Trends and the Changes in the Nature of Employment Structure in Organized Manufacturing Sector of India with respect to Total Employment, Gender and Casualization of Workers During 2000-2016

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Abstract

The organized manufacturing sector in India has undergone structural shift of economic activities during the process of economic growthin terms of the pattern of employment and distribution of workforce across sectors, regions and industries in the period of economic reforms and trade liberalization.This paper purports to study the nature and trend in the growth of workforce and changes in occupational structure of the organizedmanufacturing sector of the economy in terms of various dimensions like rural urban distribution, sectors and product groups, gender dimension and sex composition during the period from 2000-01 to 2015-16 based on data from Annual Survey Reports of industries and labour bureau reports. More specifically this paper examines the changing scenario of employmentof labour and the extent of variation in the incidence and annual growth rate of the employment with special reference to the rural- urban division, direct and contract work participation and male- female ratio in work participation in the organised manufacturing sector at the national level, industry level and region/state level during 2000-01 to 2015-16.

Keywords: *employment growth rate, contractualization, male-female ratio,workforce participation, industry-wise distribution, states and regions*
JEL classification: *J1, J2, J8, L6*

Introduction

The post reform period has witnessed some major changes in the structure andcharacteristics of organized manufacturing sector of India in respect of various outcomes likeoutput, employment, capital investment and consumption.The changes in technology and technological composition ofmanufacturing output in the organized sector in the post reform period have resulted in increase of share ofcapital intensive industries and decline of shareof labour intensive industries.It has been argued that industrialization and urbanization has resulted in increasing importance of capital intensive industries like coke and petroleumproducts, motor vehicles and basic metals over that of agro and material based industries like textiles, paper and paper products, food products and beverages. Labour productivity has increased rapidly and productivity of capital has sharply declined.While these developments may be necessary to improve competitiveness of Indianmanufactures in the global markets, they are not very helpful in

generating employment.

Furthermore the organized manufacturing sector has undergone phenomenal change in terms of the pattern of employment and distribution of workforce in the twenty first century. The Indian employment framework has undergone the structural shift of economic activities during the development process, in terms of relative share of the sectors from agriculture to industryand eventually to services. Inspite of this transition, the manufacturing sector is still considered as the key provider of employment. However, the quality of employment raised inhibitions among policy makers with the alarming concern of where most new jobs have been created. . Roy(2016) has argued that in order to mend the gap between growth and employment in the Indian organized manufacturing sector, which recorded declining employment elasticity a larger strategy of full employment with interventions related to demand structures, technology, size structure of firms, as well as a calibrated engagement with the global market needs to be contextualized

The persistence of unequal distribution of male and female both in terms of participation in the labour market (or Gender Segregation)and also with respect to pay for work (or Wage discrimination) at work place is prevalent in India(Madheswaran & khasnobis). Mehrotra (2017) has shown that the decline in female work participation in urban areas has been due to decline in international demand for products of labor-intensive industries in urban areas.Banerjee and Veeramani (2017) have argued that the increase in adoption of new technology due to liberalizationbiases the gender composition of workforce against females.

Another striking labour market transformation is observed in the pattern of employment moving towards casualisation of labor relationships, with production units hiring individuals on a casual basis vis-a vis contract for jobs rather than employing them directly as regular workers. This is helping in creating a low cost support system, particularly in urban areas.Papola(2012)has observed that the rising trend of employment in the organized sector has been mostly in the categories of casual and contract labour.This casualization/informalization of labour is causing a 'jobless growth' in the organized manufacturing sector with underemployed (having work only for a minor part of the time) and 'working poor'(employed but are able to earn only a fraction of what is regarded as minimum necessary to overcome poverty) constituting 20 per cent in 1999-2000 and 21 per cent in 2004-05 of the total proportion of 'employed' workers (i.e the ratio of workers gainfully employed to the total workforce) and in fact, constituting the core part of the employment problem in India (Ghosh, 2004).

