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Vocational training in India: determinants of participation and effect on wages

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Abstract

Background: India is at the cusp of a population change and is currently undergoing the phase of 'demographic dividend'. This has thrown a challenge towards the policymakers to ensure that there are enough employment opportunities for the ever-increasing labour force. One of the areas where improvement is urgently required in India is skill development. This paper attempts to identify the factors, which affect an individual's participation in vocational training using nationally representative National Sample Survey Office (NSSO) data. Further, we investigate the impact of vocational training on the wages of an individual at overall and sectoral levels.

Methods: For addressing the first question of factors that are associated with participation in vocational training programmes, we will be applying logit and multi-nominal logit models. The explanatory variables will broadly be social and economic indicators of the individual as well as the individual's household characteristics. The second issue of identifying the effect formal vocational training on wages will be analysed through a multiple regression model.

Results: We found that being an urban dweller increases the odds of participating in formal vocational training. Further, being male increases the odds of receiving formal vocational training. We found that having formal training increases the wage by 4.7% in the overall economy as compared to a person without any training. The effect is highest in the primary sector, where the individuals with vocational training had a wage increase of 36.9%. Workers with formal vocational training in the secondary sector had an increase in wages by 17.6%.

Conclusions: The analysis done in the paper reveals that formal vocational training is associated with higher wages with the effect being the highest in the primary sector. Being male and urban dweller improved the odds of participating in formal vocational training. The model suggests that there exist good economic returns, which are associated with formal vocational training, and hence, it makes sense to invest resources in vocational training.

Keywords: Vocational training and education, Wages, Skill development, Student attributes, India

JEL Classification: I21, I26, J24, P46

Introduction

India's economic growth has received appreciation and recognition globally. Over the last 3 decades, the transformation of the Indian economy has been quite remarkable and conspicuous. The growth of per capita income, which was a little over 1% prior to 1980 jumped to over 4% per annum in years afterward. India's economic growth rate in the beginning of the 21st century was among the ten highest in the developing world. The country achieved an average growth rate of around 8% in the period from 2001–2002 to 2005–2006 (Krueger 2013). However, this growth has attracted a lot of criticism as well. The 'inclusivity' of this growth has always been a point of contention with the growth of India often being labelled as 'jobless growth'. The population growth of India has been declining over many years, yet the labour force is projected to grow by close to 2% or some 7 million or more per year over next few years. Modernisation and social processes have led to more women entering the work force, lowering the dependency ratio from 0.8 in 1991 to 0.73 in 2001 and is expected to further decline to 0.59 by 2011 (Goel 2017). The dependency ratio has indeed declined to 0.55 in 2011 and further reduced to 0.51 as of 2016. Simply put, that in the coming times, there would be more number of people who would be looking for a job in India every year.

India is currently in a unique position where both the employers requiring skilled workers and the employment seeking population are facing issues. It is expected that the Indian manufacturing sector would require labour force of 20 million, which in turn would necessitate the training of 1.5 million technicians every year (McKinsey 2004). A survey on 'labour/skill shortage for industry' of over 100 companies by the Federation of Indian Chambers of Commerce and Industry (FICCI 2011) found that 90% of respondents (companies) were facing a shortage of labour. About 89% of the respondents said that they have been unable to meet the potential demand for their products in the market due to labour shortage. On the other hand, as India never saw an economic boom in the manufacturing sector it has become very difficult to provide jobs to the unskilled and semi-skilled population. This problem is further aggravated by the fact that the country does not have enough extensive Skill Development programs to bridge the gap and make people employable. Vocational education and training is defined as the educational and training programs designed for achieving a particular job or type of job in the labour market (OECD 2010). Even after almost 50 years of independence, Industrial Training Institutes (ITIs), which are important government run centres for imparting vocational training in India, were able to cater to only 660,000 youth in the year of 2002. During the 10th Five Year Plan period of 2002–2007, the number rose to only 750,000. Hence, the skilling of the labour force has been insufficient in the country further worsening the employability of the masses, especially the youth. Briefly, there is a mismatch between the demand and supply of labour (Agrawal 2012). This paper is an attempt to see which factors determine the participation of an individual in vocational training. Further, we will try to assess the impact of the skill training received through vocational courses on the wages an individual receives.

