How acute is skill scarcity in Indian Manufacturing? Emerging contours

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This paper investigates the nature of skill formation in Indian Manufacturing. Discussing household, personal, and labour market characteristics of manufacturing employment in India, the study discusses the linkage between educational attainment, technical training, and vocational training on select labour market outcomes such as wage, formal employment, and occupational structure. The core objective of this paper is to outline the emerging contours of skills availability or shortages in the contemporary Indian labour market. The unit of analysis of the study is employed person in manufacturing. We use unit records of National Sample Survey 68th Round on employment and unemployment for the analysis. To delineate effectively the linkage between skill and labour market outcomes like wage and formal employment, we examine determinants of wage by specifying wage as a function of age, education, vocational and technical qualifications, household, personal, and labour market characteristics.

Employment in Indian Manufacturing, Skills, Labour Market Outcomes

1. Introduction

We have been witnessing widely subscribed rhetoric on India's emerging roles in manufacturing. These days it is not hard to find media contents that project the potential of India as a global manufacturing hub. These contents and discourses seemingly foresee that global capital destine to land in India owing to country's advantages in labour and other propitious circumstances. Would this optimism ever turn to a happening reality may be theme for lasting narratives and debates. However, it would be interesting to assess the contemporary contexts and facts concerning manufacturing employment in India, in particular the skill formation and select labour market outcomes. Is it a fact that even for high skilled occupational profiles, nominal economies from low wages guide enterprises to satisfice with not so skilled, but, low wage workers? Quite important, apart from these usual questions, what makes Indian landscape more complex is multitude of diverse informal vocational systems that feed to the efficacy and creativity of manufacturing systems. Is it important to envisage the synergetic linkage between diverse streams of skilling that makes co-movement of real economies to enterprises and decent wage and entitlement to workers?

The principal objective of this paper is unravel the interlinkage between employment in manufacturing, skills, and labour market outcomes. The unit of analysis of the study is employed person in manufacturing. We use unit records of National Sample Survey 68th Round on employment and unemployment for the analysis. The paper has six sections. Section 2 provides an overview of manufacturing employment in India. Section 3 discusses skill formation in Indian manufacturing. Section 4 unravels the linkage between skill and wage. Section 5 examines determinants of wage while focusing how pivotal skill is in labour market outcomes. Section 6 concludes the paper.

2. Manufacturing Employment in India

As depicted in Table 1, urban sector accounts for 51% of employment in manufacturing, while the rest are based in the rural. While slightly above three fourth of employed are Hindus, one fifth are Muslims. Other Backwards forms the largest group amongst social categories, forming 46%, followed by others (33%), Schedules Caste (SC) (16%), and Scheduled Tribe (ST) (4%). Employment is manufacturing discernibly male dominated; male forms 77% of total employment (Table 2). For every 1000 females, there are 2851 males employed in manufacturing. Persons who are in the age group of 15-34 constitutes 51% of employed while the age group 35-59 forms 44%. It is important to note that mean, median, and mode age are 36.7, 35, and 35, respectively. Only one twentieth of the employed are 60 years and above. A whopping 72% are married. Interestingly, frequency distribution of educational attainment approximates a bi-modal pattern (Figure 1); not literates and persons who have studied up to middle school (i.e. 7 years of education) form one fifth apiece. Aggregating the categories from not literates to middle school makes slightly above two third of the distribution while university graduates constitute just 8%. Six Indian large states –Uttar Pradesh (13.8%), Tamil Nadu

(11.9%), West Bengal (11.6%), Maharashtra (10.8%), Gujarat (9.3), and Andhra Pradesh (7.6%)- account for two third of manufacturing employment (Figure 2). Paradoxically, populous big states like Bihar accounts for merely 2.6% of manufacturing employment while much tinier states like Delhi generates 1.8% of manufacturing employment. Moreover, aggregating seven north eastern states –Arunachal, Assam, Meghalaya, Mizoram, Nagaland, and Tripura-, share in manufacturing employment is just 1.5%. Presumably, the mix of concentration of manufacturing employment in select regions and industrially sparse areas may have explanations that emanate from locational pecuniary and real economies, apart from salient and specific socio-cultural-spatial-cultural-political-historic reasons.

While regular salaried & wage employment forms 37%, a whopping 45% are self-employed–own account workers (32.6%), employed (1.6%), and helpers (11.2%), followed by casual workers who constitute 19% (Figure 3). Quite important, amongst these livelihood streams, close to one fifth of casual workers are engaged in subsidiary paid activities to make both ends meet, while only 4% of regular salaried/wage persons are into subsidiary options (Figure 4). As shown in Table 3, three-fourth of persons are employed in proprietor owned enterprises, while just one sixth work in public/private limited enterprises. Moreover, 46% enterprises operate without electricity. Enterprises with less than 10 persons employ 60% of persons. Just one fourth are employed by enterprises having at least 20 employees. Above patterns hint at pivotal role small scale/volume enterprises play in creating manufacturing jobs in India.

Table 1: Household Characteristics of Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

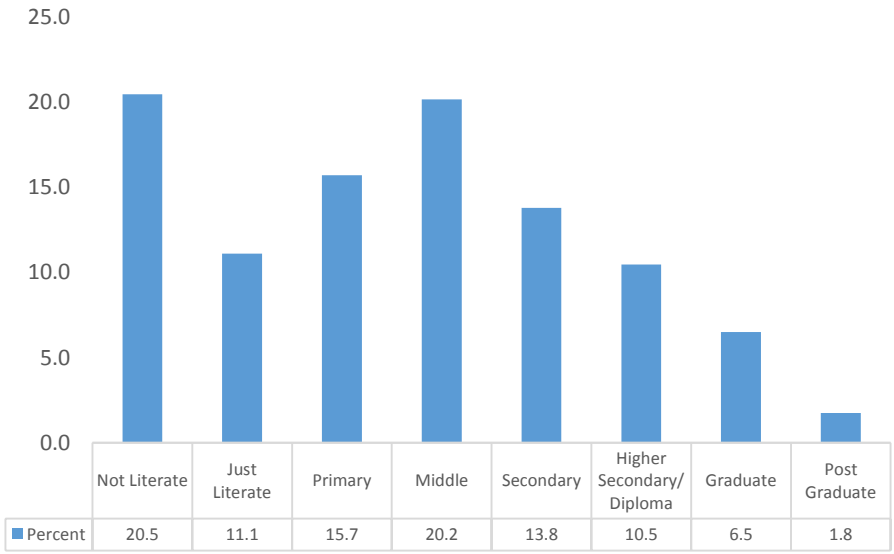
Area of Residence	**Percent**
Rural	48.8
Urban	51.2
Total	100.0
Religion	**Percent**
Hindu	76.2
Muslim	19.7
Christianity	1.9
Sikhism	1.5
Others	0.7
Total	100.0
Social Category	**Percent**
Scheduled Tribe (ST)	4.0
Scheduled Caste (SC)	16.3
Other Backward Classes (OBC)	46.2
Others	33.5
Total	100.0

Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Table 2: Personal Characteristics of Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

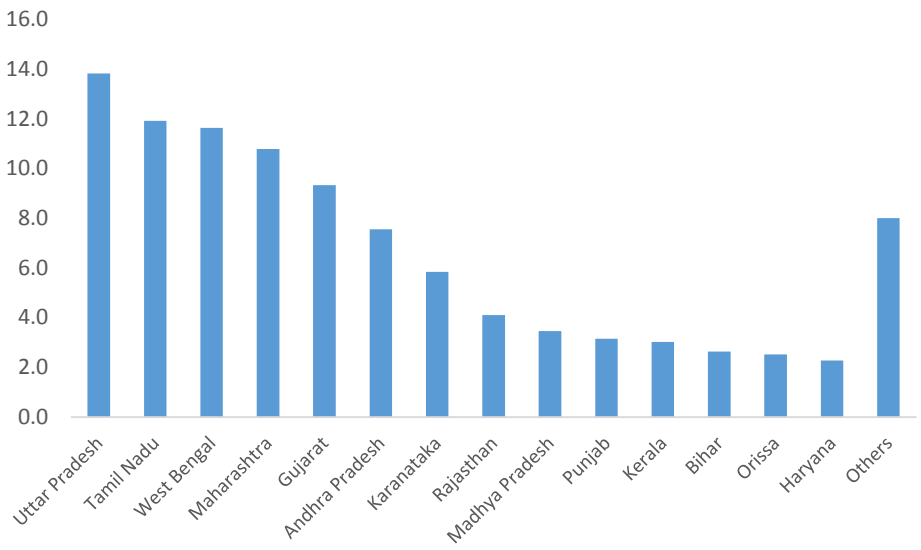
Sex	**Percent**
Male	76.6
Female	23.4
Total	100.0
Age Category	**Percent**
15-34	50.9
35-59	43.9
60 and above	5.2
Total	100.0
Marital Status	**Percent**
Never Married	24.1
Currently Married	71.6
Widowed	3.7
Divorced/separated	.6
Total	100.0

Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round



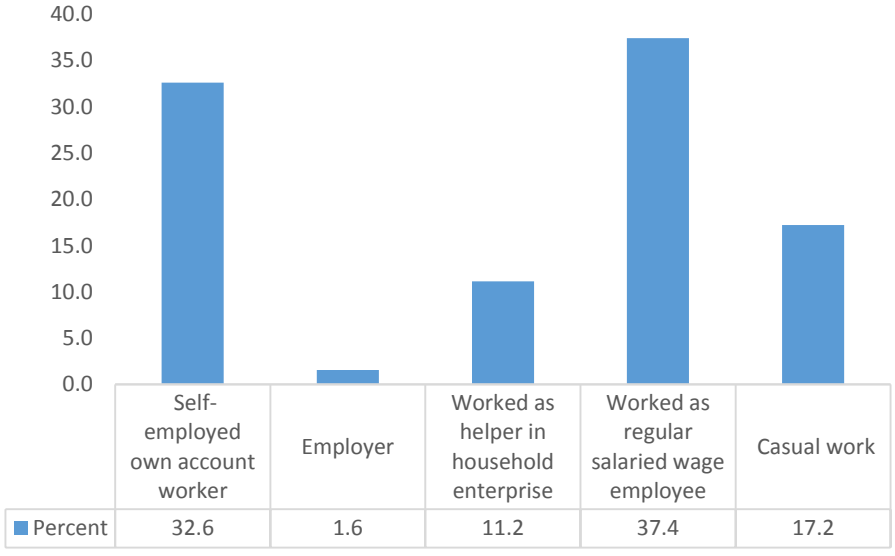
Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 1: Educational Attainment of Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status (Percentage)