The shift in the pattern of employment in recent years towards the process of casualization has created more demand for cheap labour and female labour supply easily falls in this category.This shift towards casualization of labour has gained momentum with the role and size of government shrinking, giving way to a rapidly growing presence of private sector in the labor market.The increasing role of private sector in the organized market has put a question mark on the provisions of job security and wage parity.Bhat

(2014) has claimed that growth in employment rate in the organized manufacturing public sector has been dismally shrinking due to lack of government investment and some degree of privatization. On the one hand private sector did not show high response to enhance employment, and on the other, with inflexibility in hiring labour and rigid labour laws the private sector opted for more capital intensive mode of production. The quality of the employment in these units may be exploitative. Thus increasing casualization and privatization calls attention to the economic principle of equity in terms of the wage paid and the nature of work in which these casual workers are employed. There is need to analyze the effect of the growing casualization on the labour market opportunities and wage distribution in the organized sector. In this light the long existing debate of male female work participation disparity needs to be analyzed.

Objective of the Study

This paper tries to review the changes in occupational structure and industry wise as well as state and region wise distribution and trends in the Indian labour market spanning from 2000 to 2016 with respect to overall growth of employment, rural-urban division of employment, male-female participation rates in employment, nature and extent of casualization of employment in the organized sector. Thus this paper tries to

1. Explore the nature and trends in employment of the organized sector from 2000 to 2015
2. Study the trends and extent of inequality in male and female employment in the organized sector
3. Study the nature and trends in employment of contract vis-avis casual workers in the the Indian organized sector.

Data and Methodology

The data used for analysis are secondary data. The period considered here is from 2000-01 to 2015-16. The sources of data are Annual Survey of Industries (ASI) data over the period 2000-2015, data from the Labour Bureau of Ministry of India. This period has been chosen for the study because it covers a big part of the period of economic reforms and trade liberalization in India. And also, complete set of necessary data is available for this period.The present analysis is confined to the organized / registered manufacturing sector and excludes the unorganized manufacturing sector along with electricity, water and gas supply undertakings & repair services units, all of which are counted as industry. 22 industries have been considered in our study. The study has been done at three levels namely at the national level, inter-industry level and state level.Descriptive statistics and Regression analysis have been used for our analysis. The exponential growth rate has been estimated using the formula

$Y=Ae^{bt}$

Taking log, it has been converted into a log linear form as

$y= \text{Log } Y = a+bt$

Where
Y represents the employment components,
t represents time
b represents the average annual growth rate of Y.
The annual growth rate of employment is calculated using the formula
$G_t=(E_t-E_{t-1})/E_{t-1}$
Where G_t represents annual growth rate of employment in period t,
$E_t$represents employment in time period t
E_{t-1} represents employment in time period (t-1).
Annual data for 22 major manufacturing industries in the organized sector for four time periods 2001-2002, 2005-2006, 2011-2012 and 2015-2016 have been taken for panel regression in our study. The econometric analysis is based on panel data estimation, using the Stata software.
Panel regression has been done using the following equation:

$$Y_{it} = \beta_0 + \beta X_{it} + u_i + \varepsilon_{it}$$

where Y_{it} is the dependent variable of the ith individual in period t, X_{it} is the observed explanatory variable of the ith entity in period t. u_i is the unobserved individual heterogeneity of the i-th identity and ε_{it} is the error term of the ith entity in period t. Both random effects and fixed effects model are used and Hausman test used to test the acceptability of model.