Literature review

Based on 61st round of NSSO survey (2004–2005), only 4% of the population between 15 and 29 years had received (or was receiving at the time of survey) formal vocational education & training (VET) and 8% of that age group had received non-formal VET. A vast majority of the population (89%) in that age group do not have any sort

of VET. A high unemployment rate for vocational graduates was found but the rate was slightly lower than the unemployment rate of general secondary graduates in the age group. Daily wages of both casual and regular/salaried workers of people with VET were found to be higher than general secondary graduates in males as well as females (Agrawal 2012). From 61st round of NSSO survey (2004–2005) to 66th round of NSSO survey (2009–2010), the population in the age group of 15–29 years who had received formal vocational education reduced from 2.37 to 1.96% and those who had received non-formal vocational education declined from 7.74 to 4.80%. Although unemployment rate among the formal VET graduates has decreased by 2 percentage points from 2004 to 2009, still around one-fourth of formally trained labour force remained unemployed (Agrawal 2014). Returns to vocational education were found to be significantly higher than returns to general secondary general education using Mincerian wage function approach on data from 68th round of NSSO survey (2011–2012) of those people who have received vocational education in the age group of 15–59 years. Average daily wage of formal trainees was found to be much higher than non-formal trainees suggesting that VET was indeed helpful from an earnings point of view. The unemployment rate of formal trainees who mainly worked in the tertiary sector though, was found to be much higher than rate of unemployment of informal trainees who mostly worked in the primary and secondary sectors (Agrawal and Agrawal 2017).

Manufacturing sector can provide meaningful employment on a large scale. In a study by Banerjee (2016), participation in the manufacturing sector was found to increase across all social groups with VET. However, the participation as wage workers increased to lesser extent in socially backward castes (OBCs, SCs, and STs) than General category workers. VET was also found to enhance wages in the manufacturing sector overall. The wage differential among manufacturing workers with VET was found to be lesser between General category and all socially backward workers than the wage differential between them without VET. VET had improved the conditions of all social groups in the manufacturing sector but it does not do much to remove the social inequality existing in the Indian manufacturing sector.

Previous studies have also reported the same positive effects of vocational education with the same caveats, in other developing countries. Technical and Vocational Education and Training (TVET) in several African countries was found to start at the secondary school level and taken up by students belonging to families with a financial burden preventing them from accessing general secondary education. TVET was seen to occupy a small and marginal position in the schooling system of Africa, mostly taken up with the hope of joining the labour market and early income (Oketch 2007). When allowed for selectivity, a much higher return for vocational education was found over and above general education at the same level in Thailand (Moenjak and Worswick 2003). Vocational stream graduates employed in occupations related to their field of study had significantly higher earnings than regular academic stream graduates in Brazil (Arriagada and Ziderman 1992). Men in Egypt with vocational education had a 29% higher rate of return over men having education till the general secondary level. This rate however, was found to be only 2% higher in women (El-Hamidi 2006). Vocational high school education was found to be a low risk investment strategy in Turkey. Children with humble backgrounds were found more likely to be enrolled in a vocational school compared

to children whose parents held a managerial position. Women who received vocational education were found to have a higher probability of employment (Tunali 2002). Salaried earnings in women were found to rise substantially due to increased employment, better access to jobs and increase in productivity when unemployed youth belonging to the lowest two strata in population were randomly provided training in Columbia (Attanasio et al. 2011).

Contrasting sets of evidence also exist which find academic education to be better than vocational education as per the labour market outcomes. Returns to vocational training were found to be higher than academic education at the lower levels of education and lower than academic education at the higher levels of education (Kahyarara and Teal 2008). The returns to general or academic education in Suriname for both the genders were found to be exceeding the returns to vocational or technical education from both private as well as social perspective (Horowitz and Schenzler 1999). Employment prospects and earnings were found to be lower for vocational school graduates in newly industrialized countries of Taiwan, Singapore, South Korea and Malaysia than academic graduates (Tzannatos and Johnes 1997). Very little difference was found between the returns of technical and formal education in Singapore. Returns to technical education were found to be higher among women at the secondary level whereas the returns to formal education were found to be higher among men at the same level (Sakellariou 2003). Most students in Australia were found not to complete their VET and discontinue their studies as soon as they have gained employment or after the obtainment of the specific skills they were seeking (Fieger 2015).

Numerous studies have shown the benefits of vocational education in developed countries too. Though vocational education hinders students' chances of moving onto higher education and thus hindering their chance of entering highly prestigious occupations, it provides a safety net for students who are unlikely to receive further education. Higher education dropouts in Germany without pre-tertiary vocational qualifications were found to have greater difficulties in finding a job compared to such dropouts with pre-tertiary vocational qualifications indicating that VET does serve as a safety net in case of dropouts (Scholten and Tieben 2017). Vocational education increased chances of employment for secondary graduates in the US and helped them in becoming skilled workers rather than unskilled workers (Arum and Shavit 1995). Earning gains of 8 percent were found for vocational school graduates working in their training related jobs over workers who followed normal US high school curriculum (Campbell et al. 1987). Students who take up vocational education tended to be of lesser academic ability and came from a lower socio-economic background and their parents were less educationally qualified. For such students who do not take up higher education in Israel, vocational schooling was found to be more cost effective and graduates with vocational training earned more than general secondary school graduates if they worked in closely related occupations to their field of vocational study (Neuman and Ziderman 1991, 1999). Vocational qualifications have a high value for individuals of low ability and those who work in low skill jobs. However, wage premiums were found to be higher from academic qualifications than vocational qualifications in Britain in absolute terms. But the wage gap reduced to a large extent when the time taken for acquiring academic degrees was controlled for as vocational degrees take much shorter time to complete (Dearden