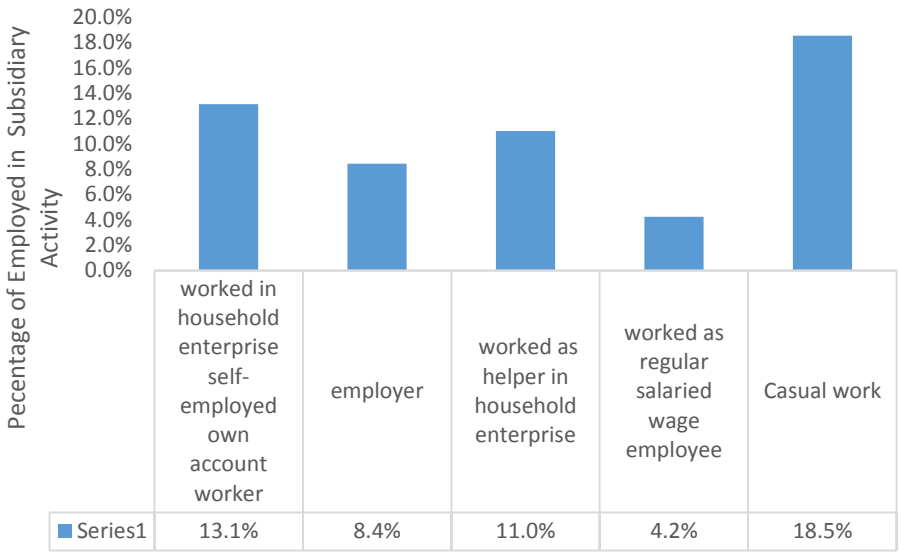
Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 2: State wise Percentage Distribution of Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status



Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 3: Employment Status of Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status



Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 4: Percentage of Employed Persons who are engaged in subsidiary activity (Manufacturing) in 2011-2012
(Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Table 3: Characteristics of Enterprises as reported by Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Type of Enterprise	**Percent**	**Using Electricity in Operation**	**Percent**
Proprietary male	62.6	Yes	54.3
Proprietary female	11.6	No	45.1
Partnership with members from same Household	2.8	Not Known	.6
Partnership with members from different Household	1.9	Total	100.0
Government/public sector	1.4	**Number of Employees**	**Percent**
Public/Private limited company	16.4	less than 6	52.6
Co-operative societies/trust/other nonprofit institutions	.4	6 to 9	9.5
Others	2.9	10 & above but less than 20	7.6
Total	100.0	20 & above	26.0
		Not known	4.2
		Total	100.0

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Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Table 4 outlines patterns concerning entitlements to persons who are employed in manufacturing, capturing distribution type of employment contract, availability of paid leave, provisioning of social security, and method of pay. Vividly, a whopping five sixth of persons who are employed in manufacturing work without any written contract, while three fourth are not entitled to paid leave. Quite important, percentage of employed persons who are eligible for at least one type of social security is merely 12%; thus, a whopping 88% of persons are identified as informal workers. Percentage of employed persons who are eligible all types of social security – Provident Fund (PF)/ pension, gratuity, health care & maternity benefits- is just 3.2%. However, 77 % of employed persons receive pay on either regular weekly pay or monthly salary, while 11% receive pay on the basis of output produced by them, called piece rate method. It appears from above patterns that an enormous chunk of Indian manufacturing is built around under provisioning of entitlements to workers. Is this due to low skill base? Or, low productivity? Or, to gain nominal economies that emanate from under provisioning entitlements to working class. We carry forward these questions to subsequent sections.

Table 4: Employment related entitlements Characteristics of Enterprises as reported by Employed Persons (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Type of Job Contract	**Percent**	**Availability of Social Security**	**Percent**
no written job contract	84.3	only Provident Fund (PF)/ pension	3.6
written job contract : for 1 year or less	2.4	only gratuity	.5
more than 1 year to 3 years	1.7	only health care & maternity benefits	1.0
more than 3 years	11.6	only PF/ pension and gratuity	1.2
Total	100.0	only PF/ pension and health care & maternity benefits	1.8
Paid Leave	**Percent**	only gratuity and health care & maternity benefits	.6
Yes	24.2	PF/ pension, gratuity, health care & maternity benefits	3.2
No	75.8	not eligible for any of above social security benefits (**Informal Employment**)	88.0
Total	100.0	Total	100.0
		Method of Pay	**Percent**
		regular monthly salary	59.9
		regular weekly payment	17.4
		daily payment	10.4
		piece rate payment	10.6
		Others	1.6
		Total	100.0

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Source: Computed from unit records of National Sample Survey (NSS) 68th Round

To gauge the diversity of Indian manufacturing, we disaggregate the manufacturing to 24 categories using National Industrial Classification (NIC) 2008. Table 5 presents percentage distribution of industrial activity and occupation in Indian manufacturing. Nearly half of employment comes from traditional industries such as wearing apparel (15.4%), textile (14.6%), food (10.4%), and non-metallic mineral (8.9%), while technologically advanced industries such as Pharmaceuticals, Medicinal Chemical And Botanical Products, Motor Vehicles, Trailers, and Semi-Trailers, Computer, Electronic and Optical products, and Machinery and Equipment account for 1.4%, 1.8%, 1.8% and 0.8%, respectively. However, we get a different picture if percentage distribution of employment is cross tabulated with registered manufacturing. For example, the share of Pharmaceuticals, Medicinal Chemical and Botanical Products zooms to 4.3% (Figure 1, Appendix). Another interesting case is Wearing Apparel; sector's share in manufacturing plummets from 15.4% to 7.2% when we change to registered manufacturing. However, for industries like food sector there is no discernible change when we move from manufacturing to registered manufacturing. Presumably, the pattern points to the coexistence of registered and unregistered manufacturing in the industrial continuum. The question is if this coexistence is mutually advantageous or exploitative. A large chunk of employed persons are craft and related workers (51%), while plant operators, managerial occupation, elementary occupations form 15%, 13%, and 12.5%, respectively. This pattern points to the relevance of knowledge –tacit and codified- in pursuing employment in the manufacturing industry.

Table 5: Percentage distribution of Industrial Activity and Occupation (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

National Industrial Classification (NIC) 2008	Percent	National Industrial Classification (NIC) 2008	Percent	National Classification of Occupation (NCO) 2004	Percent
Food Products	10.4	Rubber And Plastics Products	2.1	Managerial	13.1
Beverages	.7	Other Non-Metallic Mineral Products	8.9	Professionals	2.7
Tobacco Products	6.4	Basic Metals	2.7	Technicians/Associate Professionals	1.7
Textiles	14.6	Fabricated Metal Products, Except Machinery And Equipment	5.4	Clerk	1.9
Wearing Apparel	15.4	Computer, Electronic And Optical Products	.8	Service Professionals	2.5
Leather And Related Products	2.2	Electrical Equipment	1.8	Craft and Related Workers	50.6
Wood And Products Of Wood And Cork, Except Furniture	6.5	Machinery And Equipment	1.8	Plant Operators	14.9
Paper And Paper Products	.9	Motor Vehicles, Trailers And Semi-Trailers	1.8	Elementary Occupations	12.5
Printing And Reproduction Of Recorded Media	1.1	Other Transport Equipment	1.0	Total	100.0
Coke And Refined Petroleum Products	.3	Manufacture Of Furniture	4.4		
Chemicals And Chemical Products	2.0	Other Manufacturing	5.5		
Pharmaceuticals, Medicinal Chemical And Botanical Products	1.4	Repair And Installation Of Machinery And Equipment	1.8		
		Total	100.0		

Estimated N = 47808094 from a sample of 19740

Source: Computed from unit records of National Sample Survey (NSS) 68th Round

At a disaggregate level, employment in manufacturing industry appears to show three patterns: employment concentrated in the rural, employment concentrated in the urban, and evenly composed systems (Table 6). For example, in industries such as tobacco products, other non-metallic minerals, wood and products of wood and cork, except furniture, and manufacture of furniture, two third and above employed persons are based in the rural. On the other hand, majority of employed persons, in the range of 65% to 80%, in industries like Pharmaceuticals, medicinal chemical and botanical products, Textiles, Leather and related products, Paper and paper products, Printing and reproduction of recorded media, Computer, electronic and optical products , machinery and equipment, and rubber and plastics products are based in the urban.

Reproducing the general demographic structure, invariably, all the industries show higher concentration of Hindus in employment, ranging between 61% (tobacco products) and 95% (other transport equipment). However, Muslim workers form 36% of employment in tobacco, 35% in leather related products, and 29% in textiles. In wood and products of wood and cork except furniture, leather and related products, other non-metallic mineral products, and basic metals, shares of employed persons who belong to Scheduled Tribe (ST)/Scheduled Caste (SC) are 37%, 36%, 38%, and 30%, respectively; these industries show discernibly higher density of SC/ST in employment. Across industries, percentage of persons who belong to Other Backward Classes (OBC) varies in thin range, ranging between 29% and 55%. However, the range for the category 'others' is wider, ranging from 18% to 61%.

It is important to note that share of women in employment varies in a wider band, from 0.5% (other transport equipment) to 78.6% (tobacco). In computer, electronic and optical products, women form just one tenth of employment, while shares of women in textile and wearing apparel are 31% and 35%, respectively. It is worthwhile to associate if concentration of women in sectors like tobacco has immensely been swayed of nominal economies like lower wages or it this being powered by dexterity and specialization. There appears to be no discernible variation in the share of age group 15-34 across sectors.

Coming to the previous question about why there is so much concentration of women in tobacco product sector, Table 7 provides interesting cues. In this sector, share of regular employment is just 3.2 %, while share of formal employment is merely 1.8%. Unequivocally, this sector provides least advantages to workers. Contrary to this, in the industry 'Other Transport Equipment' formal employment forms 58%. Share of formal employment in the industry 'Computer, Electronic and Optical Products' is 55%. What does this mean? We plot an interesting graph (Figure 2, Appendix) that shows an inverse relation between share in employment and percentage of formal employment. This indicates that in Indian manufacturing industry more jobs entails under provisioning of social security and other entitlements. Is it plausible to envisage an alternate pattern of direct relation between these two indicators; while jobs are increasingly created, entitlements expand?