Trends in Total Employment in the Manufacturing Sector

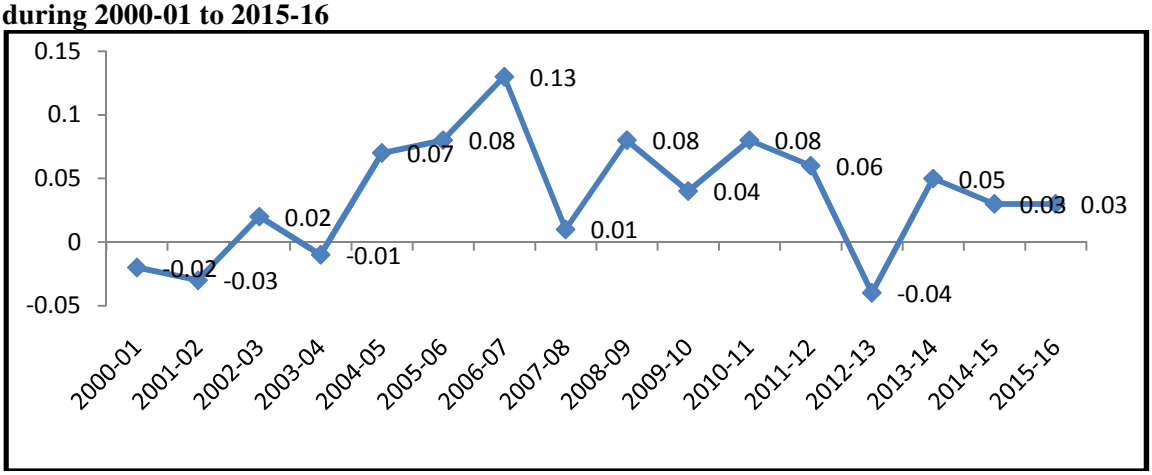
In this segment the broad structure and trends in growth of total employment in the organized manufacturing sector in India shall be discussed for the period 2000-01 to 2015-16. The total employment in the manufacturing sector refers to the total persons engaged in an economic activity.Total persons engagedinclude

1. Workerswho are defined as all persons employed directly or through any agency whether for wages or not and engaged in any manufacturing process or in cleaning any part of the machinery or premises used for manufacturing process or in any other kind of work incidental to or connected with the manufacturing process or the subject of the manufacturing process
2. Employeesare all workers defined above and persons receiving wages and holding clerical or supervisory or managerial positions engaged in administrative office, store keeping section and welfare section, sales department and also those engaged in purchase of raw materials etc. or purchase of fixed assets for the factory as well as watch and ward staff.

Thus the total employment refers to all the employees as defined above and all working proprietors and their family members who are actively engaged in the work of the factory even without any pay, and the unpaid members of the co-operative societies who worked in or for the factory in any direct and productive capacity.

Figure 1 shows the trend in growth of total employment in organized sector in India. The annual growth rate of total employment was recorded at -2.3% in 2000-01 and remained negative till 2003-04. Thereafter a positive trend in growth was recorded and by 2006-07 the total employment recorded a 13.4% growth rate. But a fluctuating trend in growth is observed thereafter and by 2015-16 the growth rate was registered to be around 3%.