et al. 2002). Governments of industrialized countries provide VET through the educational system to improve the job opportunities of youth who do not possess the skills demanded of them in the labor market and the ability, funding or motivation to pursue higher education (Eichhorst et al. 2015). Workers in United States were found to reap substantial benefits from training provided both inside the firm and outside the firm. Wages of workers who received training outside the firm were found to be ten percent higher while the wages of workers who received training inside the house were found to be eight percent higher (Lengermann 1996). No difference in long-term wages was observed for individuals of basic vocational programs who were additionally provided with an extra year of general education in Netherlands (Oosterbeek and Webbink 2007). Positive labour market outcomes were observed for individuals in Australia who had not completed high school at all levels of VET qualifications. However, similar outcomes were observed for individuals who had completed high school at only diploma or higher levels of VET qualifications (Lee and Coelli 2010).

A systematic review of 26 studies found the impact of TVET interventions on monthly earnings, overall paid employment and formal employment to be positive and significant albeit the effects being small, in youth from middle to low-income countries (Tripney and Hombrados 2013). Overall, a large number of empirical studies, both in developing and developed countries setting, showed that vocational education was found to increase participation, employability, probability of employment and wages of the workers who received it in all kinds of countries.

In Indian context, there have been few studies, which have used the dataset used in the present paper. Banerjee (2016) in her analysis found that participation in the manufacturing sector was found to increase across all social groups with VET. Agrawal and Agrawal (2017) found evidence of higher returns to VET as compared to general education. They further found that there exists mismatch between skills attained through VET and the field of employment in which these people worked. Our paper makes important contribution to the existing literature on the vocational training in India. The research objective of our paper is twofold. Firstly, we identify the factors, which are associated with an individual's participation in vocational training. Secondly, we investigate the impact of formal vocational training on the wages of an individual at overall and sectoral levels. To the best of our knowledge, there is no econometrics-based studies, which tried to find out the factors associated with individuals' decision to participate in vocational training in India. The returns to vocational training at three major sectoral level is also a significant contribution to literature as the authors were not able to identify any such study for India.

Skill development in India: a discussion

Usually, a growing economy banks on agriculture in its initial phases, which is followed by a high growth phase in its manufacturing sector and finally leading to a strong service sector growth. In the case of India, the 'high growth phase of the manufacturing sector' was more or less absent in its growth take-off. As Table 1 suggests, the growth in Agricultural and industrial sectors was never able to match the consistent and strong growth of the Services sector after the 80s. The share of services increased from 30% of gross domestic product (GDP) in 1950–1951 to a mammoth 57% in 2008–2009. On the other

hand, agriculture's share has declined from 55% to less than 17% during the same period (Eichengreen and Gupta 2011). Owing to consistent GDP growth and a strong service sector, job opportunities for the highly skilled are relatively easily available. However, in a developing country only limited population has access to quality higher education. The situation in India is no different. Hence, a large section of population has found it difficult to be employed in productive activities. In fact, it is feared that if the issue of the employment is not addressed soon enough, India may not be able to fully capitalize on the demographic dividend that it is currently experiencing.

The system of skilling of India in the form of vocational training is facing a multitude of problems. The ecosystem of skill training is unable to cope with demands in terms of quantity, quality and relevance as expected from the industry. A survey of ITIs found shortage of trained teachers/instructors. Moreover, many instructors were not at par with the new technologies and needs of the modern industry. Many ITIs had actual staff strength much lesser than the sanctioned posts. Apart from this, the apprenticeship system of India is also very weak. India has 270,000 apprentices in an economy that has 460 million persons of working age. Since the Indian economy is very dynamic, the training imparted in ITIs alone may not be sufficient for acquiring a skill. Training in the actual work environment by the experts is necessary. Although Apprentices Act of 1961 has been implemented to promote apprenticeship, private enterprises have not shown much enthusiasm for offering apprenticeships. This may be because there is no incentive for them to do so and because of the fact that they have to bear the costs for it.