As regards ownership of enterprises, government appears to have extremely stockholding in manufacturing sector, except a notable exception of coke and refined petroleum products. Moreover, industries like 'Computer, Electronic and Optical Products', 'Pharmaceuticals, Medicinal Chemical and Botanical Products', 'Motor Vehicles, Trailers And Semi-Trailers', and so on, good chunk of persons are employed in Public /Private limited enterprises. However, in industries like 'Tobacco Products' share of Public /Private limited enterprises is quite abysmal. Quite important, enterprise employing at least 20 persons account for 83% employed persons in 'Pharmaceuticals, Medicinal Chemical and Botanical Products', 79% in 'Other Transport Equipment' , 73% in 'Motor Vehicles, Trailers And Semi-Trailers', and 69% in 'Computer, Electronic and Optical Products', while only 1.5% of employment in 'Manufacture Of Furniture' emanates from enterprise employing at least 20 persons. These patterns seem to reinforce the argument that outreach of financial resources such as equity and foreign direct investment feed to select industries that give thrust to more professional governance systems that are autonomous of family systems, although lesser emphasis has been given to employment generation.

Table 8 outlines occupational structure of employment. Using National Classification of Occupation (NCO) 2004, we classify occupations into eight: managerial, professional, technicians, clerk, service professionals, craft related work, plant operators, and elementary occupations. An interesting pattern emerges is a majority of persons in six industries –tobacco related (86%), textile (60%), wearing apparel (63%), leather related work (63%), wood and products of wood and cork, except furniture (66%), manufacture of furniture (81%), and Repair and installation of machinery and equipment (64 %)- are engaged in craft related occupations, while in industries like 'Pharmaceuticals, Medicinal Chemical and Botanical Products', 'Beverages', and 'Chemicals and Chemical Products', percentages of craft based occupation are 3.2%, 8.2%, and 8.4%, respectively. Plant operators form just 0.6 of workforce in tobacco based products while constituting the highest proportion in machinery and equipment (40%), generating a visibly wider a range. With regard to the percentage of professionals, tobacco products reports the least (0.2%), while 'Computer, Electronic and Optical Products' reports the highest (20%). Interestingly, percentage of managerial category varies from 5.3% (Basic Metals) to 25.7% (printing and reproduction of recorded media). These pattern seem to guide us in envisaging broader contours of skill, occupation, and manufacturing industry. Quite vividly, there is no space for positing homogenous human capital composition in every industry. While some industries and managerial-technology-operation based, some are predominantly craft based systems.

Table 6: Household and Personal Characteristics of Employed
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Economic Activity (NIC 2008 2 Digit)	Rural (%)	Hindu (%)	Muslim (%)	SC/ST (%)	OBC (%)	Female (%)	Age Group 15-34 (%)
Food products	56.0%	78.4%	15.9%	19%	48.2%	21.3%	42.6%
Beverages	49.6%	91.5%	2.9%	22%	31.1%	12.6%	62.3%
Tobacco products	71.8%	61.3%	36.4%	22%	48.3%	78.6%	42.8%
Textiles	36.9%	69.5%	28.9%	15%	51.7%	31.3%	56.4%
Wearing apparel	45.4%	64.3%	31.2%	15%	49.1%	35.0%	55.9%
Leather and related products	24.7%	62.7%	34.8%	36%	31.3%	14.4%	50.8%
Wood and products of wood and cork, except furniture	73.0%	82.1%	13.1%	37%	45.1%	18.1%	39.6%
Paper and paper products	32.8%	87.7%	10.0%	24%	42.7%	21.7%	46.1%
Printing and reproduction of recorded media	19.8%	86.1%	7.1%	15%	41.5%	7.9%	45.0%
Coke and refined petroleum products	41.0%	84.1%	3.5%	6%	47.4%	2.7%	55.0%
Chemicals and chemical products	43.7%	86.7%	8.1%	16%	46.4%	21.2%	53.5%
Pharmaceuticals, medicinal chemical and botanical products	24.3%	94.4%	3.7%	16%	29.4%	10.9%	54.6%
Rubber and plastics products	34.4%	81.6%	15.2%	10%	49.5%	15.8%	57.1%
Other non-metallic mineral products	75.2%	84.1%	11.7%	38%	42.6%	16.7%	51.1%
Basic metals	50.6%	86.7%	7.2%	30%	31.4%	3.5%	47.2%
Fabricated metal products, except machinery and equipment	40.7%	77.1%	16.5%	16%	55.0%	5.7%	49.6%
Computer, electronic and optical products	18.9%	94.2%	2.5%	16%	35.4%	10.1%	53.2%
Electrical equipment	38.9%	91.1%	6.2%	16%	26.8%	6.8%	67.1%
Machinery and equipment	24.0%	89.0%	6.5%	13%	29.4%	2.2%	59.6%
Motor vehicles, trailers and semi-trailers	42.8%	74.8%	16.3%	9%	30.5%	4.8%	55.0%
Other transport equipment	20.3%	95.2%	2.8%	16%	31.8%	.5%	51.3%
Manufacture of furniture	64.6%	82.0%	13.0%	22%	55.1%	.7%	46.3%
Other manufacturing	30.1%	85.3%	12.9%	10%	47.2%	19.2%	56.7%
Repair and installation of machinery and equipment	43.1%	72.8%	20.0%	15%	53.7%	1.0%	41.4%

Estimated N = 47808094 from a sample of 19740

Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Table 7: Labour Market Characteristic of Employed
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Economic Activity (NIC 2008 2 Digit)	Regular Employment	Formal Employment	Government/public sector	Public /Private limited company	20 and above employees
Food Products	35.6%	13.3%	1.2%	13.1%	24.0%
Beverages	67.3%	16.4%	4.6%	44.1%	50.1%
Tobacco Products	3.2%	1.8%	.4%	1.9%	3.4%
Textiles	34.8%	8.6%	.4%	12.3%	18.6%
Wearing Apparel	25.9%	4.3%	.0%	6.1%	11.9%
Leather And Related Products	59.7%	13.1%		22.3%	44.5%
Wood And Products Of Wood And Cork, Except Furniture	8.2%	.6%	.1%	1.9%	2.2%
Paper And Paper Products	63.8%	29.4%	3.7%	31.5%	40.2%
Printing And Reproduction Of Recorded Media	59.8%	16.3%	3.3%	12.2%	18.2%
Coke And Refined Petroleum Products	81.4%	38.5%	46.9%	37.5%	59.0%
Chemicals And Chemical Products	67.9%	28.9%	4.4%	34.2%	62.5%
Pharmaceuticals, Medicinal Chemical And Botanical Products	93.9%	44.3%	.1%	73.1%	83.0%
Rubber And Plastics Products	79.1%	27.5%	.4%	46.2%	50.9%
Other Non-Metallic Mineral Products	22.3%	3.6%	.1%	11.5%	42.7%
Basic Metals	73.3%	35.3%	5.9%	53.2%	60.1%
Fabricated Metal Products, Except Machinery And Equipment	48.2%	12.6%	1.7%	16.2%	22.7%
Computer, Electronic And Optical Products	93.6%	55.0%	6.5%	57.9%	69.2%
Electrical Equipment	85.6%	46.5%	3.7%	57.1%	58.5%
Machinery And Equipment	81.9%	33.7%	.4%	54.8%	60.1%
Motor Vehicles, Trailers And Semi-Trailers	81.8%	47.2%	2.6%	60.8%	73.0%
Other Transport Equipment	92.1%	58.3%	35.7%	44.0%	79.3%
Manufacture Of Furniture	15.6%	1.0%	.0%	2.7%	1.5%
Other Manufacturing	42.9%	6.0%	.3%	6.6%	23.1%
Repair And Installation Of Machinery And Equipment	26.7%	6.9%	3.1%	11.7%	10.0%

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Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Table 8: Occupational Structure of Employed
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Economic Activity (NIC 2008 2 Digit)	Managerial	Professionals	Technicians/Associate Professionals	Clerk	Service Professionals	Craft and Related Workers	Plant Operators	Elementary Occupations	Total
Food Products	21.3%	3.1%	1.4%	3.6%	10.2%	28.0%	13.4%	19.0%	100.0%
Beverages	20.1%	2.4%	13.7%	10.4%	6.8%	8.4%	18.1%	20.1%	100.0%
Tobacco Products	6.3%	.2%	.1%	.6%	.4%	86.3%	.6%	5.5%	100.0%
Textiles	9.2%	1.5%	.8%	1.4%	1.2%	59.7%	21.3%	5.0%	100.0%
Wearing Apparel	15.6%	.8%	.4%	.6%	.6%	72.3%	6.2%	3.4%	100.0%
Leather And Related Products	9.2%	1.2%	.6%	1.2%	.7%	63.1%	12.9%	11.2%	100.0%
Wood And Products Of Wood And Cork, Except Furniture	15.1%	1.3%	.5%	.3%	3.3%	65.9%	6.6%	7.0%	100.0%
Paper And Paper Products	8.0%	3.9%	.2%	6.6%	8.2%	12.6%	31.0%	29.5%	100.0%
Printing And Reproduction Of Recorded Media	25.7%	5.6%	1.3%	4.9%	2.2%	28.3%	29.5%	2.4%	100.0%
Coke And Refined Petroleum Products	16.6%	9.3%	3.5%	5.2%	1.0%	24.2%	18.5%	21.6%	100.0%
Chemicals And Chemical Products	15.5%	6.1%	4.9%	5.2%	2.9%	8.4%	33.1%	23.8%	100.0%
Pharmaceuticals, Medicinal Chemical And Botanical Products	7.4%	6.0%	21.4%	2.5%	4.0%	3.2%	24.3%	31.2%	100.0%
Rubber And Plastics Products	7.3%	3.8%	.8%	5.1%	2.6%	22.1%	34.4%	24.0%	100.0%
Other Non-Metallic Mineral Products	7.0%	2.5%	.2%	.9%	.8%	33.9%	16.0%	38.6%	100.0%
Basic Metals	5.3%	5.9%	2.6%	1.6%	1.2%	34.4%	25.1%	23.9%	100.0%
Fabricated Metal Products, Except	16.4%	2.5%	.5%	2.1%	2.1%	51.5%	12.8%	12.1%	100.0%

