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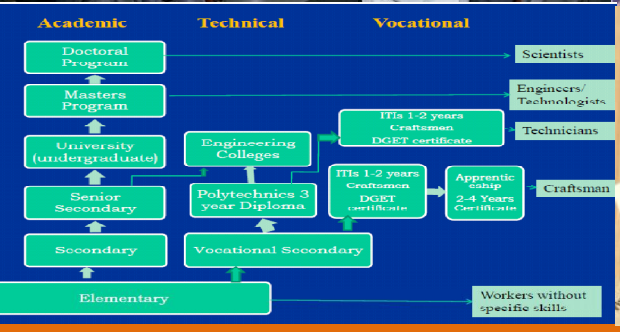

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Abstract

The window of opportunity called the Demographic Dividend is available to India only till 2040. Realizing the demographic dividend brings to the fore the very serious challenge of skilling our labour force. But before devising the skill development strategy for these coming years, a task of greater importance is to estimate the magnitude of the challenge and to assess the skill gap. The paper tries to estimate the skilling requirements, sector-wise, in different scenarios to arrive at a realistic and desirable target. No matter which scenario one ends up realizing, the challenge of skill development –both in quantitative and qualitative terms –is enormous and requires a careful policy stance.

1. Introduction

When the economyôs growth rate picked up from 3.5 per cent per annum between 1950 and 1980 to 5.4 per cent per annum between 1980 and 1990 some signs of a skills shortage started to show up. However, the policy discourse changed dramatically once the GDP growth rate jumped to 7.3 per cent during the 10th Five Year Plan period (2002-2007). For the first time in the history of Indian planning, the 11th Five Year Plan document (Planning Commission, 2008) introduced a chapter on skill challenges facing the nation. The increase in the GDP growth rate has been one reason for realizing skill shortages in the Indian economy.

The other structural shift in the Indian economy is a demographic one, with significant implications for skills. The increase in GDP growth has itself been partly driven by an increase in the share of working-age population in total population. This demographic dividend comes but once in the life of any nation. It is defined as the benefits derived from a rise in the ratio of working age (usually 15-59) to dependent or non- working population (usually under 15 and over 60 year olds). When the share of population above 60 years goes over 10 per cent of the total population, the UN defines that society as aging. Chinaôs demographic dividend will be over by 2015; Indiaôs is expected to continue till about 2040 (World bank, 2012).

The benefits come from the fact that as the share of working-age population rises, they get work, earn incomes and save part of that income. As a result, savings as a proportion of GDP rises. Following a standard Harrod-Domar model logic, investmentôs share in GDP rises correspondingly. It is this rise in the savings-investment ratio that is a major part of the explanation of the high GDP growth story of India, though there are many other factors.

This underlying rise in the share of the working-age population brings with it, its own risks. First, employment must be found for this growing population of working-age. Employment increased in the first half of the 2000s (1999-2000 to 2004-05) over the five year period by 60 million, it hardly grew in the second half. Employment in manufacturing actually fell in the second half of the decade (2005-10) by five million and in services the increase has been only 4 million (Mehrotra et al 2012). Hence, increasing non-agricultural employment will remain a challenge, if the total factor productivity (TFP) growth we have seen in the first half of the decade is to continue.

However, sustaining TFP increases will, from this point on, also depend on improving the educational (general and vocational) and skill level of this growing work force. In other words, realising the full potential of the demographic dividend in the future will depend critically for India upon both generating non-agricultural employment as well up-grading the skill levels of the existing as well as the growing workforce.

The demographic dividend is available only till about 2040. If the skill challenge is not met within the next decade, there is a risk that India may be unable to sustain growth in non-agricultural output and non-availability of skilled manpower may result in machines replacing labour on a large scale. This in turn will result in declining employment elasticity of output leaving large numbers among the increasingly youthful labour force unemployed.

2. The labour force: their level of education and vocational training

Given the scale of the challenge posed by the rapid economic growth and the rising share of working age population, the first dimension of the skill challenge is that the general education level of Indiaôs labour force in the age group 15-59 remains extremely low (Table 1). The total labour force in 2009-10 was 470 million. However, for the analysis in this paper we have used labour force estimates of those aged between 15-59 years (the working age population) which is 431 million. Of the labour force of 431 million between the ages 15-59 in 2009-10 nearly 126 million or 29 per cent of the labour force, are not even literate. An additional 102 million, or nearly 24 per cent, of the labour force either has below primary or only primary level of education. In other words, well over half of the labour force between 15-59 years of age has extremely low levels of education or none at all. An additional 17.6 per cent had middle level education in 2009-10 and a further 12 per cent had attained secondary level education. In other

words, the remainder of only 17 per cent has higher secondary and higher levels of education (including diploma/certificate, graduates, and post graduation levels of education).

This low level of general education corresponds to the continuing high share of those engaged in agriculture and even higher share of the total population that lives in rural areas. Economic growth should entail a transition of labour out of agriculture into manufacturing, non-manufacturing industry and services (Mehrotra et al 2012). Low levels of education in the labour force, especially among those engaged in agriculture, makes it more difficult for the latter to move into activities in urban areas, except as labourers in the construction industry. The low level of general education also makes it more difficult to provide vocational training to youth who have not even completed elementary education (i.e. until class 8). In other words, the first challenge for skill development in the 12th Plan is two-fold. The first is that existing 228 million in the workforce, or half of the current work force that is either illiterate have only attended primary or less education (who are likely to be functionally illiterate except for the ability to write their name), must be ensured functional literacy and numeracy. Even though such workers have acquired their skills informally, they should be able to now get recognition of their prior learnt skills, for which there is provision now in the National Skill Qualification Framework ().

The second challenge is to ensure that all children between the ages of 6 and 14 are completing elementary education by the end of the 12th Plan, as required by the Right to Education Act, 2009. It is difficult to prepare a teenager for a vocation if he/she has not completed at least eight years of schooling.

Table 1: General Education Level of Labour force (PS+SS) in the age group 15-59

	Numbers (million)	Share in labour force in age group 15-59 per cent	Share in labour force (470.1million) per cent
Not literate	125.7	29.1	26.7
Literate without formal schooling: EGS/ NFEC/ AEC +TLS + Others	2.1	0.5	0.5
Below primary + Primary	102.4	23.7	21.8
Middle	76.1	17.6	16.2
Secondary	52.4	12.2	11.1
Higher secondary	29.2	6.8	6.2
Diploma/certificate course	6.0	1.4	1.3
Graduate	28.0	6.5	6.0
Graduate and above	9.4	2.2	2.0
Total	431.2	100.0	91.7

Source: Computed from NSS (66th Round), 2009-10.