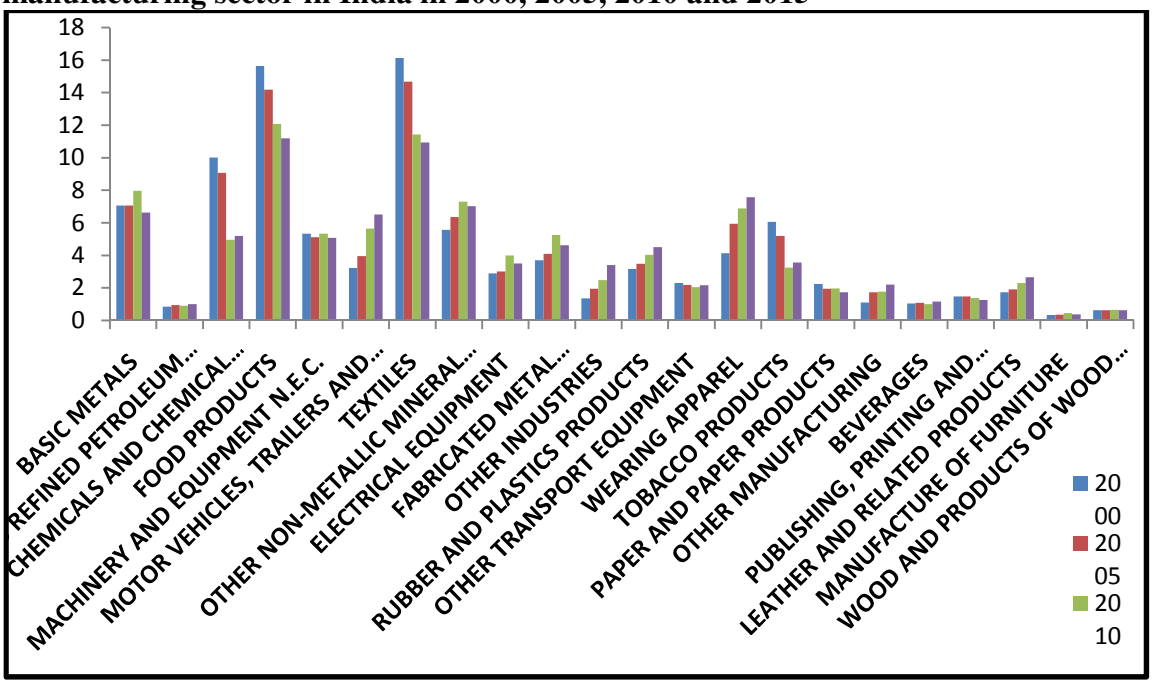
Figure 1: Annual Growth rate in Total Employment in Organized Manufacturing sector during 2000-01 to 2015-16



Source: Author's computation from ASI data

At the disaggregate level the distribution of total employment and its growth trend are observed for 22 two digit industries for the period 2000-01 to 2015-16.Figure 2 shows the distribution of total people engaged in different industries in organized manufacturing sector for the years 2000-01, 2005-06, 2010-11 and 2015-16. The distribution of the total employment in organized manufacturing sector is heavily concentrated in the industries related to food, textile and chemical and chemical products though all these three industries project a declining trend in their share of total employment. Figure 2 shows that the share of total employment of the food industry has declined from 15.64% in 2000-01 to 12.8% in 2010-11 and to 11.19% in 2015-16 respectively. The textile industry has also shown a fall in its share of total employment from 16.13% to 10.94%during the same period. On the other hand, the total employment share of industry related to furniture,wood and products of wood and cork, except furniture and coke and petroleum related products has been significantly low. More specifically the total employment share of industry related to wood and products of wood and cork, except furniture has remained almost stagnant at around 0.62% over the entire period under consideration. An important observation in this regard is that the capital based industries have not been promising in terms of their share in total employment in organized manufacturing sector in India.