Lately many initiatives have been launched to improve the situation. The government has realised the importance and need of reaping maximum benefits from its demographic dividend. National Democratic Alliance government has set up a new ministry of Skill Development and Entrepreneurship. The National Youth Policy (2014) and the proposed National Employment Policy will prioritize skill development and tackle the problems identified with the VET. It has also taken other important steps like redesigning the curriculum of around 10,000 vocational schools, expanding women ITIs, setting up of National Career Service portal, implementing the Standard Training Assessment and Reward scheme and maintaining a central repository, namely Skill Development Management System, which can be utilised by various stakeholders. Apart from these,

Table 1 Sector wise growth in India (y-o-y growth). Source: Authors' calculations based on Data from Ministry of Statistics and Program Implementation, Government of India

Period	Total	Agriculture	Industry	Services
1st plan 1951–1956	3.6	2.9	6.0	3.7
2nd plan 1956–1961	4.3	3.3	6.5	4.6
3rd plan 1961–1966	2.8	– 0.3	6.9	5.1
4th plan 1969–1974	3.4	2.8	3.0	4.0
5th plan 1974–1979	4.9	3.6	6.2	5.4
6th plan 1980–1985	5.5	5.8	5.3	5.8
7th plan 1985–1990	5.7	3.0	6.6	7.5
8th plan 1992–1997	6.5	4.8	7.1	7.3
9th plan 1997–2002	5.7	2.5	4.6	8.2
10th plan 2002–2007	7.6	2.4	9.2	8.8
11th plan 2007–2012	8.0	4.1	7.7	9.4

there are various reforms, which are being carried out in Craftsman Training Scheme of the ITIs and Apprentices Act of 1961. Further, the initiatives like National Skills Qualification Framework facilitating mobility from vocational to general education and vice versa, Labour Market Information Systems to plan the skill training more efficiently, National Employability Enhancement Mission focussing on the job practical training, among others have been undertaken.

A third of India's population was below 15 years of age in 2000 and close to 20 per cent were young people in the 15–24 age group. The population in the 15–24 age group grew from around 175 million in 1995 to 190 million in 2000 and 210 million in 2005, increasing by an average of 3.1 million a year between 1995 and 2000 and 5 million between 2000 and 2005. In 2020, the average Indian will be only 29 years old, compared with the average age of 37 years in China and the US, 45 in west Europe and 48 in Japan. The responsibility of using this to our advantage lies in the hands of the Government. This has potential to be a crucial resource for a country but also can turn into a liability if not handled well (Chandrasekhar et al. 2006). There is a need to develop an effective and innovative pro-poor and gender aware informal economy strategy to achieve decent and productive outcomes from skill development programmes (Agrawal 2014).

Skill training in India—current status

The official sample survey on employment showed that the proportion of age group 15–29 years population that had received/were receiving formal training increased by a meagre 0.1% from 2004–2005 to 2011–2012. Between 2004–2005 and 2011–2012, the skilled working population almost remained stagnant, in spite of decent economic growth registered by the country in the same period (Table 2). Another important finding was that majority of the skilled population acquire skills through non-formal training, which includes hereditary passing of skills, self-learning, or on-job acquisition of skills etc.

The data further showed that out of those who rely on non-formal vocational training for upgradation of their skills, the reliance on learning on the job was more in urban areas and total population (Table 3), which show the skill levels of those in job force are clearly below the required levels. The other methods of non-formal vocational training included hereditary and self-learning, which are clearly not the optimal way for acquiring the skills. Further, the non-formal vocational training also means that labour skilled through these methods do not have certification to back their skills, which in-turn may lead to lower employability and low wages from point of view of labour. From the employer's perspective, hiring the labour without any formal training may be detrimental to productivity and efficiency.

As far as the employment status of those who received or were receiving formal vocational training is concerned, more males were found to be employed as compared to their female counterparts. Further, the employment of vocationally trained or being trained persons was higher in the urban areas rather than rural areas, may be indicating better absorption of skilled labour in these areas (Table 4).

Table 2 Population who received/are receiving vocational training per 100 persons (15–29 years of age)—changes over time. Source: NSSO (2015) and NSSO (2006)

Sectors	Gender	Received/receiving formal training		Received non-formal training	
		2004–2005	2011–2012	2004–2005	2011–2012
Rural	Male	2.5	3.1	11.9	9.0
	Female	1.8	1.9	6.2	4.9
	Total	2.2	2.5	7.9	7.1
Urban	Male	8.5	7.1	9.2	11.7
	Female	6.4	6.2	4.9	3.9
	Total	7.6	6.7	7.3	7.9
Total	Male	4.3	4.4	9.4	9.9
	Female	3.0	3.2	5.9	4.6
	Total	3.7	3.8	7.7	7.3

Table 3 Population who received/are receiving vocational training per 100 persons (15–59 years of age)—detailed description. Source: NSSO (2015)