Note1: Estimated numbers of persons are adjusted to total census population. Ideally it should be adjusted by census population in the age group of 15-59. But due to data constraints it is not possible. However, the ratio of total NSS population to total Census population is similar to that ratio of NSS population in the age group of 15-59 and projected census population in the same age group.

Note 2: PS and SS refer to Principal Status and Subsidiary Status respectively. The activity status on which the person spends more than 180 days during the reference year is considered to be the principal status of the person. If a person pursues some economic activity for a shorter time (less than 180 days but more than 30 days) during the reference year then that activity is considered to be the subsidiary status.

The share of vocationally trained in the labour force

In the 11th Plan it was stated (based on NSS 61st Round 2004-05) that among persons of age group 15-29 years only about 2 per cent are reported to have received formal vocational training and another 8 per cent to have received informal vocational training. These numbers (2 per cent formally and 8 per cent informally trained) refers to the stock of those having received training and in the labour force. However, using NSS 66th Round (2009-10 data) we have estimated the stock of those who have received vocational training, formal or informal, or are receiving formal vocational training. In other words, our estimate of the vocationally trained refers not merely to those who are between 15-29 years of age (as shown in the 11th Plan), but also includes those between the ages 29-59 (in other words, it covers the entire working age group of 15-59 years in the labour force).

We should also emphasize that the 2 per cent and 8 per cent number refers to those who had received vocational training as a proportion of the entire labour force in agriculture, industry and services. Those engaged in agriculture, numbering 244 million in 2009-10, clearly cannot be said to be unskilled in their main vocation of crop production and/or allied activities in agriculture; for centuries they have been reasonably skilled farmers. It is only when they migrate out of agriculture into non-agricultural activities that they can be referred to as ónskilledô. Hence, in Table 2 we not only focus on the stock of the vocationally trained in the labour force in the age group 15-59, but estimate the share of the stock of vocationally trained in the non-agricultural labour force. Interestingly, the vocationally trained in this age group in the labour force turned out to be 20 per cent (Table 2). The number of this stock of the vocationally trained in the age group (15-59) in the industrial (i.e. manufacturing and non-manufacturing) work force consists of 99 million workers, and the vocationally trained as a proportion of all workers in industry is 44 per cent. This latter estimate is useful because most of the vocational training available in India is intended for the manufacturing and non-manufacturing work force, rather than those who end up in services. Hence the relevant denominator used is industry, rather than industry plus services.

The absolute number of those receiving formal vocational training is 1.9 million in 2009-10. An additional 9 million in the labour force have already received vocational training formally. Finally, an additional 32.7 million have received non-formal vocational training. Thus, the total number of those received or receiving vocational training in the labour force (15-59) was 43 million in 2009-10. In other words, only 10 per cent of the labour force and workforce in the working age group is vocationally trained (receiving or received) in 2009-10.

Table 2: Vocational Training in Labour force (PS+SS) in the age group of 15-59

Sno.		Estimated Numbers in 1000	Percentage	Share in the labour force in the age group of 15-59 *(i.e. 431 mn)*	Share in the Labour force for all age groups *(i.e. 470 mn)*	Percentage of non-agriculture Workforce	Percentage of Industrial Workforce
1.	**Receiving formal vocational training**	**1892**	**4.3**	**0.4**	**0.4**	**0.9**	**1.9**
2.	**Received vocational training: Formal**	**9006**	**20.6**	**2.1**	**1.9**	**4.2**	**9.1**
3.	**Received vocational training non-formal, of which:**	**32719**	**75.1**	**7.6**	**6.9**	**15.2**	**33.0**
	Received vocational training non-formal: Hereditary	*11897*	*27.3*	*2.8*	*2.5*	*5.5*	*12.0*
	Received vocational training non-formal: Self-learning	*7130*	*16.3*	*1.7*	*1.5*	*3.3*	*7.2*
	Received vocational training non-formal: Learning on the Job	*11511*	*26.4*	*2.7*	*2.4*	*5.3*	*11.6*
	Received vocational training non-formal: others	*2181*	*5.0*	*0.5*	*0.5*	*1.0*	*2.2*
	Total (1+2+3)	**43617**	**100.0**	**10.1**	**9.3**	**20.3**	**44.0**

Source: Computed from NSS (66th Round) 2009-10.

In Table 3 we have estimated the size and share of the stock of those in the labour force (age group 15-59 years) who have received technical education.[1] Those with technical education are a sub-set of those with vocational training. Their total number is 11.76 million. The share of those with technical education in the labour force aged 15-59 years is 5.5 per cent of all non-agricultural workers, and 11.9 per cent of all manufacturing and non-manufacturing industrial

workers. Only about 2.5 per cent people in the labour force for all age groups (470 million) are receiving or have received technical education.

Table 3: Technical Education of Labour force (PS+SS) in the age group of 15-59, 2009-10

Sno.	Technical Education	Estimated Numbers in 1000	Percent-age	Share in the labour force in the age group of 15-59	Percentage of non-agriculture workers	Percentage of Maf. and Non-Manf workers
1.	**Technical degree in agriculture/ engineering/ technology/ medicine, etc**	**2176**	**18.5**	**0.5**	**1.0**	**2.2**
2.	**Diploma or certificate (below graduate level), of which:**	**6436**	**54.7**	**1.5**	**3.0**	**6.5**
	Diploma or certificate (below graduate level) in: agriculture	*177*	1.5	0.04	0.08	0.18
	Diploma or certificate (below graduate level) in engineering/ technology	*34.5*	29.0	0.79	1.6	3.4
	Diploma or certificate (below graduate level) in medicine	*505*	4.3	0.12	0.23	0.51
	Diploma or certificate (below graduate level) in crafts	*143*	1.2	0.03	0.07	0.14
	Diploma or certificate (below graduate level) in other subjects	*2205*	18.8	0.5	1.0	2.2
3.	**Diploma or certificate (graduate and above level), of which:**	**3145**	**26.8**	**0.7**	**1.5**	**3.2**
	Diploma or certificate (graduate and above level) in: agriculture	55	0.47	0.01	0.03	0.06
	Diploma or certificate (graduate and above level) in: engineering/ technology	1114	9.5	0.3	0.5	1.1
	Diploma or certificate (graduate and above level) in: Medicine	287	2.4	0.07	0.13	0.29
	Diploma or certificate (graduate and above level) in: Crafts	79	0.7	0.02	0.04	0.08
	Diploma or certificate (graduate and above level) in: other subjects	1610	13.7	0.37	0.75	1.6
	Total (1+2+3)	**11758**	**100.0**	**2.7**	**5.5**	**11.9**

Source: Computed from NSS (66th Round) 2009-10.

