprises (MSE). Further, micro enterprise (employing less than 6 workers) alone had contributed a huge (17 million) chunk of this increase in employment. About 70 per cent (almost constant since 2004-05) of the total non-agriculture workers are employed by the MSE, of which about 58 percentage are employed by micro enterprises in 2011-12.

There is, however, a miniscule "middle" (enterprises that employed 10 and more but less than 20 workers), which could be possibly called 'medium' sized) - if such enterprises can be called that - whose share is increasing but at a very slow pace (from 6.4 to 7.8 per cent during 2005 to 1012). In absolute terms, there had been an increase in employment by 2 million during 2005-10 and 4.7 million during 2010-12 in these 'medium' size enterprises. The share of employment in the enterprises that employed more than 20 workers, however, increased from 15.4 per cent to 17.1 percent (8.5 million) during 2010-12.

Workers are moving out of low-productivity agriculture. To reap the benefits of this structural shift it is essential that this 'missing middle' is begun to be filled. Further, the productivity (and wage) gap between the two extreme size groups is much larger in India than in other Asian economies. This kind of bi-modal distribution increases wage inequality which can then impede the growth of skilled labour, entrepreneurship, and allocative efficiency which in turn can affect growth.

2. Towards an Understanding of Employment trends since 1993-94

In this section we examine the reasons – the demographic, economic and social forces – underlying the trends discussed in the previous section of the paper.

Demographic Reasons

While the workforce increased by nearly 25 million between 1993-4 and 1999-2000 (a six year period), it increased by 60 million in the five years between 1999-2000 and 2004-5. Since the workforce (i.e. those who obtain jobs) tracks the labour force (i.e. those who are looking for work), understanding demographic trends (i.e. how many people are turning 15, the minimum age of work) is critical to understanding labour (and work) force trends.

The fact is that fewer people joined the labour force in the second half of the decade of the 2000s compared to the first half. The reason for this is that the population[11] of age 11 to 15 years had increased enormously (16.6 million) from 94.7 million in 1993-94 to 111.3 million in 1999-2000 with a 3.5 percent rate of annual exponential growth. However, the population of this age group had grown only about 7.4 million (0.73 percent per annum) to

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[11] These population figures are estimated using NSS unit data and adjusted to census population.

reach 118.7 million in 2004-05, who then started joining the labour force; thus decelerating the increase in the labour force. Since 2004-5 the workforce in the age cohort below 15 and between 15 and 24 is decreasing consistently. It is obvious from Panel A of Table 6 that the workforce (tracking the labour force) was increasing, especially between 1999-2000 and 2004-5, but fell sharply after 2004-5.

In addition, fewer people were available to join the workforce due to rising enrolments in school and continuing into education. That is, while in 2004-05, 208 million children in the relevant age group (less than 15 years) were attending educational institutions and therefore were not part of labour force, the number rose to 238 million in 2011-12; for the youth (15 to 24 years) it increased from 60 million in 2004-05 to 97 million in 2011-12. This is true for both girls as well as boys. The increase was slow prior to 2004-5, but accelerated very sharply thereafter.

Women joining and then withdrawing from the labour force: a major contributor to employment trends

A second reason for the employment trend of falling entrants to the labour force post-2005 (as noted above) was rising school enrolment. During 2000 and 2005 (Gill and Singh, 2006; Jeromi, 2007; and Shroff and Mitra, 2007), low agricultural productivity and lack of alternate employment opportunities in rural areas led to a large number of women joining agriculture as reserve family labour. We have also argued elsewhere that most of the so-called increase in employment in agriculture during this period (of 20 million) was due to women; but shockingly, 1.65 million of that increase was by over-60 year old women. This lead to an increase of four percentage points in the LFPR of such women (but this increase lasted only just during the first half of the last decade, bucking a long term trend of the female LFPR falling for three decades in India).

Between 2005 and 2012 there was a sharp decline in female employment, particularly for rural females, returning to the long-term trend. There are important reasons for the decline in female labour force participation rates between 2005 and 2012.

First is education (as noted earlier). There had been a significant increase in enrolment, higher for girls both in the age-group below 15 years, as well as 15-19 years. There was a similar increase for 20 to 24 year youth: from 14.9 per cent for boys and 7.6 per cent for girls in 2004-05 to 22.5 and 12.8 per cent in 2009-10 (Planning Commission, 2012).

Second, the incidence of child labour fell consistently, with the number of child workers (those between the compulsory school going ages of 6 and 14) declining from 13.3 million in 1993-94 to 3.7 million in 2011-12.

Third, growth in mechanisation of agriculture as reflected in increased gross private sector capital formation in recent years probably caused a decline in female employment. Himanshu (2011) also noted that mechanisation in agriculture particularly in states such as UP, Bihar, Jharkhand, Chhattisgarh, Karnataka, Andhra Pradesh and West Bengal led to a fall in female employment.

A fourth reason for the decline in female LFPR was that, with older girls going to school (they were earlier responsible for the care of younger siblings) and increased male out-migration from rural areas, adult women face a serious time constraint forcing them to withdraw from the workforce.

Fifth, elderly women (over 60-year olds), who were joining the labour force in the first half of the decade, did not leave the labour force, but their numbers did not continue to swell. If anything, their LFPR fell, presumably as a result of household incomes rising from other sources, as well as the open market wage rates rising in both rural and urban areas.

A final reason for a continuation in the fall of female LFPR is a decline in household level dairying, which is normally work performed by women. With the fall in common property resources, women in households of small and marginal farmers, who earlier undertook dairying, are now less able to do so (which affects subsidiary status employment) (Mehrotra and Sinha, 2017).[12]

A Lewisian structural change is occurring

We noted earlier that 36 million fewer persons are engaged in agriculture in 2011-12 compared to the number in 2004-5 – a first in the economic history of India. A set of push and pull factors caused this Lewisian (Lewis, 1954) structural change. During the second half of the decade there had been a remarkable and historic shift in rural wages, partly due to the spillover effect of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA, the rural public employment programme guaranteeing 100 days of work to any household demanding work), on the one hand, and shortage of labour partly due to higher participation in education (Thomas, 2012), that forced the farmers to start using machines[13]. In addition, rising demand for labour in the construction sector, both in rural and urban areas, with relatively higher wages also partly explains the absolute fall in agricultural employment post-2005.