Gender	Receiving formal vocational training	Received vocational training					Received/receiving vocational training	Did not receive vocational training
		Formal	Non-formal					
			Hereditary	Self-learning	Learning on the job	Others		
Rural								
Male	0.8	1.6	4.8	1.8	4.2	0.3	12.7	86.4
Female	0.3	0.9	2.4	1.3	1.4	0.4	6.4	93.1
Total	0.5	1.3	3.7	1.5	2.8	0.4	9.6	89.7
Urban								
Male	1.9	5.0	2.2	2.8	8.2	0.5	18.6	79.4
Female	1.3	3.3	0.9	1.2	1.6	0.6	7.6	91.1
Total	1.6	4.2	1.6	2.0	5.0	0.5	13.3	85.0
Rural + urban								
Male	1.1	2.6	4.0	2.1	5.5	0.4	14.6	84.2
Female	0.6	1.6	2.0	1.3	1.5	0.4	6.8	92.5
Total	0.9	2.2	3.0	1.7	3.5	0.4	10.7	88.3

Data and methodology

In the present study, we have used the 68th round of National Sample Survey Office (NSSO) data (2011–2012) to investigate and empirically analyse the issues related to the skill development in India and 61st round of NSSO has been used in the preceding section for understanding the broad changes in the situation. The sample survey is carried out throughout India and is nationally representative in nature. The 61st round of NSSO pertaining to year 2004–2005 was the first time that data related to vocational training was collected by this government agency. The survey was designed in a way that it captured the factors affecting people's enrollment and participation in the vocational training programmes apart from various others things. Thus, it acted as a good starting point for comparison and keeping track of advancements in this area over the period. The 68th round of NSSO was conducted between the years 2011–2012. The survey was expanded over 12,737 first stage units (7469 villages and 5268 urban blocks) covering 1,01,724 households (59,700

Table 4 Broad usual principal activity status of those who received/were receiving formal vocational training (Percent) Source: NSSO (2015)

Category of persons	Usual principal activity status			All
	Employed	Unemployed	Not in labour force	
Rural				
Male	67.7	7.2	25.1	100.0
Female	29.3	9.2	61.5	100.0
Total	54.6	7.9	37.5	100.0
Urban				
Male	76.0	4.5	19.6	100.0
Female	36.7	4.7	58.6	100.0
Total	60.9	4.5	34.5	100.0
Total				
Male	72.4	5.7	22.0	100.0
Female	33.9	6.4	59.7	100.0
Total	58.3	5.9	35.8	100.0

in rural areas and 42,024 in urban areas) and surveying 4,56,999 persons (2,80,763 in rural areas and 1,76,236 in urban areas). As far as source of earning is concerned, the households deriving their major income from regular income was much higher in urban areas compared to rural areas (Table 5).

The questionnaire included the questions of socio-economic background of the people including educational background, their employment status, whether they availed vocational training and other related issues. To maintain the brevity of the paper, the other finer details have been skipped like exact sample selection methodology, definitional aspects etc. However, the details regarding the same can be found in the official reports accompanying NSSO data viz. NSSO (2015).

The study aims to make inquiry into two main aspects. First, we will try to find out the relevant factors, which determine the participation of the households in the vocational training programmes. However, in India many people rely on informal training for acquiring skills. Hence, our study will identify the factors responsible for their participation in non-formal training as well as formal training. This analysis will give us a clear picture about the background of the households who are undertaking the vocational training. The second part will attempt to identify the effect of formal training on income of the respondents. Further, these questions are investigated for primary, secondary and tertiary sectors separately.

For addressing the first question of factors that determine participation in vocational training programmes, we are applying logit and multi-nominal logit models. While in logit model, the dependent variable is whether an individual has attended formal training or not, the multi-nominal logit model has three categories, which are 'received/receiving formal training', 'received/receiving informal training' and 'no training'. The explanatory variables will broadly be variables related to social and economic status of the individual as well as his/her household characteristics.

The logit model is given by:

$$L_i = \ln (P_i/1 - P_i) = \beta_0 + \beta_i X_i$$

Table 5 Distribution of the households/populations as per major source of income NSSO 68th round. Source: NSSO (2015)

Source of major income	Households	Population
Rural		
Self-employed (total)	49.8	54.1
Of which		
Agriculture	34.3	37.6
Non-agriculture	15.5	16.6
Regular wage/salary earning	9.6	9.3
Casual labour (total)	34.5	33.1
Of which		
Agriculture	21.0	19.3
Non-agriculture	13.5	13.7
Others	6.1	3.5
All	100.0	100.0
Urban		
Self-employed	35.3	41.5
Regular wage/salary earning	41.7	40.0
Casual Labour	11.8	12.6
Others	11.2	5.9
All	100.0	100.0

where, L is the log of the odds ratio, P is the probability of the event happening, X_i 's are the independent variables included in the study.

In our case,

P_i = Probability of getting formal vocational training.

Therefore, $P_i/1 - P_i$ denotes the odds of getting formal vocational training.

X_i 's, the independent variables consist of variables associated with Household characteristics and Individual characteristics.