These estimates presented above suggest that the scale of the problem, while not being as stupendous as suggested in the 11th Plan, is certainly very challenging. Further, we noted above that in an economy which has been growing at nearly 8per cent per annum during the 11th Plan period and which is expected to grow between 8 to 9 per annum during the 12th Plan, the scale of challenge is only going to increase. Moreover, the scale of challenge will be multiplied by the fact that the Right to Education Act (2009) will increase enrollment in elementary schools

thus increasing the number entering the secondary level, thus increasing the demand for vocational training and education in the country.

Educational qualification and vocational training of workers in the primary, secondary & tertiary sectors

Despite making considerable progress in terms of literacy (particularly after launching of Sarva Shiksha Abhiyan), high incidence of illiteracy cripples the workforce. As in the previous two sections, the estimate for work force in the age group 15-59 years, which is 421 million, is used rather than the 460 million work force for all age groups. Out of the 421 million workers in the age group of 15-59, 125 million (or 30 per cent) are illiterate (Table 4). As expected, the proportion of illiterate workers is maximum in agriculture and allied activities (40 per cent), followed by the non-manufacturing sector (33 per cent).

Bulk of the workforce in the non-manufacturing sector (90 per cent) is in construction works. The second half of the decade experienced a massive increase in the number of construction workers (26 million to 44 million) and a sharp decline in agricultural workers (253 million to 238 million). The slow growth rate in the agricultural sector has resulted in a shift in the workforce away from agriculture into non-agricultural occupations. Given the low level of education of agricultural workers, the sectors to which they migrate also have very high incidence of illiterate workers.

Table 4: Estimated number of Workers (PS+SS in the age group of 15-59) by level of education by sector (millions), 2009-10

Level of Education	Agriculture and Allied	Manufacturing	Non-Manufacturing	Services	Total
Not Literate	87.4 (40)	9.6 (20)	14.4 (33)	13.7 (12)	125.0 (30)
Below primary + Primary + Literate without formal schooling	58.9 (27)	12.9 (27)	12.7 (29)	18.7 (17)	103.2 (25)
Middle	36.2 (17)	10.3 (21)	8.7 (20)	19.0 (17)	74.1 (18)
Secondary	21.3 (10)	7.0 (15)	4.3 (10)	18.2 (17)	50.8 (12)
Higher Secondary and above(Diploma/certificate/graduate/post graduate)	15.5 (7)	8.1 (17)	3.5 (8)	40.4 (37)	67.5 (16)
Total	**219.2 (100)**	**47.9 (100)**	**43.5 (100)**	**110.0 (100)**	**420.6 (100)**

Source: Computed from NSS (66th Round), 2009-10.
Note: This is an estimate of the education level of the workforce in the age group 15-59 years, using their Principal Status + subsidiary Status.
Figures in parentheses are percentage shares.

Surprisingly, 47 per cent of our manufacturing workers have primary or below primary level of education. Also, services sector has the highest share of those who have completed higher secondary or above education. This reflects the preference of the educated workers towards white collar jobs compared to the blue collar ones.

With such a high proportion of illiterates in the workforce, it is but natural to expect a very low level of technical education among the workers. This is precisely the case across sectors (agriculture, manufacturing, non-manufacturing industry and services) (see Table 5). Out of a total of 219 million workers engaged in agriculture and allied activities, only 0.75 million have acquired some form of technical education. In other words, less than 0.5 per cent of workforce (in the age group of 15-59) engaged in agriculture have some sort of formal technical training. The corresponding figures for manufacturing, non-manufacturing, and services are 4 per cent, 2 per cent, and 6 per cent respectively. Out of the work force of 421 million in age group 15-59 years, merely 2.5 per cent have acquired technical education. But of the total workforce of 460 million, only about 2.3 per cent have technical education.

Table 5: Estimated number of workers (PS+SS in the age group of 15-59) with Technical education by sector, 2009-10 ('000)

Sno.	Level of Technical Education	Agriculture and Allied	Manufacturing	Non-Manufacturing	Services	Total
1.	**Technical degree in agriculture/ engineering/ technology/ medicine, etc**	**40**	**323**	**133**	**1542**	**2038**
2.	**Diploma or certificate (below graduate level), of which**	**427**	**1273**	**471**	**3491**	**5662**
	Diploma or certificate (below graduate level) in: agriculture	*7*	*18*	*13*	*127*	*176*
	Diploma or certificate (below graduate level) in engineering/ technology	*241*	*897*	*375*	*1477*	*2989*
	Diploma or certificate (below graduate level) in medicine	*12*	*08*	*05*	*420*	*445*
	Diploma or certificate (below graduate level) in crafts	*10*	*68*	*13*	*43*	*133*
	Diploma or certificate (below graduate level) in other subjects	*147*	*281*	*65*	*1424*	*1918*
3.	**Diploma or certificate (graduate and above level)**	**287**	**341**	**265**	**1918**	**2811**
	Diploma or certificate (graduate and above level) in: agriculture	*07*	*19*	*0*	*21*	*48*
	Diploma or certificate (graduate and above level) in: engineering/ technology	*27*	*156*	*111*	*629*	*923*

	Diploma or certificate (graduate and above level) in: Medicine	*01*	*9*	*0*	*261*	*271*
	Diploma or certificate (graduate and above level) in: Crafts	*05*	*23*	*8*	*38*	*74*
	Diploma or certificate (graduate and above level) in: other subjects	*246*	*135*	*147*	*969*	*1496*
	Total (1+2+3)	**754**	**1937**	**869**	**6951**	**10511**
	Of total sector % (sector total in Million)	**0.3 (219)**	**4 (48)**	**2 (44)**	**6.3 (110)**	**2.5 (421)**

Source: Computed from NSS (66th Round), 2009-10

From among those who have some sort of technical education, vast majority of them have a diploma in technical education below graduate level. As against technical education, the situation is slightly better in vocational training where overall 10 per cent of the workforce in the age group of 15-59 years received some form of vocational training (see Table 6). Of these, only 2.3 per cent are formally vocationally trained. Of the 5 per cent vocationally trained in agriculture, 4.7 per cent (i.e. a proportion of 92%) are due to non-formal training. In agriculture, of all those trained informally, 65 per cent were due hereditary transfer of knowledge. Within manufacturing, 27 per cent of the workers are vocationally trained, of which 86 per cent are non-formally trained. What is remarkable is that there is little difference between manufacturing and agriculture in the share of those with vocational training who only received non-formal training: 86 per cent in manufacturing and 92 per cent in agriculture. Only in services is the share of those with informal training is lower at 56 per cent. That is, in the services sector 44 per cent of those vocationally trained have acquired some form of formal training. Compared to agriculture, in the non-agricultural sectors, the non-formal vocational training was in the form of on the job learning. Dependence on non-formal vocational training to such an extent highlights the grossly inadequate system of vocational training that currently exists in the country.