Machinery And Equipment									
Computer, Electronic And Optical Products	10.7%	20.1%	18.4%	11.5%	3.4%	24.6%	6.1%	5.1%	100.0%
Electrical Equipment	14.9%	11.6%	6.7%	3.4%	.6%	33.7%	13.5%	15.6%	100.0%
Machinery And Equipment	11.2%	8.9%	4.6%	5.7%	3.1%	22.0%	39.7%	4.8%	100.0%
Motor Vehicles, Trailers And Semi-Trailers	18.3%	6.6%	7.5%	2.9%	2.7%	22.3%	24.4%	15.2%	100.0%
Other Transport Equipment	9.0%	6.5%	8.2%	5.8%	.4%	22.6%	26.4%	20.9%	100.0%
Manufacture Of Furniture	11.8%	1.1%	.3%	.4%	.9%	80.7%	.5%	4.4%	100.0%
Other Manufacturing	16.6%	3.6%	1.7%	1.6%	2.4%	39.9%	26.9%	7.2%	100.0%
Repair And Installation Of Machinery And Equipment	18.5%	2.1%	1.8%		4.1%	63.7%	7.3%	2.5%	100.0%

Estimated N = 47808094 from a sample of 19740

Source: Computed from unit records of National Sample Survey (NSS) 68th Round

3. Skill formation in Indian Manufacturing: educational attainment, technical and vocational qualification

Percentage distribution of educational attainment for each industry is presented in Table 9. Broadly, educational attainment is classified into eight categories: not literate, just literate, primary, middle, secondary, higher secondary/diploma, graduate, and post graduate. The table provides an interesting contrast of two sets of industries. Computer, Electronic and Optical Products (54%) and Pharmaceuticals, Medicinal Chemical and Botanical Products (40%) report perceptibly higher density of graduates and post graduates in the workforce, while three industries-tobacco products (63%), other Non-Metallic Mineral Products (56%), and wood and products of wood and cork, except furniture (48%) report discernibly higher percentage of not literates and just literates in the workforce. In rubber and plastic products, secondary levels school education emerges as highest frequency category (29%), called modular category.

We also assess two other streams of skilling: technical qualification, and vocational qualification, and technical qualification. While vocational stream has three categories: formal vocational training, informal vocational training, and no vocational training, technical qualification consists of four categories: graduate, diploma, post graduate diploma, and no technical qualification. As shown in Table 10, proportion of technical graduates is highest in computer, electronic and optical Products (7%), while highest proportion of diploma holders amongst workers is in other transport equipment (26%). Across industries, highest proportion of post graduate diploma amongst the workforce is in Motor Vehicles, Trailers and Semi-Trailers (11.6%), and the same industry has noticeably higher proportion of persons with formal vocational training amidst the workforce (29%). Other industries with visibly higher proportion of persons with formal vocation training include other transport equipment (29.5%), and electrical equipment (23%). Interestingly, in four industries perceptibly higher percentage of workers have obtained vocational training through informal channels- Fabricated Metal Products, Except Machinery And Equipment (38%), Machinery and Equipment (38%), Manufacturing of Furniture (44%) and Repair And Installation Of Machinery And Equipment (38%).

These patterns evoke a few concerns. Foremost countries like India has been working with diverse institutional streams, to skill the masses, such as National Council of Vocational Training (NCVT), All India Council of Technical Education (AICTE), University Grants Commission (UGC) through Bachelor Vocational Training, recent initiative like National Skill Development Agency (NSDA). However, even with recent acceleration of skill development through diverse technical, vocational, and general educational initiatives, balance sheet of employment does not seem to reflect the envisaged skill deepening in Indian manufacturing. Perhaps, we may see a perceptibly distinct trend in years to come.

Table 9: Educational Attainment of Employed
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Economic Activity (NIC 2008 2 Digit)	Not Literate	Just Literate	Primary	Middle	Secondary	Higher Secondary /Diploma	Graduate	Post Graduate	Total
Food Products	23.3%	11.4%	14.8%	21.9%	11.2%	9.2%	6.1%	2.2%	100.0%
Beverages	8.6%	3.7%	2.9%	19.6%	18.0%	23.6%	21.4%	2.0%	100.0%
Tobacco Products	47.5%	14.9%	17.7%	11.7%	5.9%	1.8%	.4%		100.0%
Textiles	21.0%	14.7%	18.0%	21.6%	12.0%	7.6%	4.3%	.6%	100.0%
Wearing Apparel	12.2%	12.1%	19.8%	25.5%	15.9%	9.0%	4.4%	1.0%	100.0%
Leather And Related Products	23.3%	9.4%	18.5%	19.1%	13.8%	8.7%	6.7%	.4%	100.0%
Wood And Products Of Wood And Cork, Except Furniture	32.7%	14.5%	15.8%	21.3%	8.5%	5.4%	1.7%	.0%	100.0%
Paper And Paper Products	23.3%	8.2%	12.6%	15.3%	11.1%	12.2%	14.8%	2.5%	100.0%
Printing And Reproduction Of Recorded Media	6.9%	2.4%	11.6%	17.0%	20.0%	15.1%	25.5%	1.5%	100.0%
Coke And Refined Petroleum Products	7.3%	7.4%	6.0%	13.3%	18.0%	23.2%	22.7%	2.1%	100.0%
Chemicals And Chemical Products	12.0%	7.3%	9.5%	21.0%	14.7%	16.8%	13.0%	5.9%	100.0%
Pharmaceuticals, Medicinal Chemical And Botanical Products	11.0%	.4%	10.4%	9.4%	14.8%	14.5%	25.3%	14.3%	100.0%
Rubber And Plastics Products	6.1%	10.0%	11.2%	20.0%	28.8%	12.0%	9.4%	2.5%	100.0%
Other Non-Metallic Mineral Products	42.0%	14.0%	13.4%	13.6%	8.1%	5.6%	2.7%	.6%	100.0%
Basic Metals	14.9%	6.3%	14.0%	19.8%	16.9%	18.6%	7.7%	1.8%	100.0%
Fabricated Metal Products, Except Machinery And Equipment	17.0%	8.0%	13.9%	22.5%	16.0%	16.5%	5.4%	.7%	100.0%
Computer, Electronic And Optical Products	4.5%	.1%	1.6%	6.7%	17.2%	15.7%	39.2%	15.0%	100.0%
Electrical Equipment	2.8%	1.3%	7.2%	16.9%	17.2%	29.2%	17.4%	8.1%	100.0%
Machinery And Equipment	5.9%	4.6%	15.5%	13.6%	15.4%	22.0%	20.1%	2.9%	100.0%
Motor Vehicles, Trailers And Semi-Trailers	1.3%	.8%	5.1%	13.6%	18.5%	25.9%	17.1%	17.7%	100.0%
Other Transport Equipment	1.0%	.2%	7.7%	15.2%	23.4%	29.5%	20.2%	2.8%	100.0%
Manufacture Of Furniture	14.1%	10.6%	20.5%	25.4%	17.1%	9.5%	2.7%	.1%	100.0%
Other Manufacturing	8.7%	12.6%	18.6%	23.4%	19.0%	11.0%	6.2%	.5%	100.0%
Repair And Installation Of Machinery And Equipment	6.1%	8.7%	12.5%	22.7%	24.5%	19.1%	6.5%		100.0%

Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Table10: Educational Attainment of Employed
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Economic Activity (NIC 2008 2 Digit)	Graduate	Diploma	Post Graduate Diploma	No	Total	Formal	Informal	No	Total
	Technical Qualification					Vocational Qualification			
Food Products	.2%	1.0%	1.2%	97.6%	100.0%	2.0%	16.5%	81.5%	100.0%
Beverages		12.6%		87.4%	100.0%	12.9%	4.8%	82.3%	100.0%
Tobacco Products		.0%		100.0%	100.0%	.6%	30.4%	69.0%	100.0%
Textiles	.4%	1.8%	.3%	97.6%	100.0%	3.1%	37.6%	59.4%	100.0%
Wearing Apparel		1.3%	.2%	98.5%	100.0%	9.0%	40.2%	50.9%	100.0%
Leather And Related Products		1.0%	.6%	98.4%	100.0%	2.1%	17.5%	80.4%	100.0%
Wood And Products Of Wood And Cork, Except Furniture		.7%	.1%	99.1%	100.0%	1.3%	37.2%	61.5%	100.0%
Paper And Paper Products		5.1%	3.6%	91.3%	100.0%	6.9%	20.1%	73.0%	100.0%
Printing And Reproduction Of Recorded Media	1.3%	4.6%	1.4%	92.7%	100.0%	11.3%	27.9%	60.8%	100.0%
Coke And Refined Petroleum Products	4.0%	8.4%	10.4%	77.2%	100.0%	11.1%	11.7%	77.2%	100.0%
Chemicals And Chemical Products	2.0%	5.3%	3.8%	88.9%	100.0%	6.0%	12.0%	82.0%	100.0%
Pharmaceuticals, Medicinal Chemical And Botanical Products	.8%	6.0%	1.9%	91.4%	100.0%	13.6%	12.6%	73.8%	100.0%
Rubber And Plastics Products	.6%	5.9%	1.7%	91.9%	100.0%	5.1%	17.1%	77.8%	100.0%
Other Non-Metallic Mineral Products	.0%	.9%	.5%	98.6%	100.0%	.8%	15.5%	83.6%	100.0%
Basic Metals	2.2%	9.9%	.8%	87.0%	100.0%	10.3%	22.9%	66.7%	100.0%
Fabricated Metal Products, Except Machinery And Equipment	.5%	6.5%	.5%	92.5%	100.0%	5.5%	37.5%	57.0%	100.0%
Computer, Electronic And Optical Products	7.2%	20.6%	11.3%	60.9%	100.0%	15.4%	14.5%	70.2%	100.0%
Electrical Equipment	6.7%	24.1%	2.8%	66.3%	100.0%	22.5%	13.3%	64.2%	100.0%
Machinery and Equipment	3.9%	13.2%	4.6%	78.3%	100.0%	8.9%	38.4%	52.7%	100.0%
Motor Vehicles, Trailers And Semi-Trailers	4.3%	19.8%	11.6%	64.4%	100.0%	29.1%	14.2%	56.8%	100.0%
Other Transport Equipment	3.4%	25.5%	3.8%	67.4%	100.0%	29.5%	11.9%	58.6%	100.0%
Manufacture Of Furniture		.5%	.1%	99.4%	100.0%	1.4%	43.6%	55.1%	100.0%
Other Manufacturing	.2%	1.9%	.4%	97.5%	100.0%	2.9%	45.1%	52.0%	100.0%
Repair And Installation Of Machinery And Equipment	.8%	8.3%	.5%	90.4%	100.0%	9.1%	37.9%	53.0%	100.0%
Total	.6%	3.6%	1.0%	94.8%	100.0%	5.6%	30.0%	64.4%	100.0%

Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Now, we turn to the association between educational attainment and occupational categories (Table 11). It appears university education (graduation and post-graduation) plays pivotal role in supplying human resources to three occupation profiles that include professionals (45%), technician/associate professionals (59%), and clerk (42%). In contrast to this, 35% of craft related workers have not attained school education; they are either not literate (23%) or just literate (13%). However, 37% of plant operators have attained at least secondary education. Amongst them, 15% are not literates. Interestingly, one sixth of managerial category are not literates that is higher the percentage of post graduates who are in the same category (5%). This points to the need for scaling up of flexible open educational-learning progarmme that suits to the learning needs of many aspirational but not so qualified professionals, workers, and managers.