Similarly, in order to determine the participation in formal as well as informal vocational training, we have used the multinomial logistic regression. The multinomial model is given by:

$$\ln [P(\text{formal vocational training})/P(\text{no vocational training})] = \beta_0 + \beta_i X_i$$

$$\ln [P(\text{informal vocational training})/P(\text{no vocational training})] = \delta_0 + \delta_i X_i$$

Here,

P is the probability of the event happening, X_i 's are the independent variables included in the study (discussed above).

Finally, to determine the effect of vocational training on wage, we have used the multiple regression model given below:

$$\text{Wage} = \beta_0 + \beta_1 (\text{Received formal training}) + \beta_i X_i$$

The main independent variable used in our analysis is regarding the vocational training status (dummy variable), where 1 denotes that the respondent has received formal vocational training and 0 denotes otherwise and X_i s are the other independent variables related to household and individual characteristics. It is important to

mention that the results from logit, multinomial and multiple regressions should not be interpreted as causal relation (Cox 1992).

Results

We start with the discussion of the factors that show association with the participation of an individual in a formal vocational training programme. As discussed earlier, we have employed a logit model to ascertain the significant factors for an individual's participation. The results are presented in Table 6 followed by an interpretation of the results.

From the above results, we observed that being in an urban area as compared to a rural area as well as being a male as compared to a female increased the odds of receiving formal training. Similarly, increased education level as compared to no education and having received technical education as compared to not receiving any technical education increases the odds ratio of receiving formal training. Further, an ever-married person has a lesser chance of getting formal training as compared to a single person.

In the case of religion, individuals belonging to Christianity and other religions have higher odds ratio of receiving formal training as compared to the individuals belonging to the Hindu religion. Among different social groups, Scheduled Tribe (STs) individuals have lower odds ratio than all other types of social groups in being enrolled for formal training. Individuals working in manufacturing (secondary) sector and service (tertiary) sector have got higher odds ratio of getting formal training as compared to the individuals working in the agriculture & allied activities (primary) sector.

Focussing on marginal effects, we observe that individuals from urban area have higher probability of getting formal training as compared to the individuals from rural area. Similarly, male and single individuals have higher probability of getting formal training as compared to females and ever-married individuals, respectively. Individuals with any formal education have higher probability of getting formal training as compared to the illiterate individuals. Individuals with any technical education have higher probability of getting formal training as compared to those who do not have any education. In the case of religion, individuals from Christianity and other religions have higher probability than individuals following Hinduism. As far as social groups are concerned, individuals from Scheduled Castes (SCs), Other Backward Castes (OBCs) and general households have higher probability of getting formal training as compared to the individuals from STs households. Individuals working in secondary and tertiary sector have higher probability of having received formal training as compared to those working in primary sector.

In the second leg of identification of factors behind participation in formal training vis-à-vis informal training programmes, we have used the multinomial Logit Model. The results of the model are tabulated in Table 7.

The relative log odds of receiving informal training as well as formal training will increase if the respondent belongs to an urban area as compared to a rural area. With the increase in age, the relative log odds of receiving formal or informal training will decrease. In the case of gender, the relative log odds of receiving informal training increase for females as compared to their male counterparts while it decrease for the females in the case of formal training. In the case for formal training, relative log odds increase with increase in level of education while in the case of informal training, there was no clear trend but it decreases at higher levels of education. The relative log odds

Table 6 Determinants of formal training (Logistic Model)—NSSO 68th round (2011–2012)

Independent variable	Odds ratio	Marginal effects (d_Y/d_X)
Place of residence [base-rural]		
Urban	1.178 (0.0328)***	0.006 (0.001)***
Age	0.995 (0.00157)***	0.000 (0.000)***
Sex [base-female]		
Male	1.624 (0.0519)***	0.019 (0.001)***
Marital status [base-never married]		
Ever married	0.817 (0.0301)***	− 0.007 (0.001)***
Educational level [base-not literate]		
Literate without formal education	3.287 (1.528)**	0.007 (0.004)
Primary and below	4.324 (0.567)***	0.010 (0.001)***
Secondary and middle	14.84 (1.823)***	0.039 (0.001)***
Higher secondary and above	27.61 (3.404)***	0.069 (0.001)***
Technical education [base-no technical education]		
With technical education	7.913 (0.271)***	0.145 (0.004)***
Religion [base-Hinduism]		
Islam	1.038 (0.0438)	0.001 (0.001)
Christianity	1.239 (0.0684)***	0.008 (0.002)***
Others	1.291 (0.0805)***	0.009 (0.002)***
Social group [base-STs]		
SCs	1.716 (0.112)***	0.016 (0.002)***
OBCs	1.876 (0.105)***	0.019 (0.001)***
General	1.662 (0.0929)***	0.015 (0.001)***
Sector [base-primary]		
Secondary	2.429 (0.120)***	0.024 (0.001)***
Tertiary	2.736 (0.126)***	0.029 (0.001)***
Constant	0.000410 (6.31e−05)***	0.042 (0.000)***
Observations	172,163	

Standard errors in parentheses

For column (2), d_Y/d_X for factor levels is the discrete change from the base level

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

will decrease for an ever-married person as compared to a single person but the difference is significant only for formal training.