Table 6: Distribution of formally and informally vocationally trained workers (PS+SS in the age group of 15-59) within primary, secondary and tertiary sectors (per cent) in 2009-10

Status of Vocational Training	Agriculture and Allied	Manufacturing	Non-Manufacturing	Services	Total
Receiving or Received formal vocational training	0.4	3.8	1.7	5.5	2.3
Received vocational training non-formal	4.7	23.6	8.2	11.7	7.7
Total	**5.1**	**27.4**	**9.9**	**17.2**	**10.0**

Source: Computed from NSS (66th Round), 2009-10

The proportion of workers who received vocational training was the highest in the services sector (33 per cent), followed by manufacturing (31 per cent), agriculture and allied activities (27 per cent), and non-manufacturing (9 per cent). Of all those trained formally, the highest proportion (around 60 per cent) were employed in services sector (Table 7). That is, services sector is grabbing most of those with technical degrees, diplomas or certificates. Services account for 75 per cent of all those between 15 and 59 in the workforce who have a technical degree in agriculture/engineering/technology/medicine, while services employ only 27 per cent of the workforce in the age group (15-59). Barely 16 per cent of those with technical degrees are employed in manufacturing (Table 5). An important thing to note here is that a vast majority of workers received non-formal vocational training.

Table 7: Distribution of formally and informally vocationally trained workers (PS+SS in the age group of 15-59) within primary, secondary and tertiary sectors (per cent) in 2009-10

Sl no.	Status of Vocational training	Agriculture and Allied	Manu-facture	Non-Manufacture	Service	Total
1.	**Receiving formal vocational training**	**18.7**	**16.6**	**5.5**	**59.2**	**100**
2.	**Received vocational training: Formal**	**7.8**	**19.8**	**8.1**	**64.4**	**100**
3.	**Received vocational training non-formal, of which:**	**31.9**	**35.0**	**11.0**	**39.7**	**100**
	Received vocational training non-formal: Hereditary	*56.9*	*26.3*	*4.1*	*12.6*	*100*
	Received vocational training non-formal: Self-learning	*26.4*	*33.5*	*9.2*	*30.8*	*100*
	Received vocational training non-formal: Learning on the Job	*11.1*	*45.1*	*14.5*	*29.3*	*100*
	Received vocational training non-formal: others	*22.0*	*33.6*	*7.0*	*37.4*	*100*
	Total (1+2+3)	**26.8**	**31.4**	**8.7**	**33.1**	**100**

Source: Computed from NSS (66th Round), 2009-10

Low level of technical education in agriculture is not so much of a problem as in manufacturing. In agriculture, lack of irrigation facilities and lack of formal sector credit are the two principal bottlenecks for increasing agricultural productivity. The uninformed use of pesticides, fertilizers, hormones in livestock etc has become a major roadblock to our export effort of agricultural, horticultural, livestock and marine products .Therefore, more than skill training, what the farmers need is timely and adequate information on new varieties of seeds, fertilizers, and new farming techniques. Dissemination of this information and advice, not formal training, is crucial for improving agricultural productivity.

This advice, information and counseling have to come from those who have technical education. Technical education in agriculture is spearheaded by Indian Council of Agricultural Research (ICAR) and agricultural universities at the State and Central level and is specifically targeted at creating trained research and extension professionals. Till 2011, there were 61 agricultural universities imparting education in eight major disciplines viz, crop, horticulture, forestry, veterinary, fishery, dairy, agri-engineering, and agri-biotechnology. These institutions together produce 24000 graduates and post-graduates in a year. Given the importance of agriculture in the economy in terms of employment and livelihood, this clearly is grossly inadequate. Further, with the exception of Rajasthan and Uttar Pradesh, agricultural education as a separate stream is not imparted at the school level. Revival of agricultural extension service and periodic training of extension officers is essential for wider, timely, and correct dissemination of information to the farmers. It is not training of farmers that should be accorded primary importance, but rather focus should be given to strengthen the support system (irrigation, credit, dissemination of information) for farmers.

3. Estimating skill development on a realistic basis for 2022

The previous sections have estimated the numbers and share of the labour force that has acquired vocational training, based on an analysis of NSS data.

Since early in the 11th Five Year Plan, the National Policy on Skill Development has set a target of 500 million to be skilled by 2022 (i.e. the end of the 13th Plan) (Appendix Table 1A). There are a number of concerns with the 500 million targets for persons to be skilled by 2022. First, there is no definition of óskillô that underlies this estimate. Second, it seriously over-estimates the number of those who are to be skilled in the non-agricultural workforce, since they assume that the majority of agricultural workers will move out of agriculture. We have shown here that there is no expectation of any massive outflow of workers out of agriculture into industry and services. There were 244million workers in agriculture (or 53% of the total workforce) in 2009-10, and in the best case scenario there will be a fall to 190 million in 2020 (or to 33 per cent of the total workforce). A third reason for their overestimate is that they make no estimate of how many are currently already trained who are in the workforce; they only have an estimate of the annual flow of training capacity (of the 17 ministries and private players). Our estimate is however made based on NSS data.

As we noted above, the 500 million estimates has also been prepared without any specific definition of skill. It should be noted that for the purpose of this analysis and the estimates of the numbers requiring vocational training by 2022, the following are defined as óskilledô: i) those between ages 15-59 who have received any vocational training (VT); ii) those between ages 15-59 who have received post-secondary technical education (TE); and iii) those between ages 15-59 who received at least general education up to class 10, i.e. up to and including secondary

school. (The source of the data for all estimates presented here is NSS data.) The third category is included since the assumption is that the Right to Education will shortly be extended to class 10, i.e. all children between the ages 6 to 16 will complete 10 years of schooling by 2022 (although the current requirement in vocational training is completion of 8 years of schooling). This third category is also used since not all jobs in non-agricultural economic activity require more than a general, academic education. There will remain need for unskilled workers in the non-agricultural workforce, well beyond 2022. There will also remain need for workers with general, academic education upto at least class 10 (i.e., those who have completed secondary education). In addition, there will be need of those who are vocationally trained, as also those who have technical education beyond diploma or certificate level.