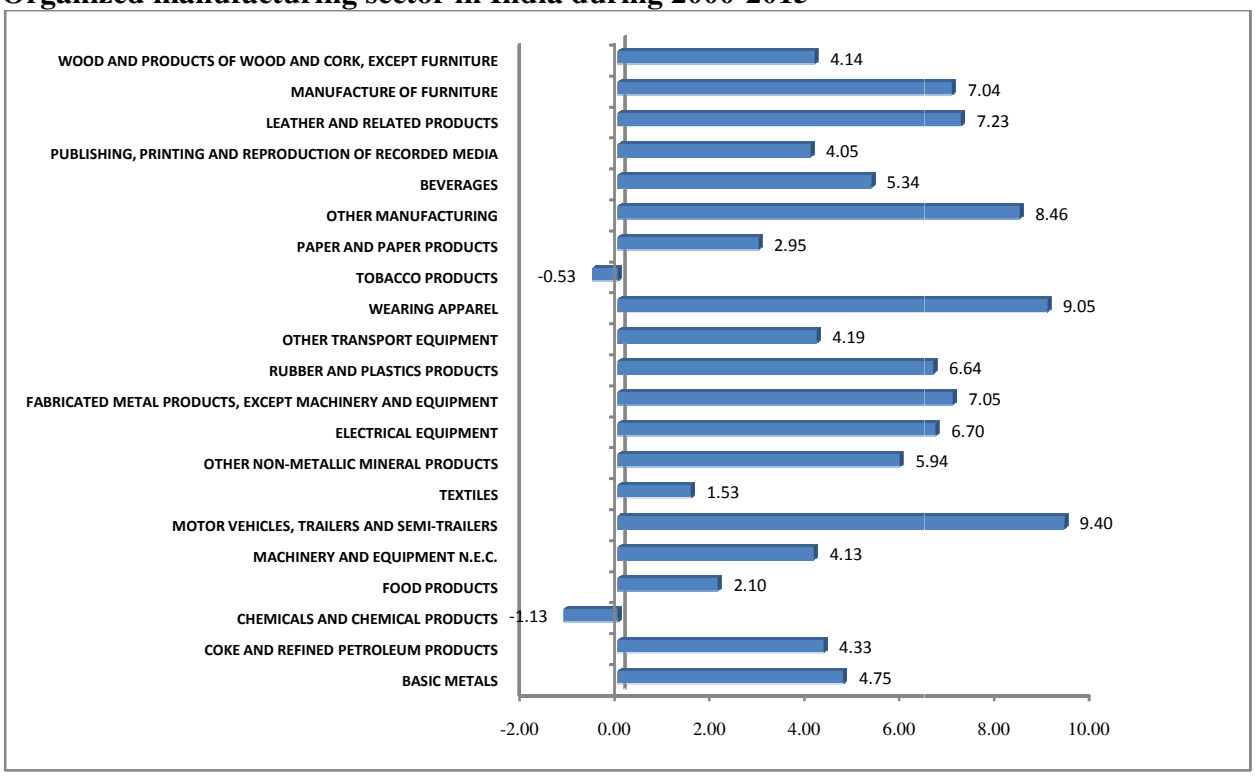
Figure 2: Industry wise Distribution of Total Employment in the organized manufacturing sector in India in 2000, 2005, 2010 and 2015



Source: ASI data

Figure 3 shows the annual average growth trends of the industries in terms of employment in the manufacturing sector during 2000 to 2015. From the data it is observed that the tobacco industry and the chemical products industry have recorded negative annual growth rate in total employment of -0.53% and -1.13% respectively. Motor vehicles and semi trailers industry recorded the highest growth rate in total employment (9.40%) followed by wearing apparel industry (9.05%) and other manufacturing industries (8.46%) respectively. The textile industry registered a very low but positive growth rate at 1.53% followed by food industry at 2.10% and paper and paper products industry at 2.95% respectively.

Figure 3: Average Annual Growth Rate of Employment in Major Industries of Organized manufacturing sector in India during 2000-2015



Source: computed from ASI data

The regional distribution of employment in manufacturing industriesacross all states (except Sikkim and Arunachal Pradesh) and Union Territories(except Andaman and Nicobar Island)is discussed in the following segment. Table 1 shows the employment share of regions and states in organizedmanufacturing sectorfor 2000-01, 2010-11 and 2015-16 respectively.The region wise comparison shows that the southern region has the highest share in the employment generation despite a falling trend in its sharefrom35.39% in 2000-01 to 34.51% in 2015-16 . The western zone occupies the second position in terms of its contribution to the total employment of the nation recording an increase from 28.4% to 28.78% during the same period of reference followed by thenorthern region which recorded a steady increase from 17.97% in 2000-01 to 21.25% in 2015-16in its contribution to total employment.The north eastern region, on the other hand, recorded an abysmally low share at 1.84% in 2015-2016 which is a marginal increase from 1.58% in 2000-01. The eastern and central regions depict a dismal picture in terms of the decelerating trend in their already very low employment share.The employment shares of eastern and central regionsfell from 11.7% in 2000-01 to 8.34% in 2015-16 and 4.38% in 2000-01 to 3.71% in 2015-16 respectively.