The relative log odds will increase for the individuals having technical education for formal training as compared to the individuals without technical education. Technical education does not have a significant effect in the case of informal training. Apart from 'Other' religions, the relative log odds decrease for Islam and Christianity as compared to the Hindu religion individuals for receiving informal training. On the other hand, the relative log odds of Christianity and Other religions are higher than Hinduism in the case of formal training. The relative log odds increase for all social groups as compared to the STs for both formal and informal training. The relative log odds increase for both secondary and tertiary sector as compared to the primary sector. This result holds true for both formal and informal training.

Also from marginal effects, we observed that individuals from urban area have higher probability of getting formal as well as informal vocational training as compared to the individuals from rural area. Similarly, male and single individuals have higher probability

Table 7 Determinants of formal and informal training (Multinomial Logit Model)—68th round (2011–2012)

Variables	Logit coefficients		Marginal effects (d _v /d _x)	
	Informal training (1)	Formal training (2)	Informal training (3)	Formal training (4)
Place of residence [base-rural]				
Urban	0.116 (0.0160)***	0.178 (0.0280)***	0.013 (0.002)***	0.006 (0.001)***
Age	−0.00655 (0.000811)***	−0.00608 (0.00158)***	−0.001 (0.000)***	0.000 (0.000)***
Sex [base-female]				
Male	−0.265 (0.0192)***	0.454 (0.0320)***	−0.031 (0.002)***	0.019 (0.001)***
Marital status [base-never married]				
Ever married	−0.00885 (0.0220)	−0.204 (0.0369)***	0.000 (0.003)	−0.007 (0.001)***
Educational level [base-not literate]				
Lit. without formal	0.171 (0.103)*	1.219 (0.465)***	0.021 (0.014)	0.007 (0.004)
Primary and below	0.0656 (0.0219)***	1.477 (0.131)***	0.006 (0.003)**	0.010 (0.001)***
Secondary and middle	0.112 (0.0211)***	2.719 (0.123)***	0.008 (0.003)***	0.039 (0.001)***
Higher secondary and above	−0.405 (0.0268)***	3.267 (0.123)***	−0.050 (0.003)***	0.069 (0.001)***
Technical education [base-no technical education]				
With technical education	−0.0878 (0.0568)	2.056 (0.0347)***	−0.029 (0.005)***	0.145 (0.004)***
Religion [base-Hinduism]				
Islam	−0.0522 (0.0219)**	0.0316 (0.0423)	−0.006 (0.002)**	0.001 (0.001)
Christianity	−0.365 (0.0377)***	0.185 (0.0552)***	−0.037(0.003)***	0.008 (0.002)***
Others	0.837 (0.0304)***	0.400 (0.0629)***	0.121 (0.005)***	0.009 (0.002)***
Social group [Base-STs]				
SCs	0.229 (0.0301)***	0.563 (0.0651)***	0.021 (0.003)***	0.016 (0.002)***
OBCs	0.468 (0.0269)***	0.683 (0.0559)***	0.048 (0.003)***	0.019 (0.001)***
General	0.399 (0.0282)***	0.552 (0.0559)***	0.040 (0.003)***	0.015 (0.001)***
Sector [base-primary]				
Secondary	0.816 (0.0190)***	1.016 (0.0496)***	0.099 (0.002)***	0.024 (0.001)***
Tertiary	0.133 (0.0205)***	1.026 (0.0462)***	0.010 (0.002)***	0.029 (0.001)***
Constant	−2.031 (0.0508)***	−7.669 (0.154)***	0.138 (0.001)***	0.042 (0.000)***
Observations	172,163			

Standard errors in parentheses

For column (3) and (4), d_v/d_x for factor levels is the discrete change from the base level

*** p < 0.01, ** p < 0.05, * p < 0.1

of getting formal training as compared to female and ever-married individuals respectively while probability for informal training for males is lower than their female counterparts. Individuals with any formal education have higher probability of getting formal training as compared to the illiterate individuals and similar results exist in the case of informal training except for the individuals with higher education, where the probability of informal training are lower. Individuals with any technical education have higher probability of getting formal training as compared to those having no such education but the probability is lower for the informal training. In the case of religion, individuals from Christianity and other religions have higher probability than individuals belonging to Hindu religion but in the case of informal training, probability of receiving informal

Table 8 Regression table (effect of formal training on wages-full table)