Scenario one

The labour force in 2009-10 was 470 million, and the workforce numbered 460 million.[2] Based on long term growth of labour force and work force, at the end of the 12th Plan (2016-17) the labour force is projected to be 534 million and the work force to be 523 million. It is projected that by 2022 the workforce will be 575 million. As per the census projection about 860 million people will be in the age group of 15-59 in the year 2021 and by 2022 it will be 880. Out of which about 125 million will be in education (based on the present attendance in secondary and above level of education and assuming this will increase by 20 percentage). So there will be 755 million who will not be in education, out of which, given our sex ratio, about 360 million will be female. Given the LPR for women in the age group of 15-59 at present is 34.5%, and assuming this will increase up to 50% by 2022, there will be about 180 million who will not be in the labour force. This leaves us with about 575 million (880million-125million-180million) persons who will be in the labour force by 2022. Therefore, it is assumed that there are no unemployed persons. One-third of which will be in agriculture (declining from the current share of 53 per cent). Therefore, the non-agricultural workforce in 2022 will be 385 million (Up from 215 million in 2009-10).Presently 84 million of the workforce is already trained as we show in section (43 million in vocational training (VT) up to diploma or certificate level, and 41 million at graduate level and above), and so there is no need for additional training for them. So, the number of persons to be trained (at a maximum) in 2022 will be 301 million (385 ï 84). Fifty one million are presently enrolled in higher secondary or higher level of education and not in labour force (according to the NSS 66th Round, 2009-10). It can be reasonably assumed that this 51 million would have acquired at least some form of skills by 2022, So the capacity for skill training that needs to be established by 2022 will be 250 million (301 ï 51), and not 500 million.

A correct scientific estimation is important for planning purposes. Unfortunately, based on the rather unscientific estimate of 500 million to be trained/skilled by 2022, an allocation was made in the National Skill Development Policy 2009 (endorsed by the National Council on Skill Development) to various agencies/ministries of the targets they are required to plan to train between the 11th and the end of the 13th Plan. Thus, the National Skill Development Council (NSDC) was óallocatedô 150 million to train by 2022; the Ministry of Labour was allocated 100 million, the Ministry of Human Resource Development another 50 million, and the remaining 200 million. were ódistributedô among the remaining Union government line ministries (agriculture 20 million., transport 30 million, rural development 20 million and so on). However, if the actual requirements are only just over half of the 500 million originally required to be trained, it requires a whole new strategy.

Scenario two

The above estimate of 250 million to be trained by 2022 is one scenario. We now present a second scenario (in Tables 8, 9 and 10) based on two further assumptions which were not present in the above estimate of 250 million. The first new assumption in scenario 2 is that 90 per cent of the workforce in non-agriculture (i.e. manufacturing, non-manufacturing industry, and services) in 2022 will be skilled, and only 10 per cent will not be skilled (note that our definition of ñskilledò is either the person in the workforce has vocational training or post higher secondary technical education or at least have completed 10 years of general academic education). We had no such assumption in scenario 1. Secondly, in scenario 2, we assume that the proportion of already skilled (by our definition) in agriculture will increase from 18.5 per cent in 2009-10 to 20 per cent by 2022. Four-fifth of the agricultural workforce is assumed in any case to know their job, having acquired skills informally, through the generations by receiving knowledge about farming from their parents. One should reiterate that the agricultural workforce does need counseling, advice, and information ï which will need to be provided by vocationally trained and technically educated persons. It may well be that those with secondary education already in the agricultural workforce may be among those who provide such advice and counsel, but will require some short courses to enable them to became extension workers.

The non-agricultural workforce we have assumed that by 2022 the majority, in fact 90 per cent, will have at least secondary level of education. This is consistent with the expectation that the Right to Education will be realized not only up to class 8, as in the current version of the RTE Act 2009, but up to and including class 10 (or secondary level) by 2022. In other words, it is expected that by 2022 all children up to the age of 16 years will be completing secondary level of education. This may appear to be an ambitious goal today, but recall that the goal of Sarva Shiksha Abhiyan when it was launched over ten years ago was that elementary schooling (classes 1 to 10) will be completed by all children by 2010.

Scenario 2 is an advance upon scenario 1 in the following two ways. First, it disaggregates the numbers to be ñskilledò sectorally for agriculture, manufacturing, non-manufacturing industry, and services. Second, it also disaggregates the numbers to be trained by those who should have vocational training (VT), which includes those who will have post higher secondary level of technical education (TE), on the one hand, and on the other the number of those who will at least have secondary level of general education.

We have further made two sets of estimations based on assumption of the share of agriculture in total workforce. In Table 9, we assume that, as compared to the share of the workforce in agriculture in 2009-10 of 53 per cent, that share will drop to 33 per cent by 2022. In China the share of the workforce in agriculture in 2008 was already 38 per cent, so the assumption that Indiaôs agricultural workforce share will decline over the next 10 years to 33 per cent is not unreasonable. Note also that there has been a fall in the numbers working in agriculture between 2005 and 2010 from 259 to 245 million. Hence, the assumption that this number will further fall to 190 million (i.e. 33 per cent of the 575 million large total workforce in 2022) is not entirely unreasonable. Table 10 is different from Table 9 only to the extent that we assume a more conservative decline in the share of agriculture in the total workforce from 53 per cent in 2009-10 to only 40 per cent in 2022, or the same percentage point decline in agricultureôs share in total employment that occurred between the year 2000 and 2010.

In Table 8 we present the situation as prevailing in 2009-10, based on the NSS 66th Round, and the situation we expect that should prevail in 2022. In 2022 the total workforce is projected to increase to 575 million from the 460 million in 2009-10. By our definition of ñskilledò the numbers that are already skilled is 143 million. It assumes that those who are skilled in 2009-10 will remain skilled in 2022. This implies that those skilled workers currently in the workforce are not moving out of the workforce by 2022; this is an over-simplification, since some workers over 50 currently in the workforce will indeed be 60 or older by 2022. But for the sake of simplicity, however, we assume no presently skilled worker will move out of the workforce by 2022 because most of those who are presently skilled are likely to be below the age of 50 years, partly because the median age of the Indian population is currently 24 years and partly because growth of the formally skilled training is a relatively recent phenomenon. Moreover, it is the older workers who are likely to be those with less than 10 years of general secondary education.