As wages rose there has been a steep reduction in poverty rate in India, more remarkable in rural areas, resulting in a new surge in consumption. The percentage of rural persons below the (Tendulkar) poverty line as estimated by the Planning Commission had fallen to 25.7% in 2011-12 as against 41.8% in 2004-05. As per National Sample Survey[14] the share of food expenditure (in both rural and urban areas) is declining, whereas the share of non-food expenditure is increasing at a much faster rate recently. In rural areas, as total consumption expenditure was growing in real terms, the share of expenditure on processed foods and beverages increased from 4.5% to 5.8%, on clothing and bedding increased from 4.5% to 6.3%, on durable goods increased from 3.4% to 6.1% and on footwear also increased form 0.8% to 1.3% during 2005-2012.

In the period of high economic growth, salaries in urban India increased steadily, because of the sixth Pay Commission (that improved salaries for public sector employees),

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[12]The total number of dairy cattle was rising in India, but fewer small/marginal farmers could keep cattle (except for home consumption of dairy products).

[13]Wages also rose because the Government of India raised the minimum support prices of cereals (rice and wheat) purchased by the Food Corporation of India from farmers.

[14] See *NSS KI(68/1.0): Key Indicators of Household Consumer Expenditure in India (Page no. 20)*

which also had a knock-on effect on private sector wages, particularly in the upper quintile of the wage distribution. This is reflected in the high rise in wages among professionals, personnel in administration and also among plant and machine operators (see Table). In urban areas, as total consumption expenditure increased, within it the share of expenditure on processed foods and beverages increased from 6.2% to 7.1%, on clothing and bedding increased form 4% to 5.3%, on durable goods increased from 4.1% to 6.3% and on footwear also increased from 0.7% to 1.2% during 2005-2012.

Slow increase in manufacturing employment: an outcome of falling exports, rising import-intensity and wage increases

Employment in manufacturing made a significant recovery between 2010 and 2012 to reach 59.8 million with an increase of 9 million in two years. However, the point remains that manufacturing employment remains an issue. Manufacturing employment had increased by 11 million or 25 per cent between 1999-2000 and 2004-5 (from 44 to 55 million), but fell by 3 million to 52 million in the latter half of the decade.

However, there are two other structural trends in place that explain falling employment in manufacturing in the second half of the 2005: rising import-intensity and increasing wages.

Rising import-intensity of manufacturing.

One of the structural trends visible in the manufacturing sector is the rising import ratio in output. The manufacturing sector is intrinsically integrated into the global economy with an average trade ratio for the period 2008/9 to 2010/11 of 180 percent;. a rise from 92 percent in 1994/95. The integration is, however, asymmetric with import penetration almost doubling whereas exports increased by only 20 percent (Mohanty, 2013).

Rising wages and other costs (rising real estate prices, taxes and tariffs, electricity)inflated the cost of our domestic manufacturers. This often encourages manufacturers to import final goods from China and other neighbouring countries as costs of production at home turned higher than imported final goods. Many countries in the world have witnessed a rising share of China in their import basket[15].

However, there is a structural dimension to the rising capital-intensity of manufacturing, which is a global phenomenon. Rising capital and skill intensity of manufacturing, as Rodrik (2012) argues, has limited the capacity of the manufacturing sector to absorb labour. According to him, it will not be possible for the next generation of industrializing countries to move 25 per cent or more of their workforce into manufacturing, as was accomplished by the East Asian economies.

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[15]China ranked one in merchandize exports to the world with a market share of over 10 per cent in 2010 compared to a share of less than 2 per cent in 1998 (Husted and Nishioka 2012).

Rising wages have raised capital intensity of manufacturing:

Wages have risen over 1994 to 2012 in real terms, analysis of National Sample Survey tells us. The increase of wages (the reasons for which were discussed earlier) in the lower quintiles has two effects in the labour market: a price and a volume effect. The price of labour was ratcheted up in the open market in rural areas leading to increase in the labour cost of production in manufacturing sector. The landless labour that would otherwise migrate to richer rural areas (e.g. Punjab, Haryana, Tamil Nadu) or to urban areas were encouraged to stay and work locally. This results in shrinkage in the volume of the unskilled labour available for the manufacturing sector. This combination of the price and quantity (of labour) effect in the labour market also combined to raise the capital intensity in manufacturing sector (in addition to the rising import intensity of manufacturing).

While this was the situation for workers at the lower end of the wage and skill distribution, a similar development was occurring at the higher end of the salary/skill distribution. Between 2003-4 and 2010-11 GDP grew by 8.4 percent per annum. Since it was both industrial (manufacturing and non-manufacturing) and services growth that was driving the GDP, skill shortages emerged at the higher end of the salary/skill distribution increasing salaries of the skilled and highly skilled.

These two sets of forces that were driving wages for the unskilled as well as salaries for the skilled/highly skilled were also driving greater capital-intensity in goods and services production.

3. Skills shortages: how serious?

India is one of the fastest growing large economies of the world, having exceeded the growth rate in China two years ago. During India's 10th Plan period (2002-2007) GDP growth rate was 7.7 per cent annum which went up slightly during the 11th Plan period (2007-2012) to 7.9 per cent per annum (Planning Commission, 2013). It was inevitable for a fast growing economy to experience skill shortages, especially among semi-skilled and highly-skilled workers.

India's neglect of elementary education in the first four decades after independence (i.e. between 1950 and 1990) had led to millions joining the labour force without even completing elementary education. As a result in 2009-10 the share of the labour force (in the age group of 15-59) that was not even literate was 29.1 per cent, or 125.7 million of the 431.2 million labour force. In addition, another 23.7 per cent of the labour force had either primary or below primary level of education (102.4 million).

A further 17.6 per cent of the labour force (or 76.1 million) had only acquired a middle level of education (i.e. upto class 8). In other words, 70 per cent of the labour force in India, as recently as 2009-10 had less than secondary education. In addition, the vocational education system in the higher secondary level had remained stunted, with only 3 per cent of those who were in higher secondary education (11th and 12th) in the vocational education stream, as compared to 43 per cent of youth at the secondary level of education in China who were in the vocational education stream.