Except professionals and technician/associate professionals, all other occupational categories report acute shortage of persons with technical qualification, reporting more than 90% of employees without any technical qualification. Further, moving to vocational training, informal vocation training emerges as the principal channel that shapes human resources in managerial category, craft related occupations, and plant operators, accounting for 27%, 37%, and 36%, respectively. These patterns point to the emerging contexts and relevance of accelerating high quality flexible skilling system that integrates informal praxis and knowledge with knowledge about emerging technologies. As a matter fact despite churning out ever increasing number of technical/vocational professionals in countries such as India, employment balance sheet returns ostensibly bleak scenarios such as enormity of not so qualified employed person in diverse occupational profile, in particular the critical sectors of the economy.

Table 11: Educational Attainment and Occupation
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Occupation	Not Literate	Just Literate	Primary	Middle	Secondary	Higher Secondary /Diploma	Graduate	Post Graduate	Total
Managerial	16.3%	9.5%	13.1%	19.0%	14.0%	9.4%	13.6%	5.1%	100.0%
Professionals	7.8%	3.2%	5.3%	7.9%	7.7%	23.7%	32.9%	11.5%	100.0%
Technicians/Associate Professionals	1.0%	.6%	2.7%	5.0%	10.4%	22.1%	38.9%	19.4%	100.0%
Clerk	.3%	1.3%	2.6%	10.0%	22.5%	21.5%	36.1%	5.7%	100.0%
Service Professionals	18.6%	8.9%	8.6%	27.2%	11.8%	12.9%	9.2%	2.9%	100.0%
Craft and Related Workers	23.2%	13.4%	18.0%	20.6%	13.3%	8.7%	2.5%	.3%	100.0%
Plant Operators	15.0%	8.8%	15.9%	23.1%	15.3%	16.0%	5.4%	.5%	100.0%
Elementary Occupations	29.5%	11.3%	16.5%	21.2%	14.7%	5.4%	1.4%	.2%	100.0%
Total	20.5%	11.1%	15.7%	20.2%	13.8%	10.5%	6.5%	1.8%	100.0%

Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Table 12: Technical, Vocational Qualification and Occupation
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Occupation	Graduate	Diploma	Post Graduate Diploma	No	Total	Formal	Informal	No	Total
	Technical Qualification					Vocational Qualification			
Managerial	.8%	2.5%	3.2%	93.6%	100.0%	7.2%	27.3%	65.5%	100.0%
Professionals	12.5%	15.9%	8.7%	62.9%	100.0%	17.6%	14.2%	68.2%	100.0%
Technicians/Associate Professionals	4.4%	25.1%	9.4%	61.2%	100.0%	20.0%	12.4%	67.6%	100.0%
Clerk	.1%	4.4%	1.2%	94.3%	100.0%	10.8%	6.0%	83.2%	100.0%
Service Professionals		3.6%	.1%	96.3%	100.0%	4.9%	9.3%	85.8%	100.0%
Craft and Related Workers	.0%	2.7%	.2%	97.0%	100.0%	5.0%	36.5%	58.5%	100.0%
Plant Operators	.6%	5.2%	.4%	93.8%	100.0%	5.5%	35.5%	59.0%	100.0%
Elementary Occupations	.1%	.4%	.0%	99.5%	100.0%	1.2%	13.7%	85.0%	100.0%
Total	.6%	3.6%	1.0%	94.8%	100.0%	5.6%	30.0%	64.4%	100.0%

Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

4. Skill and Wage

An important question for an employee is the visible that emanates from employment. A complex question. Apart from principal intrinsic motivators, extrinsic rewards like wage also plays critical role is shaping employment relations in production system, in particular in manufacturing. We have computed median wage for each industry, and cross tabulated that with educational attainment (Table 13). As shown in the table, except for repair and installation of machinery and equipment, all industries except repair and installation of machinery and equipment, all industries report direct relation between educational attainment and medina wage rates. This implies that while more education attainment entails more opportunity cost to be incurred by persons like cost of foregone opportunity during the tenure of education, cost of training and so on, higher educational attainment, in particular graduation and above, seems to cause rise in wage rates. Is the same pattern valid when we combine educational attainment with technical and vocational qualifications? As shown in Figure 5, there appears to be a hierarchy of wage rates; while post graduate diploma occupies the top, followed by post-graduation, technical graduate, graduate, technical diploma, formal vocational education, and so on. Figure 6 depicts a hierarchy of wage rates with respect to occupational structure. In a descending order the occupational structure can be ordered as follows: managerial, professional, technicians/associate professionals, clerk, plant operator, service professional, craft related workers and elementary occupations. Apart from differences in educational attainment, what makes wages different is internal structures in enterprises. For example, like the labour market as a whole, incorporated enterprises tend to have their employees with legal entitlements and the second set 'employees without any entitlements'. May be the first set is something like 'insiders', the second is 'outsiders'. Are they paid distinctly? As shown in Figure 7, across the categories of size of employment, formal workers tend to earn discernibly higher wages than informal workers earn. Further, the same pattern is valid for type of organisation as well (Table 14).

Another important exploration might be to see if wage rate goes up with age across educational attainments. To simplify the analysis, we shrunk age data to two categories: 15-34 and 35-59. While the age group 35-59 appears to earn noticeable premium over 15-34 in categories like graduation and post-graduation, as move towards lower educational attainment this difference shrinks to negligible differences (Figure 8). Except for persons without technical qualification, age group 35-59 earns discernible premium over the younger ones (Figure 9). While for formal vocation education, older ones earn visibly higher premium over younger ones, there is negligible differences between age groups in other categories (Figure 10). Intuitively, wage tends to go up with age. As demonstrated here that happens only to select educational categories. Age-wage and education-wage direct relations may emanate from factors such as improved dexterity due to cumulative experiences and training. However, apart from these two endogenous variables, it is important to envisage do other factors like household, personal, labour market characteristics impact the wage rate.

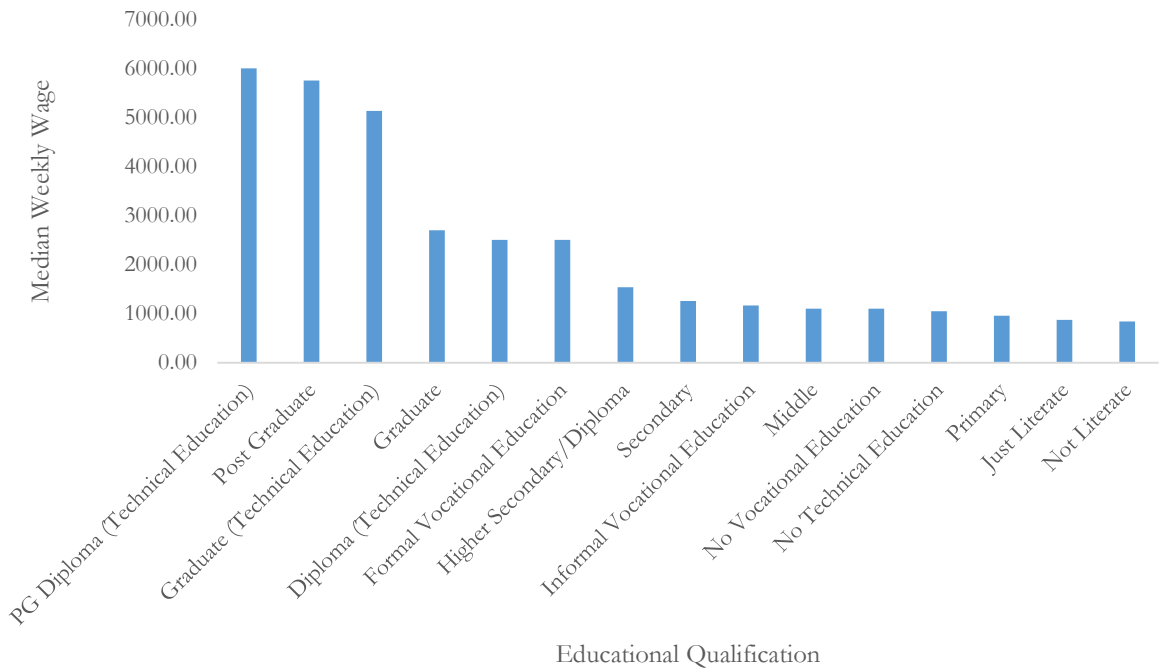
Table 13: Educational attainment and median weekly wage (Indian Rupees)