Table 8: Estimate of Skill Challenge for India by 2022 (in millions)

Sno.		2009-10	2022	Remarks
1.	Total Work Force	460.2	575.0	Based on projection and explanation given in the previous section
2.	Presently Skilled	143.2	143.2	Skilled is defined as the workers having either vocational training or educational level secondary and above. Here vocational training includes technical education and TE is complete sub set of VT. By this definition presently there are 143.1 million skilled workers. It is assumed that those who are skilled in 2009-10 will remain skilled in 2022. This implies that those skilled workers are not moving out of workforce by 2022.
3	Maximum additional to be Skilled	317.0	432	For 2022, this is 575 million minus 143 million (1-2). This assumes there is a need to train all agriculture workers and non-agriculture workers. What it implies is that all agriculture workers will be skilled and in non-agriculture we will not have any worker with less than secondary level education. Both these assumptions are highly optimistic.
4	Total Agricultural Workers	245.0	190.0	Here for 2022 we have assumed that agriculture's share in total workforce will decline to 33%.
5	Skilled Workers in Agriculture	45	38.0	In 2009-10, about 18.5% of the agriculture workers are skilled. We assume it to go up slightly to 20%. Total skilled workers required in agriculture by 2022 will be 38 million. Only a slight increase is assumed since most with secondary education presently in agriculture will move out of agriculture.
6	Less than secondary level Workers in Agriculture	200	152.0	This is the difference between total agriculture workers and skilled workers in agriculture (4-5)
7	Total Non-Agricultural Workers	215.2	385.0	This is the difference between total workforce and total agriculture workers (1-4)
8	Skilled Workers in Non-agriculture	97.4	347.0	In 2009-10 about 45% of the non-agriculture workers are skilled by our definition. We assume this percentage will double by 2022, and only 10 percentage of non-agriculture workers will have less than secondary education.
9	Less than secondary level Non-Agl Workers	110 (51%)	38.0 (10%)	In 2022 it is assumed that not more than 10% of non-agriculture workers will have less than secondary level education
10	Total Skilled Workers	143.2	385.0	In all sectors ï skilled workers in agriculture + non-agriculture (5+8)
11	Total workers with Less than secondary level	317 (460-143)	190.0 (152 + 38)	In all sectors
12	Additional Requirement for 2022		249	Total skilled workers by 2022 will be 385, out of which 143 are already skilled. Thus, 242 million additional are required to be trained. However, in 2009-10 in agriculture 45 million workers are skilled. But in 2022 we need only 38 million. Therefore, 7 million skilled agricultural workers moving out of agriculture need to be trained in non-agricultural trades. Therefore additional to be trained are (385-143+7)

Source: Authorsô estimate based on NSS 2009-10

Table 9: Distribution of 575 million and additional skilled workers by sectors and by skill Level, assuming share of agriculture will come down to 33 per cent by 2022

	Agriculture and Allied	Manufacture	Non-Manufacture	Service	Total
Less than secondary level education in 2022	152	13	16	10	191
Skilled in 2009-10	45	24	10	64	143
Additional to be trained by 2022	(-)7	61	20	161	249 (242+ 7)
Total Skilled 2022	**38**	**85**	**36**	**225**	**389**
VT (Formal and informal) of the total skilled	*8*	*51*	*14*	*43*	*116*
Secondary and Above of the total Skilled	*30*	*34*	*22*	*182*	*268*
Total	**190**	**98**	**52**	**235**	**575**

Source: Authorsô estimate based on NSS 2009-10

Table 10: Distribution of 575 million and additional skilled workers by sectors and by skill level assuming share of agriculture and allied sectors come down to 40 per cent

	Agriculture and Allied	Manufacture	Non-Manufacture	Service	Total
Less than secondary level education	184	10	15	6	215
Skilled in 2009-10	*45*	*24*	*10*	*64*	*143*
Additional to be trained by 2022	*01*	*52*	*22*	*142*	*217*
Total Skilled 2022	**46**	**76**	**32**	**206**	**360**
VT (Formal and informal) of the total skilled	*10*	*45*	*13*	*42*	*111*
Secondary and Above of the total Skilled	*36*	*31*	*19*	*164*	*250*
Total	**230**	**86**	**47**	**212**	**575**

Source: Authorsô estimate based on NSS 2009-10

Note: For arriving at a distribution of the workforce by sectors and by skill level it is assumed that the ratio of skilled to unskilled (less than secondary education) workers in industry is assumed to be 80:20 and for services it is 96:4 (since even high school general education is treated as a skill in case of services sector). In fact these are very ambitious targets

Of the 190 million who will be agricultural workers in 2022, we have estimated that 20 per cent of them will skilled (i.e. 38 million). In 2009-10, 18.5 per cent of the agricultural workforce or 46 million have either a secondary education or vocational training. The remaining 80 per cent, we take it, already have informal or hereditarily acquired farming skills. Note that not only will the workforce numbers in agriculture decline in both relative and absolute terms, but most of those youth who acquire secondary education in rural areas who currently come from farming households will tend to move out of agriculture into non-agricultural employment by 2022.

The total number of workers in non-agricultural sectors in 2009-10 is 215 million, which is expected to rise to 385 million by 2022. In 2009-10 about 45 per cent of non-agricultural workers are skilled (or 97 million workers, the majority of whom have at least secondary education). We assume that this percentage will double by 2022, and only 10 per cent of non-agricultural workers are assumed in scenario 2 will have no VT or technical education or have less than secondary education. In other words, the number of non-agricultural workers with less than secondary level of education is anticipated to decline from its 2009-10 level of 110 million to 38 million in 2022. In other words, the total number of skilled workers is anticipated to increase from 143 million in 2009-10 to 385 million in 2022 in all sectors, and correspondingly the total number of workers with less than secondary education is anticipated to decline from 317 million to 190 million in all sectors taken together.

Thus, by the definition of ñskilled workersò elucidated at the beginning, the skilled workers by 2022 will be 385 million, out of which 143 million are already skilled. Thus, 242 million additional workers are required to be trained between 2010 and 2022. However, in 2009-10 in agriculture 45 million workers are already skilled and in 2022 we need only 38 million skilled workers, given the expected absolute and relative decline in the total agricultural workforce. In other words, we anticipate that 7 million skilled workers will move out of agriculture into non-agriculture giving a total of 249 million additional workers to be skilled by 2022. (This final estimate of 249 million is marginally different from the estimate of 250 million discussed earlier in scenario 1 in this section on account of the two differences in assumptions that we have introduced, as discussed earlier).

Scenario three

As discussed earlier, there will be approximately 880 million people in the population aged 15-59 years in 2022 as per Census estimates. Keeping in mind the rising gross enrolments rates in all levels of education,[3] there will be 850 million people. Given our sex ratio, there will be 440 million males and 410 million females in the working age group. It is assumed that the LFPR (for those out of education) between the age of 15-59 for males rises from 83.6 per cent in

2009-10 to 90 per cent in 2022 and for females from 34.5 per cent in 2009-10 to 45 per cent in 2022. Accordingly the labour force is estimated at about 580 million. Table 11 shows the estimation of the additional number of people to be skilled.