A state level analysis reveals that Tamil Nadu has not only recorded the highest share of employment but also an increasing trend in employment generation with an average growth rate of 5.23%.Maharashtra is the second highest contributor to total employment with an average annual growth rate of 4.23% despite of a fall in its share to total employment from 14.68% in 2000-01 to 13.78% in 2015-16. Gujarat has also shown an impressive performance in terms of both its average annual growth rate of employment (5.78%) as well as share to the total employment registering an increase from 9.41% to 10.94% during 2000-01 to 2015-16. An interesting observation is thatAndhra Pradesh registered a drastic decline in its employment share over the years from 11.36% in 2000-01 to 3.64%in 2015-16. However this drastic decline can be attributed to the creation of Telengana as a new state in 2014 which was previously a part of Andhra Pradesh. Keralawith a meagre 1.63% average annual growth rate of employment is the only state in the southern region that has also recorded a low as well as declining trend in its employment share(3.92% in 2000-01 to 2.37% in 2015-16). The western zonal states have shown a positive trend in terms of their share to total employment with average annual growth rate of employmentof around 6%. In the northern zone, Haryana with 6.57% average annual employment growth rate has recorded an increase in share to total employment from 3.77% to 5.02%. Uttarakhand though recorded the highest average annual employment growth rate during 2000-2016(21.07%) but its share to total employment has been comparatively low, increasing from 0.54% in 2000-01 to 2.72% in 2015-16. Himachal Pradesh, Delhi, Punjab and Uttar Pradesh have recorded a fall in their share to total employment in 2015-16. A disquieting fact is that Delhi has recorded a negative average annual employment growth rate (-0.33%). In the eastern region, Orissa and Bihar with average annual employment growth rate of 6.72% and 6.35% respectively have recorded marginal increase in their share to total employment. On the contrary, West Bengal and Jharkhand have recorded a fall in their share to total employment as well as a very low annual employment growth rate of 1.59% and 1.44% respectively.The sharp decline in the share of the eastern region thus can be largely attributed to the sharp decline in the employment generation capacity of West Bengal and Jharkhand.The northern eastern states represent an abysmally low contribution to employment. However, except for Nagaland, each state in north east has recorded a marginally increasing trend in their share to total employment.In the central region while the share of Chhattisgarh to total employment remained more or less stable at 1.2% over the period, Madhya Pradesh has recorded a declining trend with its share to total employment from 3.17% to 2.51%.

Table 1: Share of States and Regions in Total Employment of Organized Manufacturing Sector

	share of states& UTs/ regions in total employment			absolute change		Average annual growth rate in employment
	2000-01	2010-11	2015-16	2000 to 2010	2010 to 2015	2000-01 to 2015-16
Andhra Pradesh	11.36	10.25	3.64	-1.11	-6.61	-3.36
Karnataka	5.94	6.16	7.03	0.22	0.87	5.48
Kerala	3.92	3	2.37	-0.92	-0.63	1.63
Tamil Nadu	14.22	15.31	16.27	1.09	0.96	5.23
Puducherry	0.49	0.47	0.38	-0.02	-0.09	2.22
Southern zone	35.39	35.19	34.51	-0.74	-0.68	
Rajasthan	2.91	3.4	3.56	0.49	0.16	5.97
Gujarat	9.41	10.2	10.94	0.79	0.74	5.78
Goa	0.39	0.42	0.5	0.03	0.08	5.73
Maharashtra	14.68	12.72	13.78	-1.96	1.06	4.23
Dadra & N Haveli	0.51	0.86	0.82	0.35	-0.04	7.65
Daman & Diu	0.50	0.89	0.67	0.39	-0.22	6.25
Western zone	28.4	26.74	28.78	-1.66	2.04	
J&K	0.29	0.44	0.48	0.15	0.04	7.95
HP	0.49	1.23	1.31	0.74	0.08	14.14
Haryana	3.77	4.3	5.02	0.53	0.72	6.57
Delhi	1.51	0.96	0.8	-0.55	-0.16	-0.33
Chandigarh	0.12	0.1	0.08	-0.02	-0.02	2.07
Punjab	4.49	4.84	4.26	0.35	-0.58	4.49
uttarakhand	0.54	2.27	2.72	1.73	0.45	21.07
Uttar Pradesh	6.76	6.37	6.58	-0.39	0.21	2.05
Northern zone	17.97	20.51	21.25	2.54	0.74	
WB	7.13	5.01	4.44	-2.12	-0.57	1.59
Orissa	1.61	2.23	1.8	0.62	-0.43	6.72
Bihar	0.79	0.84	0.84	0.05	0	6.35