(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Economic Activity (NIC 2008 2 Digit)	Not Literate	Just Literate	Primary	Middle	Secondary	Higher Secondary/ Diploma	Graduate	Post Graduate
Food Products	850.00	840.00	817.00	1000.00	1050.00	1400.00	2535.00	3000.00
Beverages	1500.00	805.00	1197.00	1150.00	1750.00	1242.00	2500.00	6100.00
Tobacco Products	480.00	520.00	460.00	350.00	1000.00	1050.00	No Frequency	No Frequency
Textiles	700.00	840.00	800.00	1140.00	1250.00	1400.00	1714.00	3734.00
Wearing Apparel	700.00	1000.00	875.00	1050.00	1250.00	1120.00	1940.00	4200.00
Leather And Related Products	700.00	715.00	966.00	1040.00	1000.00	849.00	3000.00	5100.00
Wood And Products Of Wood And Cork, Except Furniture	800.00	900.00	1100.00	1167.00	1470.00	1190.00	1400.00	7000.00
Paper And Paper Products	960.00	720.00	1000.00	1000.00	1050.00	1600.00	1600.00	3200.00
Printing And Reproduction Of Recorded Media	1400.00	1500.00	790.00	1150.00	1170.00	1806.00	2143.00	3500.00
Coke And Refined Petroleum Products	1120.00	1400.00	1400.00	1300.00	1250.00	1900.00	11000.00	7467.00
Chemicals And Chemical Products	1050.00	700.00	720.00	1000.00	1141.00	2500.00	3150.00	5833.00
Pharmaceuticals, Medicinal Chemical And Botanical Products	933.00	1867.00	1330.00	1237.00	1200.00	1500.00	2700.00	5831.00
Rubber And Plastics Products	1200.00	1000.00	1150.00	1050.00	1250.00	1750.00	2540.00	5000.00
Other Non-Metallic Mineral Products	817.00	875.00	875.00	980.00	1000.00	1400.00	2333.00	7050.00
Basic Metals	1020.00	1400.00	1100.00	1250.00	1400.00	2927.00	4500.00	5833.00
Fabricated Metal Products, Except Machinery And Equipment	1050.00	1050.00	1050.00	1260.00	1400.00	1430.00	3267.00	5500.00
Computer, Electronic And Optical Products	875.00	800.00	1218.00	1000.00	1250.00	2100.00	4000.00	6500.00
Electrical Equipment	1167.00	1000.00	1025.00	1200.00	1480.00	3800.00	4200.00	4200.00
Machinery And Equipment	1095.00	938.00	1633.00	1100.00	1050.00	1867.00	4000.00	7760.00
Motor Vehicles, Trailers And Semi-Trailers	2150.00	1867.00	1300.00	1500.00	2300.00	2100.00	2800.00	8500.00
Other Transport Equipment	785.00	6100.00	1750.00	1750.00	2300.00	3250.00	6067.00	4125.00
Manufacture Of Furniture	1050.00	800.00	1050.00	933.00	1400.00	1120.00	4555.00	3000.00
Other Manufacturing	850.00	1050.00	1050.00	1400.00	1715.00	1730.00	2000.00	12800.00
Repair And Installation Of Machinery And Equipment	887.00	7000.00	1000.00	750.00	1150.00	1283.00	2400.00	No Frequency
Total	840.00	875.00	960.00	1100.00	1260.00	1540.00	2700.00	5750.00

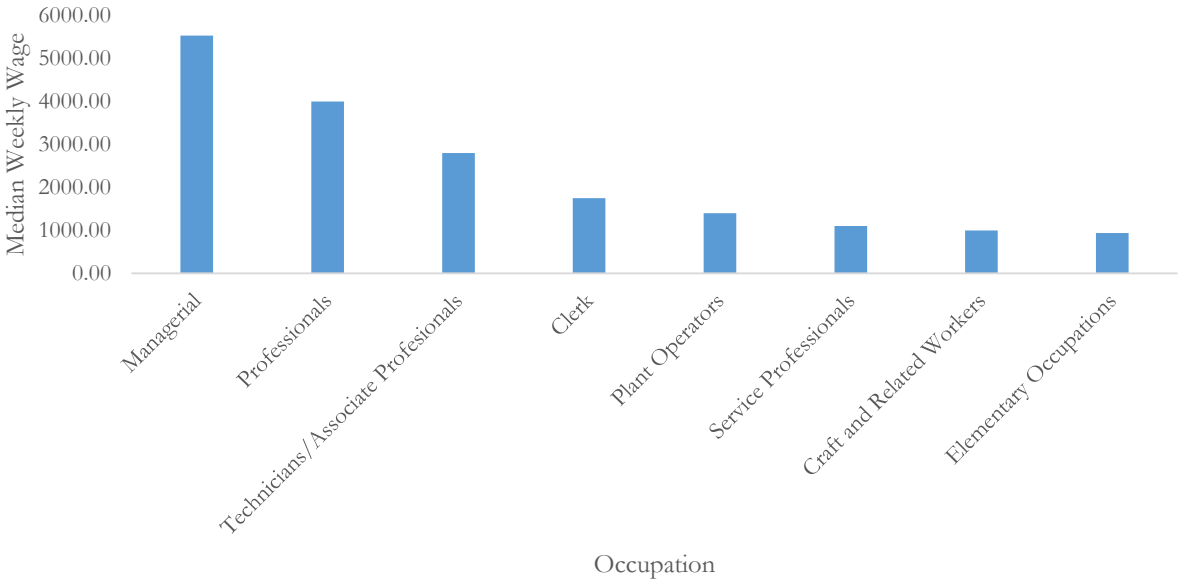
Estimated N = 47808094 from a sample of 19740

Source: Computed from unit records of National Sample Survey (NSS) 68th Round



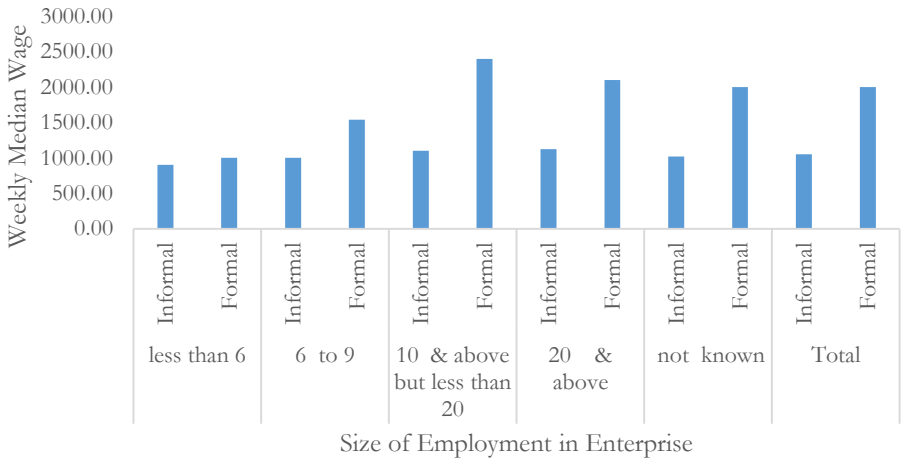
Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 5: Median Weekly Wage and Educational Qualification (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status



Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 6: Median Weekly Wage and Occupation (Manufacturing) in 2011-2012
(Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status



Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

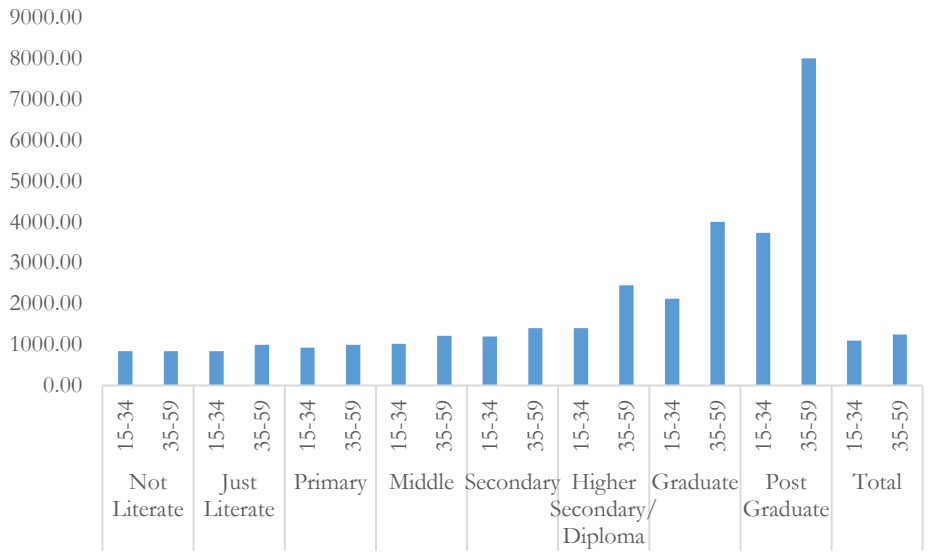
Figure 7: Median Weekly Wage and Size of employment in enterprise (Manufacturing) in 2011-2012
(Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Table 14: Type of enterprise, Nature of Employment, and Median Weekly Wage (Indian Rupees) (Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Type of Enterprise	Nature of Employment	Median Weekly Wage
proprietary male	Informal	1000.00
	Formal	1250.00
proprietary female	Informal	455.00
	Formal	1000.00
partnership with members from same Household	Informal	1000.00
	Formal	1920.00
partnership with members from different household	Informal	1100.00
	Formal	2100.00
Government/ public sector	Informal	1050.00
	Formal	5000.00
Public/Private limited company	Informal	1260.00
	Formal	2000.00
Co-operative societies/trust/ other non-profit institutions	Informal	1000.00
	Formal	2000.00
Others	Informal	875.00
	Formal	1000.00
Total	Informal	1050.00
	Formal	2000.00

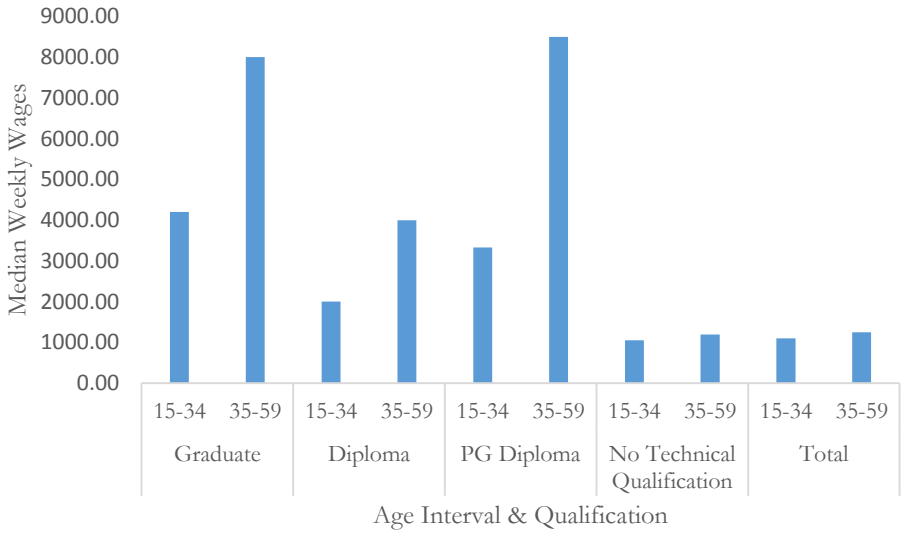
Estimated N = 47808094 from a sample of 19740