It is not surprising, therefore, that only 2 per cent of India's workforce had acquired any form of formal vocational training, and an additional 8 per cent of the workforce had acquired vocational training informally on the job. In other words, only10 per cent of the workforce and 20 percent of the non-agricultural workforce had acquired vocational training of any sort, formal or informal kind. However, it is noticeable that about 40% of the industrial workforce did have some form of vocational training (acquired either formally or informally).

The Government of India's National Skill Policy (2009) was working with an estimate of those requiring skill development of a very large number: 500 million. Given that the entire workforce in 2015 is about 500 mn, the estimate that almost all the labour force needs to be 'skilled' seems exaggerated. This 500 million number (arrived at the suggestion of an Indian American scholar, the late Professor C.K. Prahlad, a management guru who was teaching at the University of Austin, Texas, until his passing away in 2011) is a gross over estimate, since it is highly unlikely the size of the labour force in 2022 will exceed 570 million. It is illogical to suggest that 500 of the 570 million would need, or could feasibly be provided, general and vocational education and training. Moreover, the 500 million number seems to assume that all those farmers in agriculture would need training, or they move out of agriculture to non-agricultural occupations (which is highly unlikely given the rate of absorption of workers in

industry and services). In any case, there is no definition of 'skills' that underlies the 500 mn. number.

If 500 mn were indeed to be 'skilled' over 2012-2022, then that works out to an average of 50 mn per annum. What is unfortunate is that Indian planners were working with this 500 mn to be skilled target, with particular government institutions charged with the responsibility of achieving it. Thus, we shall show below how the five pillars of the Indian TVET system were charged with specific annual targets to be achieved.

However, before I proceed to analyse what the issues are with achieving this challenging target, we should note that (when a new federal government came to power in 2014), a new revised National Skills Policy came into existence (in July 2015). This new Policy revised the target downwards to 400 mn to be skilled by 2022. Clearly this was not a major change from the target of 500 mn. At the same time, there was little change in the approach to the TVET system, which was in need of radical reform.

The challenges facing the TVET system – a constraint upon achieving large quantitative expansion accompanied by quality improvement

This section discusses the challenges within the five pillars of India's TVET system. Meeting these challenges is necessary if the fast growing India, which became a middle income country in 2007, is to harness its demographic dividend. A demographic dividend is defined as a rise in the share of the working age population in the total population, with a corresponding fall in the share of the dependent population (under 15 and over 60 year olds). India is currently at the midpoint of the demographic dividend which began in the early 1980s. A rise of the share of the working age population joining the labour force every year will continue until the end of the third decade of the current century. In other words, there is perhaps no more than another quarter century to the end of the demographic dividend in India, after which India will become an aging society. Therefore, India needs to harness its demographic divided, and in order to do so it must provide productive jobs to the youthful working population (half of India's population is below age 25), and in order for them to be employed gainfully they will have to be both better education (gain improved cognitive and non-cognitive skills) as well as acquire vocational skills to be employable.

However, India's TVET system is extremely narrowly based, which is the fundamental reason for barely 2 per cent of the total workforce having formally acquired TVET skills[16]. It essentially consists of the following four segments, the first three of which relate to pre-employment TVET and the last is undertaken in-house after employment. First, vocational education has historically (since 1986) been offered only at the higher secondary level (classes 11 and 12). In other words, in the school system, the only possibility for a young person to acquire any vocational skills till recently was when the youth had achieved the age of 16, and enters the higher secondary level. Thus, unlike in China where children can opt for either the

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[16] For a more detailed critique of the Indian TVET system, see Mehrotra (2014).

general academic or the vocational scheme after completing 9 years of compulsory academic education, in India children did not have any opportunity to acquire vocational education until they have completed at least secondary schooling (classes 9 and 10) at general academic level. Not surprising that only 3 per cent of all youth of the relevant age group were in the vocational education stream (Planning Commission, 2008).

This situation changed only from the academic year 2014-15 onwards, thanks to the federal government's notification of a National Skills Qualification Framework, which required that vocational education could begin at secondary level, i.e. classes 9-10. The number of government secondary schools offering vocational education has, as a result, been increasing rapidly over the last two years. These courses are usually meant to train youth to join the services sector. Training for industrial occupations, meanwhile, have been offered since the 1950s at the Industrial Training Institutes (ITIs).

The second pillar of the TVET system are the ITIs. The Ministry of Labour ran the industrial training institutes (ITIs) (nearly 2300 in 2015) in the public sector (this responsibility was transferred to the newly created Ministry of Skill Development and Entrepreneurship as of 2015). In addition, there are about 11000 private ITIs that are supposedly regulated by the Ministry. Children who have completed 8 years of education can enter in some vocational training courses in these ITIs, but most courses require at least 10 years of general education.

Third, since 2010 when the National Skill Development Corporation (NSDC) was created private providers have emerged across the country, which are financed by the NSDC.[17] The NSDC-supported private vocational training providers (VTP) are not only registered but have to, when they receive government funding through NSDC in the form of equity and loans, promise that they will ensure 70 per cent of their trainees will get placement. The problem is that most of the training provision is of a short-term nature, and rarely lasts longer than four months. This is far too short a time period to vocationally train youth fresh out of school, who have no prior work experience.

A fourth pillar of India's TVET system consists of 16 other federal ministries (e.g., the Ministry of Rural Development, the Ministry of Micro, Small and Medium Enterprises, the Ministry of Textiles, etc). The problem is that, like the NSDC-funded private VTPs, these other ministries also provide mainly short-term training.

The final pillar of skill development is in-firm, provided by medium and large enterprises in-house. This is confined to only 16% of registered Indian enterprises in 2009. That share had risen to 36% in 2014 (according to World Bank surveys of enterprises). This training could be in one of the following three forms. First, the Ministry of Labour has been promoting the engagement of apprentices by organized sector enterprises under the

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[17] NSDC is a private-public partnership (with 51 per cent equity provided by the private Chambers of Commerce and Industry, and 49 per cent of equity by the Government of India). This PPP is only in name, given that 75% of the funding for incubating private training providers comes from the government; the remaining 25% is invested by the private entrepreneur.