Table 11: Estimating the number and share of labour force to be skilled by 2022

S.no.	*Description*	*At least Secondary Education*	*Formal Vocational Training*	*Informal Vocational Training*
	Situation in 2009-10			
1.	Absolute numbers (millions)	125	10	32
2.	Share of Labour Force (430 million) (%)	29	2.5	7.6
	Targeted by 2022			
3.	Share of Labour Force (580 million) (%)	60 (given higher GER for post secondary education)	25 (given skill development initiatives both in public & private sectors)	10 (in view of large numbers of entrants to labour with no levels of education)
4.	Absolute numbers (millions)	348	145	58
5.	Assuming exit of 10% of already trained workers aging 60+ (million)	13	1	3
	Additional to be skilled by 2022			
6.	(4) ï (1) ï (5)	236	136	55

Source: Authorsô estimate based on NSS 2009-10
Note: These three are not mutually exclusive or exhaustive categories, and therefore do not add up to 580 million

Assuming that formal vocational training can be imparted on completion of secondary education (i.e. excluding 8th class graduates getting training, the proportion of which is very small), those continuing general higher secondary education and beyond would be 100 million (236-136 million). In addition, we expect that those who are currently only informally vocationally trained, majority of whom are in agriculture and the unorganized sector, would also need recognition of their prior learning and provision of short-term vocational training. Thus, the additional requirements for training can be summarized in Table 12.

Table 12: Numbers to be skilled by Education Level in 2022

Target for 2022	Additional training requirements (million)
Formal Vocational Training	*136*
VT for those Informally trained	*55*
General education higher secondary & beyond	*100*
Total	**291**

Source: Authorsô estimate based on NSS 2009-10

Assuming the current level of 2 per cent unemployment rate to prevail ï taking into account higher unemployment rates with rising levels of education[4] ï the estimate for workforce turns out to be about 570 million. The workforce is then accordingly divided into different sectors depending upon the expected number of workers to join each sector in the next decade: agriculture, manufacturing, non-manufacturing (i.e. construction, mining, electricity, water supply) and services.

The share of agriculture in employment was 60 per cent in 2000 which fell to 53 per cent in 2010. It is expected to fall even further to 40 per cent with more and more workers moving out of agriculture. With the New Manufacturing Plan and investments in infrastructure sector doubling from $500 billion in the 11th Five Year Plan to approximately $1 trillion in the 12th Five Year Plan alone, the industry sector (manufacturing, construction, mining, electricity and water supply) is expected to absorb more than 60 million additional workers over the next decade. Also, the service sector which provided 22 million new job opportunities in the past decade (1999-2000 to 2009-10) is expected to expand even at a higher pace creating employment for around 60 million workers in the sector by 2022. Accordingly, the share of workers in each sector in 2022 is noted in the last column of the Table 13.

Table 13: Distribution of Workers by Sectors by 2022

Sector	*Number of workers in 2009-10 (million)*	*Share in employment in 2009-10 (%)*	*Additional workers to join during 2012-2022 (million)*	*Expected Number of workers in 2022 (million)**	*Share in employment in 2022 (%)*
Agriculture	245	53	-17	228	40
Manufacturing	51	11	27	78	14
Non Manufacturing	48	10	40	88	15
Services	116	25	60	176	31
Total	**460**	**100**	**110**	**570**	100

Source: Authorsô estimate based on NSS 2009-10

Note: * Workforce of 570 million is for the age group-15-59 years (used for approximation)

In 2004-05 and 2009-10, the proportion of vocationally trained (including technical education) workers in the workforce was 10 percent - two per cent with formal vocational training, while the remaining with informal training.

NSS data has been used to estimate the share of those currently in the workforce of each of agriculture, manufacturing, non-manufacturing, and services that have vocational training (both formal and informal). That share comes to 5, 27, 8 and 17 per cent (Table 6) respectively (in 2009-10). Since a tiny proportion of them are formally trained, the challenge is two-fold: those informally trained already in the workforce must be given formal training and certification (this can be achieved through recognition of prior learning and more MES type courses), plus those youth (over 14) entering the labour shall have to be formally trained.

In estimating the number of workers to be formally trained by 2022, sector-wise ratio of formally vocationally trained to non-VT workers is used. Non-vocationally trained workers include all those having informal training or no training at all. For instance, a ratio of 2:98 is used for agriculture implying that at least 2 per cent of the agricultural workers need to be formally vocationally trained by 2022. Only 0.4 % of the agricultural workforce is currently formally trained. In agriculture we assume quadrupling of the number of those with formal vocational training from 0.9 million in 2009-10 to 4.6 million in 2022. The comparable ratios for manufacturing, non-manufacturing and services are expected to be 60:40 (from 4% formal VT), 25:75 (from 2% formal VT), and 40:60 (from 6% formal VT) respectively (Table 6). These are the desired ratios of formally vocationally trained to those with no vocational training in the workforce in each of these sectors. In other words, the main challenge is to convert the share of those with VT (both formal and informal) to a situation in which by 2022 the share of workers having informal training presently will have formal VT in 2022. Given the skill development initiatives being undertaken by both the public as well as the private sector, over the next decade (given the desired sector-wise ratios) it is expected that the share of formal vocationally trained workers will rise to 25 per cent (from 2% in 2009-10) by 2022 in the entire economy.

The total number of those in the workforce with formal vocational training will then go up from 10 million in 2009-10 to 144 million by 2022. Therefore, the additional number of workers to be formally vocationally trained is 134 million, detail of which is presented in Table 14.

Table 14: Workforce formally vocationally trained by economic sector: 2009-10 and 2022 (in millions)

	2009-10	2022	Additional Requirement
Agriculture and Allied Activities	0.9 (0.4)	4.6	3.7
Manufacturing	1.8 (3.8)	46.8	45.0
Non-Manufacturing	0.7 (1.7)	22.0	21.3
Services	6.1 (5.5)	70.4	64.3
Total	9.5 (2.3)	143.8	134.3*

Source: Authorsô estimate based on NSS 2009-10
Note: Figures in parentheses are shares of workforce within each sector. The 136 million estimate of Table 12 is for those in the labour force

Box 1

How realistic is 347 million incremental skilled workers requirement projection by NSDC

As per the estimates of a study commissioned by NSDC, incremental shortfall for personnel (both skilled and unskilled) by the year 2022 will be 347 million in the non-agricultural sectors (Appendix Table 2A). This is actually an over estimation of the workforce for the following reasons:

1. The present workforce in the country is 460 million. If we add 347 million to the present workforce of 460 million, the workforce in the year 2022 will be at least 807 (460+347) million.
2. The 347 million reported is only in 20 focus non-agricultural sectors, including informal employment. If we add 200 million agricultural sector workforce (assuming that workforce dependent on agriculture come down by 40 million in the next 10 years and the economy maintains a reasonably high growth rate of 7-8 per cent per annum for the next 10 years), the size of the workforce will cross 1000 million. Added to this, if the workforce of the remaining sectors (other than the 21 high growth sectors) is included, this number will go up further. Implying, that the workforce for the entire economy will be well over 1000 million in the year 2022.
3. As explained in scenarios one and three, total labour force cannot be more than 585 given that the population in the age group 15-59 years in 2022 will be 880 million as per Census estimates.
4. Therefore, more than 1000 million workforce that we are arriving at based on the 347 million incremental persons needed in 2022 is clearly a huge outlier and gross over estimation. .