Source: Computed from unit records of National Sample Survey (NSS) 68th Round



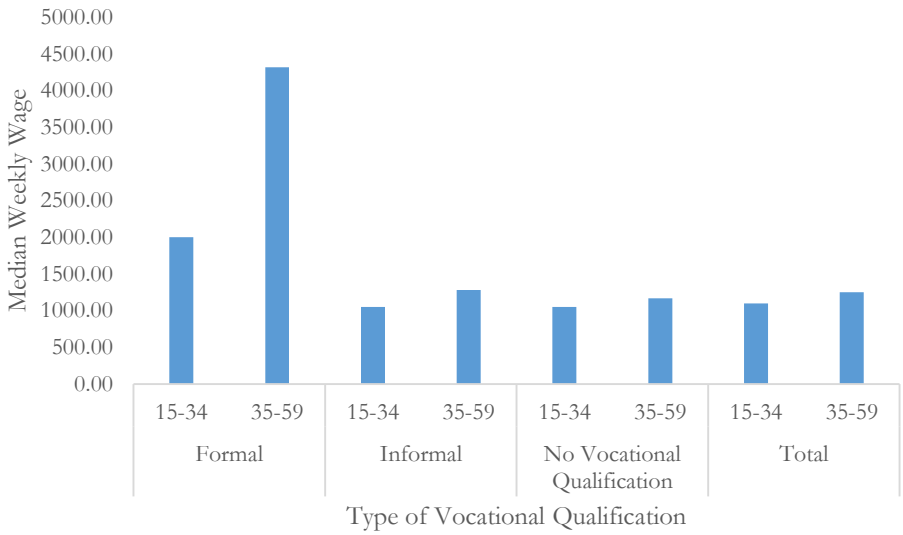
Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 8: Median Weekly Wage (Vertical Axis), Age Category and Educational Attainment on (Horizontal Axis) (Manufacturing) in 2011-2012
(Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status



Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 9: Median Weekly Wage (Vertical Axis), Age Category and Technical Qualification (Horizontal Axis) (Manufacturing) in 2011-2012
(Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status



Estimated N = 47808094 from a sample of 19740
Source: Computed from unit records of National Sample Survey (NSS) 68th Round

Figure 10: Median Weekly Wage (Vertical Axis), Age Category and Vocational Qualification (Horizontal Axis) (Manufacturing) in 2011-2012
(Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

5. Determinants of wage: *seeing how pivotal skill is*

Continuing our discussion, we posit wage as a function of age, education, technical qualification, and vocational qualification while seeing the effect of household features such as area of residence, religion, social category, personal features like sex, labour market characteristics such as type of enterprise, size of employment, occupation, manufacturing industries, states, intercept, and error. We run an ordinary least square (OLS) regression to estimate coefficients. Here the unit of analysis is employed persons in manufacturing sector in India. Out of 19740 persons who are in the sample, 8823 have reported wages. Thus, we have 8824 observations. Drawing cues from our discussion on impact of formal-informal work on wages, we separately run three models. First model is for formal employment that has 2147 observations, while the second model is delimited to informal employment, having 6677 units. The third model is a combined one.

Our dependent variable is natural logarithm of weekly wage earned of employed person. Age is one the independent variables. Quite important, both natural logarithm of wage and age are continuous variables. Following the econometric praxis, to test the hunch that wage-age tend to be inverted u shape, we square age. Squared age adds to the list of independent variables. Educational attainment is another independent variable, measured as a categorical variables. We prune the structure of eight codes to three with an objective of more meaningful interpretation of results. The revised structure has three categories: secondary/higher secondary/diploma, graduation and above, below secondary. Next independent variable technical education, measured as a categorical variable, has four codes: technical graduate, diploma, PG diploma, and no technical qualification. Vocational education is the next independent variable, with three codes: formal vocational qualification, informal vocational qualification, and no vocational qualification.

We add household, personal and labour market characteristics with these independent variables. Household characteristics include area of residence (rural/urban), religion (Hindu/Muslim/Christian/Sikh/Jain/Budhist/ Others), and social category (SC/ST/OBC/Others). Sex (Male/Female) is the only personal characteristic we consider. Age is already there in the model. The third layer is labour market characteristics. This set covers type of enterprises (proprietary male/proprietary female/ partnership with members from same Household/ partnership with members from different Household/ Government/Public Sector/ Public/ Private Limited/ Co-operative societies/trust/ other non-profit institutions/ Others), number of workers (less than 6/6 to 9/10 and above but less than 20/ 20 and above/Not known), occupation (managerial/professional/technicians/clerk/service professionals/craft related workers/plant operators/elementary occupations). Plus, we have added dummies for manufacturing categories and state. Finally, we have constant in the equations.

Table 15 provides regression estimates. Change in natural logarithm of wage due to change in age or proportionate change in wage upon change in age, for formal work, informal work and pooled sample, is a

linear equation that remains positive over a range, then bends towards consistent decline. For all three models, pattern appears to move in same direction. For educational attainment, we put the secondary/higher secondary/diploma as the reference category. When we move from reference category to graduate and above, for formal employment, the magnitude of proportionate change in wage is 0.32, while the magnitude of change for formal employment is 0.30. It appears that the formal employment offers higher positive differential in favour of university education than the informal employment does. However, moving from reference category down to below secondary, formal employment seems to be more punitive than the informal employment does. For the formal employment sample, moving from the reference group technical graduate to other groups does not make statistically significant changes. On other hand, for informal employment and pooled sample, changing from reference category to no technical qualification produces discernible negative changes. Further, in the case of vocational qualification, moving from the reference category 'formal vocational qualification' to informal vocational qualification does not produce statistically significant change irrespective sample frames. However, changing from reference category to no vocational education generates negative change in all three sample frames. Here, again formal employment is more punitive than the informal one.

The next layer is household characteristics. Compared to informal employment, the magnitude change in proportionate change in wage due to change from rural to urban, carrying positive sign, is discernibly higher for formal employment. Unequivocally, this pattern seems to be quite credible since most of formal employment in manufacturing is concentrated in urban India. Next comes religion, having Hindu as reference category. For formal employment sample, changing from reference category to Sikh produces a change of positive magnitude. However, this pattern is not statistically significant for informal employment sample. Interestingly, for the informal employment sample, changing from reference category to Muslim or Buddhist generate statistically significant negative changes. The severity of negative change is much more for Buddhists than for Muslims. Next is social category. For formal employment, moving from the reference group scheduled tribe to scheduled cate generates statistically significant negative change. However, changing to other categories produce statistically insignificant magnitudes. However, for informal employment, changing from reference categories to other categories produce similar statistically significant positive changes. Moving from male to female, the magnitude of change is statistically significant negative for both formal and informal employment samples. However, severity of negative change is higher for the informal employment sample.

We take male proprietor based enterprise as reference category for the variable type of enterprises. For the formal employment sample, moving from the reference category to public sector or public/private limited or cooperative, magnitude resultant change in proportionate change in wage is positive showing visibly highest value for public sector. However, for the informal employment sample, changing from the reference group to cooperative produces the highest positive change amongst other changes that include positive change in favour

moving to public/private limited companies, and negative change while moving to female proprietorship. Next is number of workers. Changing from the reference group less than 6 workers to the other categories produce no statistically significant change for the formal employment sample. However, for the informal employment sample, the magnitude of positive change increases with the size of employment. Lastly, for both the samples, moving from reference category managerial to other categories generate discernibly increasing negative magnitudes.

We subjected our OLS estimates to post estimation process. While all three models are homoscedastic and report lower magnitude of variance inflation factor (VIF) –mean VIF hovers around 4-, only the formal employment sample does not suffer from omitted variables.

Table 15: Determinants of Wage
(Manufacturing) in 2011-2012 (Male + Female; Urban + Rural, 15 Years and above), Usual Principal Status

Dependent Variable = Natural Logarithm of Weekly Wage	Coefficient	Robust Standard Error	p>|t|	Coefficient	Robust Standard Error	p>|t|	Coefficient	Robust Standard Error	p>|t|
	Formal Employment			**Informal Employment**			Employment		
Age	0.0371	0.0080	0.00	0.0495	0.0039	0.00	0.0376	0.0036	0.00
Age Squared	-0.0003	0.0001	0.02	-0.0006	0.0001	0.00	-0.0004	0.0001	0.00
Educational Attainment (Reference Category: Secondary & Higher Secondary)									
Below secondary	-0.1985	0.0321	0.00	-0.0994	0.0152	0.00	-0.1416	0.0142	0.00
Graduates and Above	0.3189	0.0350	0.00	0.2988	0.0357	0.00	0.3367	0.0262	0.00
Technical Qualification (Reference Category: Graduates)									
Diploma	0.0450	0.0709	0.53	-0.1860	0.1171	0.11	-0.0389	0.0608	0.52
PG Diploma	0.0689	0.0895	0.44	-0.1129	0.1603	0.48	0.0174	0.0796	0.83
No Technical Qualification	-0.1000	0.0694	0.15	-0.3064	0.1129	0.01	-0.2016	0.0586	0.00
Vocational Qualification (Reference Category: Formal)									
Informal	-0.0287	0.0437	0.51	-0.0459	0.0364	0.21	-0.0430	0.0283	0.13
No Vocational Qualification	-0.0712	0.0364	0.05	-0.0667	0.0351	0.06	-0.0761	0.0265	0.00
Area of Residence (Reference Category: Rural)									
Urban	0.1531	0.0279	0.00	0.0505	0.0135	0.00	0.0840	0.0125	0.00
Religion (Reference Category: Hindu)									
Muslim	-0.0108	0.0566	0.85	-0.0593	0.0198	0.00	-0.0591	0.0190	0.00
Christian	-0.0430	0.0764	0.57	0.0353	0.0403	0.38	-0.0083	0.0374	0.83
Sikh	0.2550	0.1085	0.02	0.0515	0.0408	0.21	0.0841	0.0447	0.06
Jain	0.0307	0.1828	0.87	0.1067	0.0898	0.24	0.0452	0.0901	0.62
Buddhist	-0.1929	0.1307	0.14	-0.2545	0.0896	0.01	-0.2241	0.0800	0.01
Others	-0.5252	0.1070	0.00	0.1846	0.1526	0.23	0.1017	0.1438	0.48
Social Group (Reference Category: Scheduled Tribe)									
Scheduled Caste	-0.1436	0.0660	0.03	0.1544	0.0326	0.00	0.0739	0.0311	0.02
Other Backward Classes	-0.1015	0.0615	0.10	0.1205	0.0315	0.00	0.0563	0.0300	0.06
Others	-0.0431	0.0594	0.47	0.2186	0.0324	0.00	0.1488	0.0305	0.00
Sex (Reference Category: Male)									
Female	-0.3779	0.0455	0.00	-0.4892	0.0208	0.00	-0.4749	0.0196	0.00
Type of Enterprise (Reference Category: Male Proprietor)									
proprietary female	0.0672	0.2738	0.81	-0.2218	0.0582	0.00	-0.2129	0.0568	0.00
partnership with members from same Household	0.0576	0.0863	0.50	0.0508	0.0430	0.24	0.0610	0.0390	0.12