Apprenticeship Act 1962. This is intended mostly for those graduating from the ITIs, private or public. However, an ITI certificate is not a necessary pre-requisite for becoming an apprentice under the federal government scheme, the Apprenticeship Training Scheme (ATS). The second form that the apprenticeship takes is intended for those who have at least a post-higher secondary diploma or certificate, or degree in one of the many engineering disciplines from polytechnics or engineering degree colleges, supervised and regulated by the Ministry of Human Resource Development of the Government of India. In other words, while the Ministry of Skill Development promotes apprenticeships for 16 to 18 year olds who have graduated from their ITIs, the Ministry of Human Resource and Development promotes apprenticeships for a slightly older age cohort which has received a higher level of skill training than the ITI graduates. The third form of in-firm training is offered usually by private companies, which have nothing to do with either the apprenticeship scheme of Ministry of Skill Development or of Ministry of Human Resource Development.

Our analysis of the World Bank's World Development Indicators suggests that of all Indian firms only large ones actually provide any form of training, and the 36% share is much lower than that for most other emerging economies, especially in East and South east Asia (see Mehrotra, Indian Journal of Labour Economics).

This outline of the TVET system in India shows it is rather narrowly based, as it manages to provide VET only to about 5 million persons a year. Whether we believe thate 50mn per annum (or total of 500 mn over 10 years) requirement of National Skills Policy 2009, or the 40 mn pa (or total of 400 mn over 10 years) requirement of National Skills Policy 2015, the TVET must be reformed and expanded. Our own estimates of skill gap, based on the main nationally representative labour force surveys conducted by the National Sample Survey organization, are quite different.

Our estimates at a national level

This is the context which led Mehrotra et al 2014 to estimate that between 2012 and 2022, India will need an additional almost 300 million that will need to be skilled (see table below). Of this number some 100 million youths will need to receive *general academic education* at least up to the secondary level (i.e. complete class 10). In addition, those who have *acquired training informally* on the job will need to receive some formal vocational training, and also certification of their already achieved vocational skills (55 million). Further, we estimated that at least 136 million youthful new entrants to the labour force will need to be provided *vocational training on a formal basis*.

Table 1 : Numbers to be skilled by Education Level in 2022

Target for 2022	Additional training requirements (million)
Formal Vocational Training	136
Voc Trng for those Informally trained	55
General education secondary & beyond	100
Totala	291

Source: Author estimates computed from National Sample Survey (66th Round), 2009-10

The task clearly needs an expanded school education system and additional vocational training providers, as well as for India's companies to undertake more vocational training. The task is stupendous, if not monumental.

4. Projections: Jobs needed, by sector, skill type, till 2019-20

In India the size of labour force was 381.1 million in 1993-94, which increased by about 104 million (6 million per annum) to reach at 484.7 million in 2011-12 (see Figure 1). This is less than half what has been repeatedly claimed by the Indian media, often repeated by policy-makers and academics: that 12 million are joining the labour force every year (or 1 million a month or 30 000 a day!). The growth pattern of the labour force is not smooth (as we noted in section 2 while discussing demographic trends). It increased by 27 million (4.5 million per annum) during 1993-94 and 1999-2000, by 61 million (12.2 million per annum) during 1999-2000 and 2004-05, but as population growth rate started to fall since 1991 onwards sharply and educational enrolments grew equally dramatically, there was only a16 million increase during 2004-5 and 2011-12 (or barely 2.3 million per annum).[18] This uneven growth pattern of labour force is mainly attributed to changes in the demographic profile of the young population (Mehrotra et al., 2014), withdrawal of women from labour force, rising enrollment in elementary and secondary schools (Thomas, 2012; Kannan and Raveendran, 2012; and Mehrotra et al., 2014), declining child labour, and to improving living standards (Mehrotra et al., 2014).

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[18]The annual growth rate of labour force during 1994 and 2000 was 1.15 percent, which increased to 2.8 percent during 2000 and 2005. Labour force growth rate has come down to about 0.04 percent during 2005 and 2010, but shows a revival with growth rate of 1.6 percent during 2010 and 2012.

Figure 1: Size and trends of labour force in India, 1993-94 to 2011-12
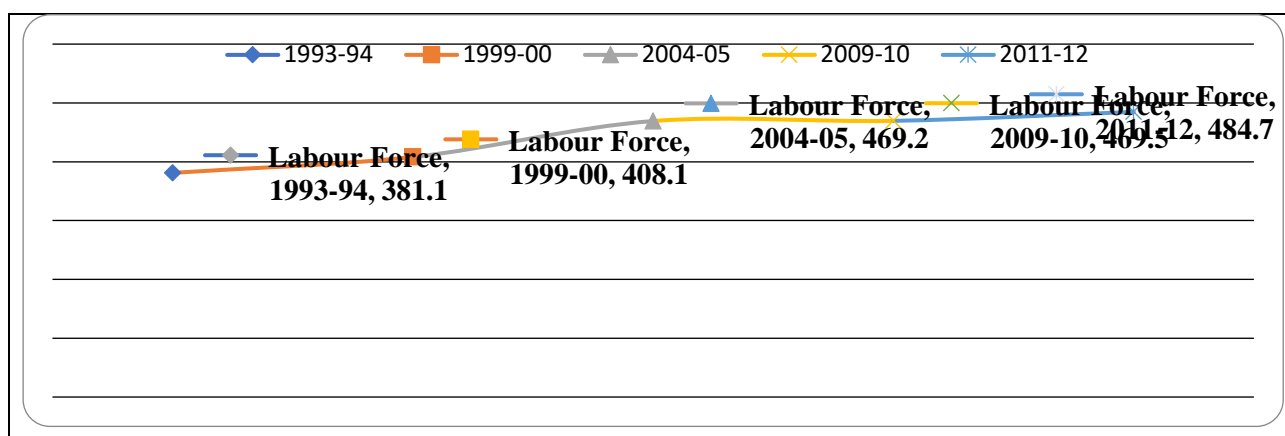
Source: Authors estimates based on NSS unit level data