Jharkhand	**2.17**	**1.48**	**1.26**	**-0.69**	**-0.22**	**1.44**
Eastern zone	**11.7**	**9.56**	**8.34**	**-2.14**	**-1.22**	
Tripura	**0.11**	**0.26**	**0.19**	**0.15**	**-0.07**	**7.91**
Nagaland	**0.04**	**0.02**	**0.04**	**-0.02**	**0.02**	**2.72**
Manipur	**0.01**	**0.04**	**0.06**	**0.03**	**0.02**	**15.28**
Meghalaya	**0.01**	**0.06**	**0.09**	**0.05**	**0.03**	**16.44**
Assam	**1.41**	**1.31**	**1.46**	**-0.1**	**0.15**	**4.46**
North Eastern Zone	**1.58**	**1.69**	**1.84**	**0.11**	**0.15**	
Madhya Pradesh	**3.17**	**2.45**	**2.51**	**-0.72**	**0.06**	**3.61**
Chhattisgarh	**1.21**	**1.41**	**1.2**	**0.2**	**-0.21**	**5.15**
Central zone	**4.38**	**3.86**	**3.71**	**-0.52**	**-0.15**	

Source: computed from ASI data

Rural vs urban employment trends in organized manufacturing sector

The analysis of employment in the manufacturing sector is highly debated on the issue of shift of workforce from rural to urban areas. Table2 shows that while share of rural employment in the manufacturing sector increased over the years from 37.58% in 2001-02 to 43.90% in 2015-16, urban employment share has declined from 61.84% to 56.10% during this period.the share of rural employment has shown an increasing trend upto 2008-09 which recorded the highest increase in rural employment share at 46.97% but thereafter a falling trend is recorded. The urban employment share has on the other hand recorded a declining trend