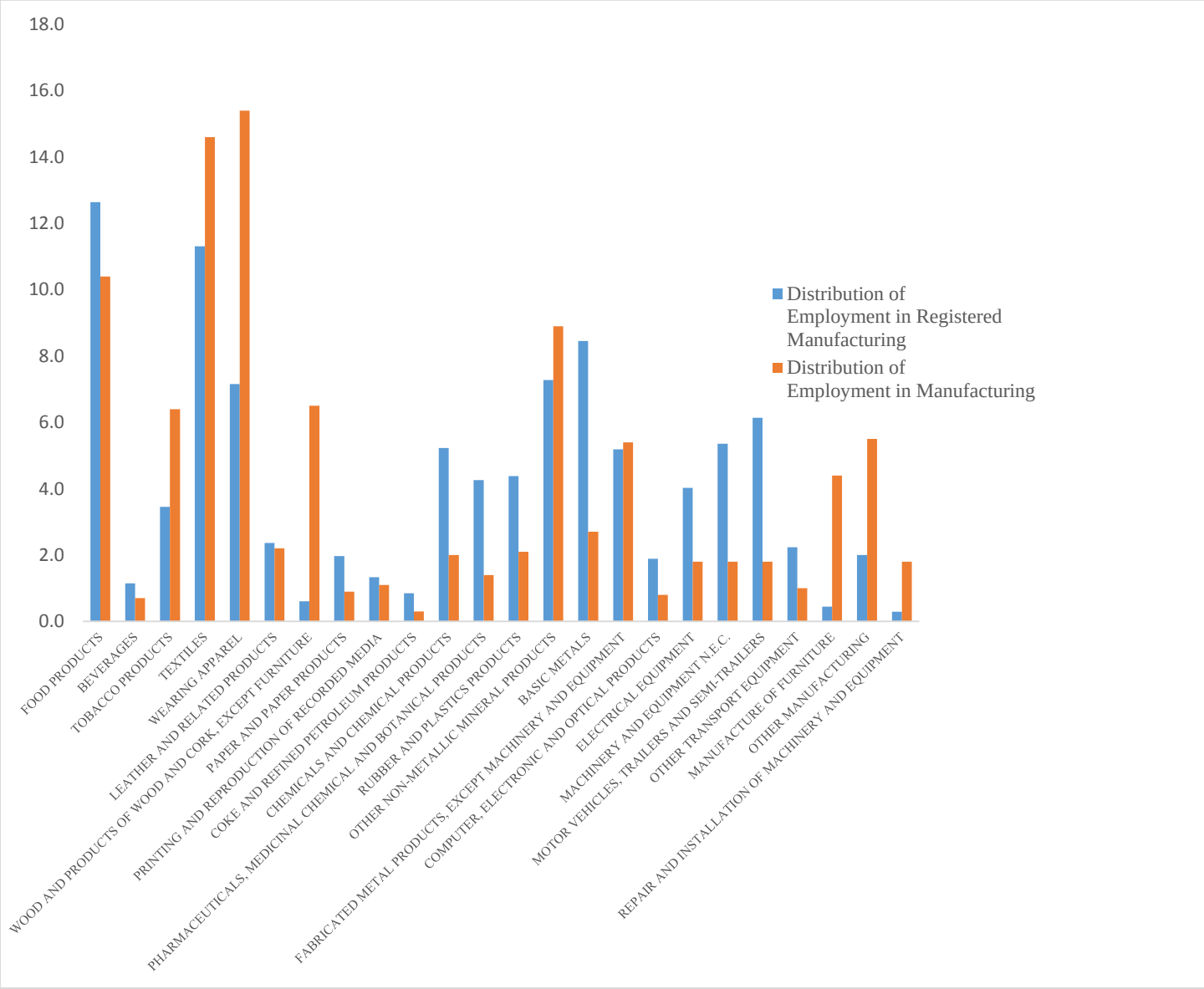
partnership with members from different Household	0.0515	0.0780	0.51	0.0528	0.0342	0.12	0.0583	0.0307	0.06
Government/Public Sector	0.5674	0.0528	0.00	0.0592	0.0699	0.40	0.6076	0.0418	0.00
Public/ Private Limited	0.1864	0.0340	0.00	0.0384	0.0182	0.03	0.1242	0.0160	0.00
Co-operative societies/trust/ other non-profit institutions	0.2126	0.0964	0.03	-0.1577	0.0859	0.07	0.0610	0.0683	0.37
Others	-0.2406	0.1639	0.14	0.0411	0.0285	0.15	0.0320	0.0285	0.26
Number of Workers (Reference Category: Less than 6)									
6 to 9	-0.1204	0.0979	0.22	0.1041	0.0200	0.00	0.0874	0.0199	0.00
10 & above but less than 20	-0.1073	0.0969	0.27	0.1304	0.0219	0.00	0.1206	0.0215	0.00
20 & above	-0.0972	0.0846	0.25	0.1764	0.0191	0.00	0.1851	0.0186	0.00
Not known	-0.0985	0.0901	0.27	0.1624	0.0290	0.00	0.1614	0.0263	0.00
Occupation (Reference Category: Managerial)									
Professionals	-0.2641	0.0637	0.00	-0.1859	0.1005	0.06	-0.2787	0.0544	0.00
Technicians/Associate Professionals	-0.3913	0.0676	0.00	-0.4032	0.1052	0.00	-0.4456	0.0584	0.00
Clerk	-0.5740	0.0646	0.00	-0.4750	0.0960	0.00	-0.6230	0.0533	0.00
Service Professionals	-0.6871	0.0824	0.00	-0.5658	0.0975	0.00	-0.7435	0.0585	0.00
Craft and Related Workers	-0.7819	0.0602	0.00	-0.6622	0.0896	0.00	-0.8350	0.0488	0.00
Plant Operators	-0.6556	0.0599	0.00	-0.5838	0.0897	0.00	-0.7399	0.0486	0.00
Elementary Occupations	-0.9154	0.0683	0.00	-0.7228	0.0902	0.00	-0.9238	0.0494	0.00
Manufacturing Dummy (NIC 2008 2 Digit)	Yes			Yes			Yes		
State Dummy	Yes			Yes			Yes		
Constant	7.2250	0.2060	0.00	6.9208	0.1770	0	7.1452	0.1126	0.00
R Squared	0.63			0.4			55		
N	2147			6677			8824		

Source: Computed from unit records of National Sample Survey (NSS) 68th Round

6. Conclusion

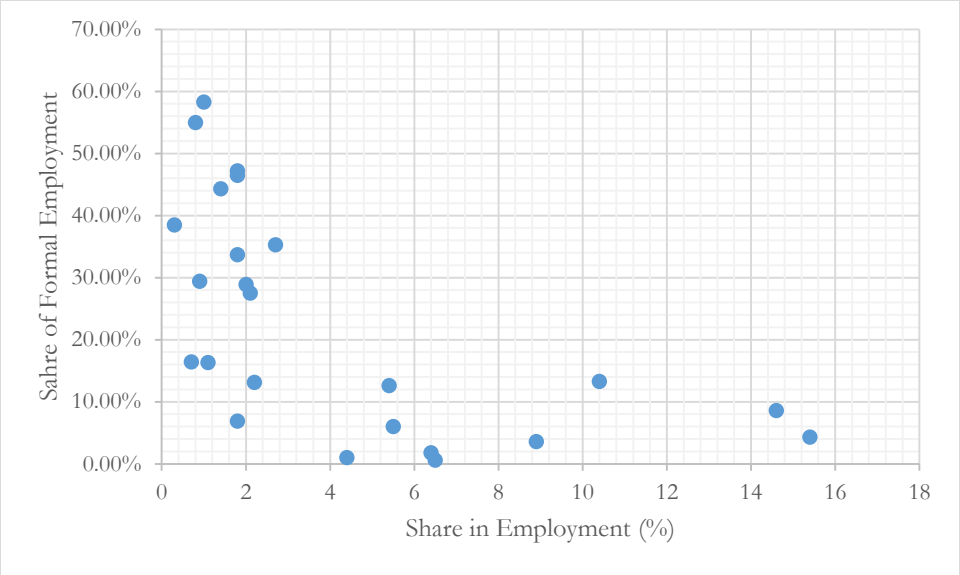
Results of our analysis clearly emphasizes on underlying structures, heterogeneities, patterns in Indian manufacturing employment system. While large chunk of Indian manufacturing workforce remains to be not so skilled enough to escape the vicious path of nominal economies emanating from low entitlements, pay and not many opportunities, that accrue to a few select groups of employers, it is imperative to carve out synergetic systems that generate opportunities for the workforce to upgrade skills and graduate to jobs with higher order entitlements. Perhaps, there may be scope for envisaging a synergic process to pool competencies of skilling institutions, state, labour market structures, and so on. Unequivocally, the current scenario of low wage and skill shortage ought to change. The future research may look into the role institutional processes and innovation to overcome the trap of skill deficit and low wages.

Appendix



Source: Distribution of Employment in Registered Manufacturing is obtained from Annual Survey of Industries (2011-2012). Distribution of Employment in Manufacturing is computed from unit records of National Sample Survey (NSS) 68th Round (2011-12

Figure 1: Distribution of Employment in Registered Manufacturing and Manufacturing (2011-12)



Source: Computed from unit records of National Sample Survey (NSS) 68th Round (2011-12

Figure 2: Share of Industries in Formal Employment and Share of Industries in Employment (NIC 2008 2 Digit Industries) (2011-12)