Participation in education is an important reason for the slow growth of labour force. But the educated are already joining the labour force, which shows itself in a massive increase (about 7.5 mn per annum) of the labour force noticed during 2009-10 and 2011-12. It indicates that a proportion of the students who, in the 2000s, were enrolled at secondary and above level of education have started joining the labour force. It is expected that this trend would continue in the next few years, hence the size of labour force would grow further. The number of persons likely to join the labour force depends on both the size of current educational enrollment and their labour force participation rates (LFPR). Therefore, first, we have calculated the number of persons enrolled at various levels of education and their age, sex and education specific labour force participation rates (see Appendix Table 1 Distribution of Non-agricultural Workforce by Level of Education (General and Technical) in India, 2011-12). We then the size of new entrants. *That will give us a sense of the numbers to be vocationally trained by 2019-20.*

Those who will turn 15 years and above by 2019-20 belong to the age group 7 years and above in 2011-12. We have calculated both number of students enrolled at various levels of education and the number of persons not attending education (illiterates) belonging to the age group 7 to 24 years.[19] The above information is used to estimate the size of labour force for the year 2019-20 and provide two scenarios, based on linear projections using current age, sex and education-specific labour force participation rate. We present the two scenarios below. Scenario 1 is based on the assumption that the LFPR remains the same in 2019-20 as it was in 2011-12. Scenario 2 is based on the assumption that LFPR for secondary and above education increases by 5% and for primary education and illiterates declines by 5% points. To repeat,

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[19] Within general education about 252.6 million (126.4 million boys and 126.2 million girls) are attending up to primary education, 40.6 million (20.1 million boys and 20.5 million girls) are attending secondary education (grades 9-10), 30.7 million (15.1 million boys and 15.6 million girls) are attending higher secondary education (grades 11-12), 6.5 million (2.4 million girls and 4.1 million boys) are attending graduate and higher level of education. Within technical education, about 2.3 million (1.5 million boys and 0.8 million girls) are attending secondary (below graduate courses) education and about 1 million (0.6 million boys and 0.4 million girls) are attending graduate and higher level of courses. About 7.5 million persons in the age group 7 years and above are illiterates and they are not enrolled/attending any education.

2011-12 is the latest year for which NSS data from the labour force survey is available,which is the basis for the projection to 2019-20.

Projected labour force for the year 2019-20

Scenario 1: If LFPR would remain the same in 2019-20 as in 2011-12

This is a very restrictive[20] assumption but it provides a rough idea about the labour force growth for the target year. The projected labour force for 2019-20 would be 543 million (for only 15-59 year olds), with 390 million males and 153 million females. In other words, the size of the labour force would increase by 58.2 million during 2011-12 and 2019-20 (see Table 2) with an average growth of 7.3 million per annum.

The distribution of expected new entrants by their level of education reveals that by 2019-20 about 9 million (6.8 million boys and 2.3 million girls) would join the labour force with secondary certificates, 6 million (4.5 million boys and 1.8 million girls) with higher secondary, and 2.5 million (1.3 million boys and 1.1 million girls) with graduate and above level of general education. About 1.5 million (1 million boys and 0.5 million girls) would join the labour force with technical education. About 45 million (30.3 million boys and 14.3 million girls) would join the labour force with either up to primary level of education or with no education (illiterates).

In other words, while a total of 19 million will join the LF with varying levels of education above secondary education (10 years of general academic education), 45 million (or nearly three times as many as those with secondary and above education) will join the LF with upto primary or even less education.

Clearly, within non-agricultural work, the latter group (of 45 mn) can only be absorbed in either manual, low-skilled construction work, or in similar low-skilled work in traditional services or unorganized manufacturing. However, the former group (of 19 mn) can be absorbed in more skilled construction work, or organized manufacturing, or modern services – all of which are areas that require higher levels of both general education as well as vocational education/training.

Scenario 2: If LFPR for secondary and above education increases by 5% and for primary education and illiterates declines by 5% points

This second scenario is based on what might be called a more realistic assumption. The LFPR of illiterates and persons with primary levels of education are showing declining trends (from 1993-94 to 2011-12), as all children are since 2007 in school (with Net Enrolment Rate of 97% achieved in that year), and all future generations of children will similarly remain in school at least until the completion of the primary cycle and even further. Hence, it could be

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[20] To test the credibility of this projection method we have projected the labour force size for the year 2011-12 assuming 2009-10 as the benchmark year. The projected labour force size (485.5 million with 351.3 million male and 134.3 million female) is very close to that of actual labour force (484.8 million with 350.6 million male and 134.2 million female) with slight over estimation. This over estimation, though negligible, arises mainly because of the declined LFPR (for both male and female) between 2009-10 and 2011-12.

assumed that LFPR of these groups would decline further. The LFPR of boys having secondary and above level of education is very high (as compared to the overall male LFPR), which is not dissimilar to the trend in upper-middle and high income countries, and shows a slight increasing trend over the years. The LFPR of girls having secondary and above level of education is also greater than the overall female LFPR (overall female LFPR is showing a declining trend), and also showing an increasing trend over the years – which is also consistent with a global trend as girls' education levels increase. It is therefore assumed that LFPR of these groups would increase.

We have assumed that LFPR for secondary and above level of education will increase by 5 percentage points (from their 2011-12 level) whereas LFPR of illiterates and persons with up to primary education will decline by 5 percentage points (the latter because the share of new entrants into the labour force with low levels of schooling is bound to fall as enrolment at primary level is already high in 2011-12). Based on this assumption we have estimated the labour force size for 2019-20. The projected labour force size in 2019-20 is 540.8 million with 388.4 million males and 152.4 million females (see Table 2). In other words, the labour force would increase by a total of 56.1 million from 2011-12 to 2019-20 with an average growth of 7 million per annum.