4. Conclusion

Improvement in quality and reduction in supply-demand mismatch by 2022

While the estimated number of people to be skilled is coming to about 291 million additionally by 2022, it is important here to make an extremely significant observation about those who are currently in the workforce that are skilled as well as those who are additionally required to be skilled. There are 2 major problems with the existing workforce that is already supposed to be skilled. First, is the poor quality of those who have general education up to secondary level or those having vocational training (including post secondary level technical education), and hence employability. The second problem that employers are known to complain about is the mismatch between the skills that are currently available in the educated or trained labour force on the one hand, and the type of skills that are actually in demand from employers, on the other. This supply-demand mismatch and the quality problem will have to be addressed over the course of the next decade simultaneously with a very sharp quantitative expansion in capacity of those to be educated or vocationally trained. Hence, while the quantitative challenge might appear reduced from 500 million to 291 million by 2022, the quality-related challenge (in respect of the 143 million in the workforce who already have either general education up to secondary level or VT or technical education of graduate level and above) remains considerable.

Whether we assume that the share of agriculture in workforce will come down to 33 per cent (Table 9) or 40 per cent (Table 10) the challenge, even in quantitative terms remains very significant. In Tables 9 and 10 the distribution of the requirement by economic sector for skilled workforce in 2022 is estimated. The assumption is that the share of óskilledô as defined earlier will remain the same in 2022 as in 2009-10. In Table 9 we have estimated by sector that the number of skilled persons that should prevail in 2022 means that the 24 million in manufacturing who are currently skilled in 2009-10 must rise to 85 million by 2022; in non-manufacturing industry it must rise from 10 million to 36 million; and in services from 64 million to 225 million.

If the current share of those who are vocationally trained (formal or informal) among the total skilled is to remain constant between 2010 and 2022 then of the 85 million in manufacturing that will be skilled in 2022, 51 million will be vocationally trained and the remaining 34 million will have at least secondary level of general education. In non-manufacturing employment, most of which is in construction sector, of the 36 million who will be skilled in 2022, 14 million will have vocational training and the remaining 22 million will have at least secondary level of general education. In services, of the 225 million that will be skilled in 2002, nearly 43 million are anticipated to have vocational training, and the remaining 182 million will have at least secondary level of education. These sectoral numbers of the total

skilled in 2022 are somewhat smaller in Table10 only because the share of the workforce of 575 million in 2022 that remains in agriculture is assumed to be larger at 40 per cent (as compared to 33 per cent in Table 9). Both the quantitative as well as qualitative challenge for skill development remains stupendous by any measure or scenario that eventually is realized.

End Note:

1. Technical education is defined (in NSS 66th Round 2009-10) as those who have a technical degree in agriculture/engineering/technology/medicine etc.; those with a diploma or certificate below graduate level again in agriculture/engineering/technology/medicine/crafts/other subjects; and finally, a diploma or certificate equivalent to graduation and above level in the same subjects.

2. Labour force is the economically active part of the population, which supplies (when employed) or does not supply but seeks to supply (when unemployed) labour for economic activity. Workforce consists of those who are in some kind of employment that is excludes those who are unemployed.

3. Assuming gross enrolment rates for secondary and higher secondary education to be 90 per cent and 65 per cent respectively (as stated in the Employment and Education chapters of the 12th Five Year Plan), it is expected that around 30 million people over 15+ will be continuing into education and therefore will be withdrawing from labour force.

4. While the overall unemployment rate according to UPSS in 2009-10 was 2 per cent, unemployment rate for those with higher secondary education level is 5%, with diploma/certificate level 10 % and for graduates and post graduates in 7%.

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Appendix

Table 1A: Targets for workers to train by NSDC and Union Ministries by 2022

Ministry/Department/Orgnisation	Projected number of trained persons by 2022 (in million)
National Skill Development Corporation	150
Labour & Employment	100
Tourism	5
Textiles	10
Transport	30
Tribal Affairs	
Rural Development (RUDSETI) and IL & FS	20
Women & Child Welfare	10
Agriculture	20
HRD Higher Education HRD Vocational Education	50
Dept. of Heavy Industry	10
Urban Development	15
Department of Information Technology	10
Food Processing Industries	5
Construction Industry Development Council (under Planning Commission)	20
Health & Family Welfare	10
Micro Small Medium Enterprise	15
Social Justice & Empowerment	5
Overseas Indian Affairs	5
Finance-Insurance/Banking	10
Consumer Affairs	10
Chemicals & Fertilizers	5
Others (Power, Petroleum etc.)	15
Total	530

Source: Government of India (2009)

Table 2A: Sector wise Incremental Requirement for Skilled Personnel.

S.No.	Sector/Industry	Incremental requirement for human resources by **2022** (million)
1	Building and Construction Industry	33
2	Real Estate Services	14
3	Gem and Jewellery	4.6
4	Leather and Leather Goods	4.6
5	Organized Retail	17.3
6	Textile and Clothing	26.2
7	Electronic and IT Hardware	3.3
8	Auto and Auto Components	35
9	IT and ITES	5.3
10	Banking, Finance Services and Insurance	4.2
11	Furniture and Furnishing	3.4
12	Infrastructure Structure	103
13	Tourism and Hospitality Services	3.6
14	Construction Material and Building Hardware	1.4
15	Chemicals and Pharmaceuticals	1.9
16	Food Processing	9.3
17	Healthcare	12.7
18	Transportation and Logistics	17.7
19	Media and Entertainment	3
20	Education and Skill Development Services	5.8
21	Select informal employment sectors (domestic help, beauticians, facility management, security guards)	37.6
	Total Incremental requirement for skilled personnel	**347**

Source: Chenoy D. (2012)