Independent variables	Model 1 (total)	Model 2 (primary sector/agriculture and allied activities)	Model 3 (secondary sector/ manufacturing sector)	Model 4 (tertiary sector/service sector)
Received formal training	0.0468 (0.0158)***	0.369 (0.118)***	0.176 (0.0309)***	0.00280 (0.0182)
Place of residence [base-rural]				
Urban	0.200 (0.00582)***	0.385 (0.0202)***	0.130 (0.00845)***	0.118 (0.00890)***
Age	0.0137 (0.000303)***	0.00277 (0.000541)***	0.00808 (0.000454)***	0.0219 (0.000508)***
Sex [base-female]				
Male	-0.492 (0.00730)***	-0.387 (0.0118)***	-0.443 (0.0139)***	-0.439 (0.0117)***
Marital status [base-never married]				
Ever married	0.204 (0.00834)***	0.104 (0.0178)***	0.162 (0.0114)***	0.211 (0.0136)***
Educational level [base-not literate]				
Literate without formal education	0.0421 (0.0479)	0.0284 (0.0962)	-0.0893 (0.0628)	0.142 (0.0956)
Primary and below	0.173 (0.00802)***	0.0715 (0.0134)***	0.0943 (0.0108)***	0.244 (0.0200)***
Secondary and middle	0.435 (0.00812)***	0.135 (0.0165)***	0.227 (0.0110)***	0.626 (0.0180)***
Higher Secondary and above	1.175 (0.00905)***	0.681 (0.0401)***	0.645 (0.0183)***	1.300 (0.0174)***
Technical education [base-no technical education]				
With technical education	0.251 (0.0150)***	0.405 (0.126)***	0.478 (0.0308)***	0.273 (0.0172)***
Religion [base-Hinduism]				
Islam	0.0296 (0.00893)***	0.0553 (0.0219)**	-0.0291 (0.0124)**	-0.00257 (0.0140)
Christianity	0.154 (0.0125)***	0.125 (0.0332)***	0.100 (0.0203)***	0.0960 (0.0173)***
Others	0.222 (0.0151)***	0.184 (0.0348)***	0.194 (0.0213)***	0.201 (0.0220)***
Social group [base-STs]				
SCs	-0.104 (0.0103)***	0.126 (0.0186)***	0.0215 (0.0148)	-0.263 (0.0181)***
OBCs	-0.111 (0.00956)***	0.110 (0.0174)***	0.0553 (0.0141)***	-0.287 (0.0158)***
General	0.0414 (0.0102)***	0.209 (0.0226)***	0.172 (0.0157)***	-0.107 (0.0157)***
Constant	6.267 (0.0187)***	6.181 (0.0375)***	6.591 (0.0278)***	6.130 (0.0343)***
Observations	75,247	13,233	25,747	34,576
R-squared	0.404	0.214	0.257	0.388

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

training is lower for individuals from Islam and Christianity religion while it is higher for other religions as compared to the individuals from Hindu religion. As far as social groups are concerned, individuals from SCs, OBCs and general households have higher probability of getting formal as well as informal training as compared to the individuals from STs households. Individuals working in secondary and tertiary sector have higher probability of receiving formal as well as informal training as compared to those working in primary sector.

In the second part of this section, we will discuss the effect of formal vocational training on wages using the multiple regression model. We have run multiple regression model separately for three sectors, i.e. agriculture, manufacturing and services as well. In Table 8 given, we observe that overall, having formal training increases the wage by 4.7%

compared to a person without any training. The effect is the highest in the primary sector where a person with formal vocational training has 36.9% higher wages. If we analyse across sectors, we observe the significant effect of formal training on wages of the workers in primary and secondary sectors (wages are higher by 36.9% and 17.6% for a person with formal training as compared to a person without any training). In the case of the tertiary sector, the effect of formal training on wages is insignificant. One of the possible reasons for this could be the fact that service sector employers do not recognize the formal training certificates of the individuals.

Conclusion

This paper attempted to identify the factors, which affect an individual's participation in formal vocational training. We found that being an urban dweller increases the odds of participating in formal vocational training. It may be indicative of lack of proper vocational training facilities in the rural areas. Further, being male increases the odds of receiving vocational training, implying that certain special interventions are required to encourage the girls to enrol in formal vocational training programmes.

We saw the impact of vocational training on the wages of an individual at an overall level and at the sectoral level. We found that having formal training increases the wage by 4.7% in the overall economy as compared to a person without any training. The effect is highest in the primary sector, where the individuals with vocational training had a wage increase of 36.9%. Workers with formal vocational training in the secondary sector had an increase in wages by 17.6%. This clearly indicates that there are good economic returns, which come with formal vocational training, and it makes sense to invest resources in vocational training.

Abbreviations

GDP: gross domestic product; ITIs: Industrial Training Institutes; NSSO: National Sample Survey Office; OBCs: Other Backward Castes; SCs: Scheduled Castes; STs: Scheduled Tribes; TVET: Technical and Vocational Education and Training; VET: vocational education and training.

Authors' contributions

All the authors contributed to all the parts of the paper. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

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