The distribution of expected new entrants with their level of education reveals that about 9 million (6.5 million boys and 2.2 million girls) would join the labour force with secondary certificates, 7 million (4.7 million boys and 1.9 million girls) with higher secondary, and 2.5 million (1.4 million boys and 1.1 million girls) with graduate and above level of general education. About 1.5 million (1 million boys and 0.5 million girls) would join the labour force with technical education. About 42.5 million (28.8 million boys and 13.6 million girls) would join the labour force with either up to primary level of education or with no education (illiterates).The most important point that emerges from an examination of the two scenarios together is that the rate at which the new entrants grow does not exceed 7.5 million per annum. These are all such that they will definitely look for work in modern services or manufacturing industry (and in both cases in registered firms, not in the unorganized sector, preferably).

If we add the stock of educated who are currently unemployed (total 10 million), the number of jobs that should be created in industry and services rises by another 1.1 million per annum. In addition, we need to take care of the 5 million per annum that were leaving agriculture over 2004-5 to 2011-12, and this rate is unlikely to fall (but is unlikely to rise unless the growth in demand for unskilled agricultural labour rises sharply beyond the rate prevailing over that 7 year period).[21]

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[21] The only condition in which the demand for unskilled labour rises sharply beyond that prevailing over 2004-5 to 2011-2 is that the infrastructural investment will be greater than the roughly $100 billion per annum that was invested in it during the 'dream run' years of the 11th Plan (2007-12). That rate has been well below $100 billion per annum since 2012, even though the rate of public investment may be beginning to pick up in 2015-16.

Table 2: Enrollments in 2011-12 by Sex and Level of Education and Projected Labour Force (2019-20)

Level of Education		No. of Persons Attending Education (Age group 7 to 24 years), 2011-12			Projected New Entrants (mn) by education, 2019-20					
					Scenario I			Scenario II		
		M	F	T	M	F	T	M	F	T
Illiterate and not attending education		5.7	15.2	20.9	3.3	4.2	7.5	3.2	4.0	7.1
General education	Up to Primary	126.4	126.2	252.6	26.9	10.1	37.0	25.6	9.6	35.2
	Secondary	20.1	20.5	40.6	6.8	2.3	9.1	6.5	2.2	8.6
	Higher Secondary	15.1	15.6	30.7	4.5	1.8	6.2	4.7	1.9	6.6
	Graduate & above	2.4	4.1	6.5	1.3	1.1	2.4	1.4	1.1	2.5
Technical education	Below Graduate	1.5	0.8	2.3	0.7	0.3	1.0	0.8	0.3	1.1
	Graduate & above	0.5	0.4	1.0	0.3	0.2	0.5	0.3	0.2	0.5
Total		**171.8**	**182.9**	**354.7**	**43.8**	**19.9**	**63.7**	**42.3**	**19.3**	**61.6**
Projected Labour Force					**389.9**	**153**	**542.9**	**388.4**	**152.4**	**540.8**

Table 3: Sectoral Employment Projections for the year 2019-20 in India

Sectors	Absolute Employment (million)		Projected employment for 2011-12 based on 2009-10 information	Projected Employment for 2019-20	
	2009-10	2011-12		Scenario I	Scenario II
Agriculture and Allied	244.9	232.0	231.7	228.3	203.1
Manufacturing	50.7	59.8	59.4	71.2	74.1
Services	116.4	127.3	127.6	131	136.2
Subsectors within Non-manufacturing Sector					
Mining & Quarrying	3.0	2.6	2.6	2.4	2.7
Electricity, Gas & Water Supply	1.3	2.5	2.5	5.9	6.1
Construction	44.1	50.3	51.0	52.1	79.3
Non-manufacturing (Sub-total)	48.4	55.4	56.1	60.4	88.1
Total	**460.2**	**474.2**	**474.8**	**490.9**	**501.5**

Source: Author estimates based on NSS unit level data

Since about 7.5 million per annum would join the labour force, it is important to find out the sectors that could absorb this growing labour force. We have projected the sectoral employment

for the year 2019-20 based on the sectoral growth projections (see Table 8), which is explained for two scenarios[22]as follows:

Scenario 1: If macroeconomic scenario of 2011-12 would remain unchanged, that means sectoral employment elasticity, sectoral output growth, sectoral growth elasticity and capital-output ratio remain constant as in 2011-12, the total employment would increase to 493 million (about 2.3 million per annum). According to this scenario manufacturing employment would increase by 11.5 million (1.4 million per annum) and construction sector employment would increase by 4 million (0.5 million per annum), while agricultural employment would decline by 3.6 million.

Over the 2011-12 to 2019-20 period all those joining the manufacturing, services, and non-manufacturing should ideally be skilled vocationally. Their numbers amount to the following in Scenario 1: 11.4 mn in manufacturing; 3.4 mn in services; and 3.4 mn in electricity, gas and water supply; and 1.9 mn in construction activities. The assumption that all entrants will need vocational training *formally* is based on the following fact. We had noted earlier that the share of the current workforce that was vocationally trained formally was <3% of the workforce; the rest have all acquired vocational skills on-the-job informally. So it is not as though the vocational skill level of the existing workforce is high at all (see my paper with Jong-wha Lee for ADB, 2017). In countries such as Korea the share of those workers with formally acquired vocational training can be upward of 80-90%, depending upon the sector of economic activity.

The scenario based on the assumption that everything would remain constant as in 2011-12 (for the next 8 years) is a very restrictive assumption[23], hence an alternate scenario is considered.

Scenario 2: If sectoral employment elasticity, capital output ratio, and growth changes:

This scenario assumes that the employment elasticity, growth and growth elasticity of the construction sector would double, capital intensity of agriculture would increase further while employment elasticity (which is negative) would decline further, and manufacturing growth would increase by 10 per cent[24]. If this scenario prevails then agriculture employment would decline by 3.6 million per annum (though past trend is showing 5 million per annum decline). About 29 million people would leave agriculture by 2019-20 (see Table 3). Construction employment would increase by 29 million, which is expected to absorb the people leaving agriculture (like earlier during the post 2004-5 to 2011-12 period).

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[22]This is a linear projection which uses sectoral growth rates (2011-12), sectoral growth elasticity (2011-12), sectoral capital output ratio (2011-12) and sectoral employment elasticity (2009-10 and 2011-12). To check the credibility of this projection method, we have projected the sectoral employment for the years 2011-12 based on scenario 1 using 2009-10 information. This projection results are very close to the actual employment figures in 2011-12.

[23]Because the growing mechanization in agriculture (Himanshu, 2011; Thomas, 2012; and World Bank, 2012; and Mehrotra et al., 2014) is expected to continue further, which has negative impact on employment elasticity and hence the labour absorption capacity in agriculture. On the other hand, huge increase in infrastructure investment would have positive impact on both employment elasticity and sectoral growth elasticity of the construction sector. The recent initiatives for increasing manufacturing growth would also likely increase manufacturing employment.

[24]These assumptions are made observing the past trends (the magnitude of fluctuations) of these variables over last 10 years.

Sectoral distribution of entrants into LF and hence to be skilled formally

We estimate that, provided the sectoral shares remain the same in 2019-20 as in 2011-12, the projected 13 million increase in manufacturing employment would be generated in the following sectors: food processing, textiles and apparels, wood and furniture manufacture, manufacture of non-metalic mineral products and machinery and metal products (see Table 3)[25]. Within manufacturing apparel (2.1 million) and textile (2 million) products would be the highest employment generating sectors which together would generate about 4 million employment by 2019-20.

On the other hand, the sub sectors like food and beverages (1.4 million), tobacco products (1 million), wood and wood products (0.8 million), leather products (0.3 million) and paper and printing etc., (0.3 million) and furniture manufacturing (0.5 million) together would be expected to generate about 4.5 million employment by 2019-20. It is important to note that these sub-sectors are labour intensive and mostly produced by the micro, small and medium enterprises (MSME) (see Table 4) which is expected to generate about 8.5 million (about 70 percent) jobs by 2019-20.

These labour-intensive sectors, in most of which employment is generated within the sector, are characterized specially by a high share of the workforce with low levels of general education and only informally acquired vocational training. Therefore, one can take it for granted that every single entrant into this segment of the LF that joins these sectors will require formal vocational training.

However, the capital intensive subsectors like machinery and metal products (1.2 million), non-metallic mineral products (1.1 million), computer, electronic & electrical products (0.3 million), motor vehicle & transport equipments (0.3 million) etc. are also likely to generate about 3 million employment by 2019-20. These are sectors where higher levels of the WF have formally acquired vocational training. But even here, the share of such workers is by no means impressive. Thus, for 2009-10 (just two years before the base year for this estimate), just 9.1% of the industrial WF (i.e. manufacturing plus non-manufacturing industry) of about 100mn had received formal vocational training (vt), and another 1.9% was receiving formal VT.

The implication is that every single new entrant would need to undergo formal VT before joining the industrial LF.

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[25]These values are estimates from the projected total manufacturing employment based on the percentage share of employment generated in these sectors during 2011-12.

Table 4: Employment Projections for Manufacturing Sub-sectors for the year 2019-20 in India

Sub-sectors of Manufacturing Sector	2011-12	Projected employment 2019-20	Projected increase	Expected % Share of Manufacturing Units by their Firm size (No. of Workers employed)			
				< than 6	6 to 10	10 to 20	20 & above
Food products and beverages	6.6	7.9	1.4	55	10	7	28
Tobacco products	5.0	6.0	1.0	91	3	1	6
Textiles	9.4	11.4	2.0	60	12	9	19
Wearing apparel	9.8	11.9	2.1	74	10	4	12
Leather products	1.3	1.6	0.3	23	9	19	49
Wood and wood products	3.9	4.8	0.8	84	9	3	4
Paper and printing etc.	1.2	1.5	0.3	47	13	10	31
Rubber & petroleum products	1.3	1.6	0.3	21	11	11	58
Pharmaceutical & Chemical products	2.0	2.4	0.4	12	7	6	75
Non-metallic mineral products	5.1	6.1	1.1	25	13	13	49
Machinery and metal products	5.5	6.7	1.2	34	10	9	47
Computer, electronic & electrical products	1.4	1.8	0.3	15	4	11	70
Motor Vehicle & Transport Equipments	1.5	1.8	0.3	5	9	3	82
Furniture manufacturing	2.4	2.9	0.5	82	9	5	4
Other manufacturings	3.3	4.0	0.7	63	5	8	24
Total Manufacturing Employment	**59.8**	**72.4**	**12.6**	**55**	**9**	**7**	**28**

Source: Authors estimates based on NSS unit level data

In Table 5 we present our estimate for employment/skill requirements in Services. In Services the subsectors like wholesale and retail trade (3.1 million), transport and storage (1.3 million), education (1 million), public administration and other services including defence service (2 million), hotel and restaurant (0.5 million) would be leading employment generating sectors. Together these sub-sectors would be generating about 8 million (about 90 percent) employment by 2019-20 (see Table 5). Most of the units in the sub-sectors (viz., wholesale and retail trade, transport and storage, and hotel and restaurant) are micro, small and medium units which hired at most 10 total workers (see Table 5).

The modern sub-sectors like information and communication (0.3 million), finance and insurance (0.3 million), health and social services (0.3 million) combined would be generating about 1 million employment by 2019-20.

Table 5: Employment Projections for Sub-sectors of Services for 2019-20 in India

Sub-sectors of Service Sector	2011-12	Projected employment 2019-20	Projected increase	Expected % Share of Service Sector Units by their Firm size (No. of Workers employed)			
				< than 6	6 to 10	10 to 20	20 & above
Wholesale and Retail Trade	44.2	47.3	3.1	87	6	2	5
Transport & Storage	19.3	20.6	1.3	72	6	3	18
Hotel and Restaurants	7.8	8.3	0.5	71	14	6	9
Information and Communication	3.6	3.9	0.3	20	9	10	61
Finance	4.3	4.6	0.3	27	14	16	44
Real Estate	0.9	1.0	0.1	75	9	4	12
Education	14.1	15.1	1.0	33	21	18	28
Health and Social Service	4.4	4.7	0.3	44	8	9	39
Administration and other Services	28.7	30.7	2.0	61	7	6	27
Total Service Employment	127.3	136.2	8.9	66	9	6	19

Source: Authors estimates based on NSS unit level data

Disaggregation of sectoral projections by states of India

In this sub-section we present estimates for sectoral employment (manufacturing, non-manufacturing industry, services) for each state of India in the year 2019-20 (see Table 6).

Given the percentage share of *manufacturing* employment generated across the states of India (in 2011-12), it is expected that the following states will be most important: the northern state of Uttar Pradesh (about 10.5 million); the eastern state of West Bengal (about 10 million); the western states of Maharashtra (about 7.5 million) and Gujrat (about 6.3 million); and the three southern states Tamil Nadu (8 million)Andhra Pradesh (about 5.1 million) and Karnataka (about 4 million). These relatively more industrialized states would be the leading states that continue to contribute the major share of manufacturing employment (which would be 72.4 million by 2019-20) in India (see Table 6). These would also be states that will need to focus their VT efforts in manufacturing (the sub-sectors of manufacturing focus have already been discussed above).

The states which would contribute to the total *non-manufacturing* employment (mostly in the construction sector) in 2019-20 include: Uttar Pradesh (about 14.6 million), Rajasthan (about 9 million), Tamil Nadu (7.4 million), Andhra Pradesh (about 6.3 million), Madhya Pradesh (6 million) Maharashtra (about 5.5 million), West Bengal (about 5 million), and Bihar (about 4.5 million) respectively.

Similarly, the states which would contribute to the total service sector employment include: Maharashtra (about 17.2 million), Uttar Pradesh (about 15.4 million), Andhra Pradesh (about

12.6 million), West Bengal (about 11.7 million), Tamil Nadu (11 million), Karnataka (8.7 million), Gujarat (7 million) and Kerala (about 6 million) respectively (see Table 6).

Table 6: State-wise Sectoral Employment Projections for the year 2019-20

Name of the States	Total Projected Sectoral Employment in 2019-20		
	Manufacturing Sector	Non-manufacturing sector	Service Sector
Jammu & Kashmir	0.49	1.38	1.27
Himachal Pradesh	0.30	0.94	0.75
Punjab	2.31	2.65	3.88
Uttarakhand	0.43	0.78	1.18
Haryana	1.51	2.09	2.96
Delhi	1.22	0.42	3.85
Rajasthan	2.93	8.90	5.73
Uttar Pradesh	10.45	14.66	15.39
Bihar	1.92	4.54	6.40
Assam	0.72	1.19	3.34
West Bengal	10.27	5.10	11.74
Jharkhand	0.98	3.44	2.44
Odisha	2.09	3.66	4.09
Chhattisgarh	0.69	1.52	1.87
Madhya Pradesh	2.41	6.03	6.03
Gujarat	6.31	2.83	7.03
Maharashtra	7.42	5.52	17.15
Andhra Pradesh	5.13	6.31	12.56
Karnataka	3.92	2.85	8.70
Goa	0.09	0.14	0.38
Kerala	2.16	3.89	6.06
Tamil Nadu	8.04	7.39	11.03
NE States (Excl. Assam)	0.31	1.64	1.62
UTs	0.30	0.24	0.72
All-India	**72.4**	**88.1**	**136.2**

Source: Authors estimates based on NSS unit level data

Education/skill level of projected workforce

Distribution of non-agriculture workforce by level of education (both general and technical education) provides a rough idea about the sectoral demand for skilled and unskilled labour force (Table 7). If these percentage shares remain constant, then the manufacturing sector is going to absorb only about 1 million (8 percent of total manufacturing employment) and the service sector is going to absorb 3.5 million (40% percent of total service sector

employment) workers of those entering the labour force with higher secondary and above level of education (both general and technical). This implies that both manufacturing and service sectors together would absorb about 4.5 million workers, while about 6.5 million (out of 10.7 million new entrants entering the labour force with higher secondary and above level of education) would not get any job and would be still searching for non-agriculture jobs.

In 2019-20, about 51 million new entrants of this category would be searching for non-agricultural jobs (as we noted above). Manufacturing and service sectors together would provide only about 17 million jobs to job seekers entering the labour force as either illiterate or with up to secondary level of general education. Hence about 34 million in this category would be unemployed during 2019-20. Assuming all those leaving agriculture would be absorbed in the construction sector (total about 29 million), about 40 million people would be still searching for either manufacturing or service sector jobs in India in 2019-20.

A final word

To sum up it can be stated that a 3.5 million per annum (or about 29 million in total over 2011-12 to 2019-20) increase in construction employment would absorb the people leaving agriculture. However, manufacturing, non-manufacturing (excluding construction) along with the service sectors would roughly generate about 3 million employment pa, which would not be sufficient to absorb the 8.5 million (7.5 million new entrants plus 1 million educated unemployed) annual increase in the labour force in India. More importantly, since the labour force is going to expand as huge numbers are currently attending secondary and higher education, the lack of employment (in manufacturing and service sectors) would lead to unemployment increasing. And due to limited scope for expanding employment in agriculture (due to increasing mechanisation), about 40 million people would be still searching manufacturing or service sector jobs in India in 2019-20. This would be a cause of concern for policy makers.

Appendix Table 1: Distribution of Non-agricultural Workforce by Level of Education (General and Technical) in India, 2011-12

Level of Education (General and Technical)	Non-agricultural Sector's Employment							
	Absolute Number (million)				Percentage Shares			
	Manufacturing	Non-manufacturing	Services	Total	Manufacturing	Non-manufacturing	Services	Total
Illiterate	13.1	19.0	16.2	48.3	22	34	13	20
Primary	28.3	26.1	42.8	97.2	47	47	34	40
Secondary	7.9	5.5	20.3	33.7	13	10	16	14
Higher Secondary	4.4	2.2	15.5	22.0	7	4	12	9
Graduate and Above	3.2	1.3	23.7	28.2	5	2	19	12
Tech Edu. Below Graduate level	2.0	0.8	4.3	7.1	3	1	3	3
Tech Edu. Graduate and above	0.9	0.4	4.5	5.7	2	1	4	2
Total	**59.8**	**55.3**	**127.2**	**242.3**	**100**	**100**	**100**	**100**

Source: Authors estimates based on NSS unit level data

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