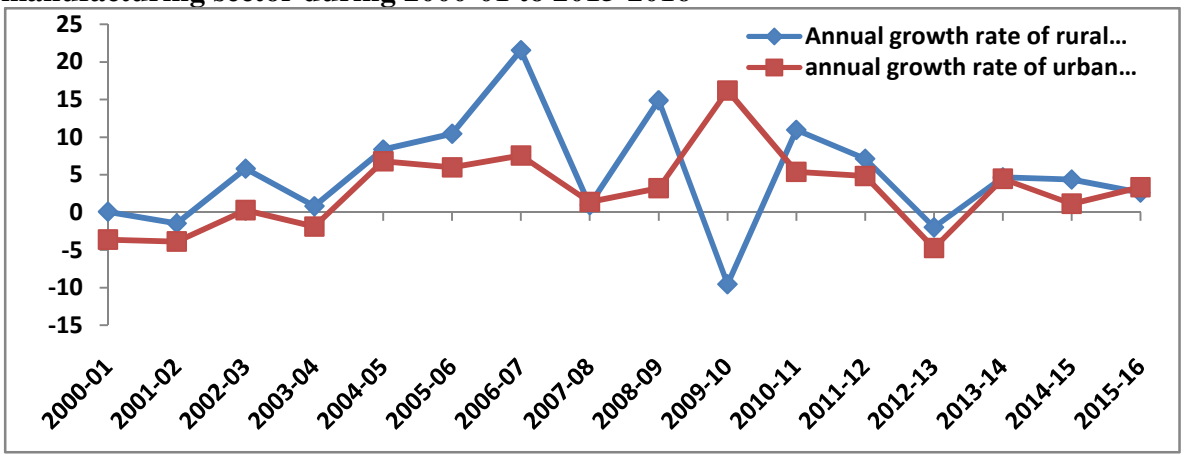
In figure 4, the annual growth rate of rural employment and urban employment has been shown. It is seen that both rural and urban employment has recorded a fluctuating trend in their growth rates. While the total person engaged in rural employment has increased from 0.08% in 2000-01 to 2.6% in 2015-16 the total person engaged in urban employment has improved from -3.62% in 2000-01 to3.34% in 2015-16. The growth rate of both rural employment and the urban employment became negative in 2001-02 and 2012-13 respectively. However the growth rate of rural employment remains higher than that of urban employment in general over the years with the exception of 2009-10

Table 2: Rural Urban employment distribution in organized manufacturing sector

	Proportion of Rural Employment	Proportion of Urban Employment
2000-01	37.58	61.84
2001-02	38.16	62.42
2002-03	39.43	60.57
2003-04	40.08	59.92
2004-05	40.43	59.57
2005-06	41.42	58.58
2006-07	44.41	55.59
2007-08	44.31	55.69
2008-09	46.97	53.03
2009-10	40.81	59.19
2010-11	42.05	57.95
2011-12	42.58	57.42
2012-13	43.27	56.73
2013-14	43.31	56.69
2014-15	44.08	55.92
2015-16	43.90	56.10

Source: computed from ASI data

Figure4: Trends in Growth rate of rural and urban employment in organized manufacturing sector during 2000-01 to 2015-2016



Source: computed from ASI data

Trends in female work participation

In this segment, female work participation in manufacturing sector is analyzed . The most distinctive feature observed about the situation women face in India's formalmanufacturing sector is their low participation rate.Female workers accountfor less than 20 per cent of the workforce. Nevertheless, it is also important tonote that the share of female workforce in direct manufacturing workers has increased from 14.15 percent in 2001-02 to 20.37% in 2002-03 and further to 20.91 per cent in 2015-16.(see Table 3)

The sex ratio of female to male workers(SR) is taken as a common measure of sex segregation index used to indicate the degree of concentration of female workers in an industryrelative to the average SR for all industries. SR is defined as

$SR_i = F_i / M_i$

where F_i denotes the total number of female workers in industry i and M_i denotesthe total number of male workers in industry i.

Table 3 shows the SR over time from 2001 to 2015. The data reveals that the sex ratio in total employment has remained more or less stagnant over the years at around 0.25.

Table 3:Proportion of male and female direct workers to total direct workers and Sex Ratio in organized manufacturing sector during the period from 2001-02 to 2015-16

	Proportion of female direct workers	proportion of male direct workers	sex ratio (SR)
2001-02	14.15	57.27	0.25
2002-03	20.37	79.63	0.26
2003-04	19.5	80.5	0.24
2004-05	20.35	79.65	0.26
2005-06	19.82	80.18	0.25
2006-07	20.66	79.34	0.26
2007-08	19.78	80.21	0.25
2008-09	20.05	79.95	0.25
2009-10	19.81	80.19	0.25
2010-11	18.78	81.22	0.23
2011-12	19.12	80.88	0.24
2012-13	18.6	81.4	0.23
2013-14	21.77	78.23	0.28
2014-15	19.9	80.1	0.25
2015-16	20.91	79.09	0.26

Source: Computations based on ASI Data

Table 4 shows a comparative study of the SR across industries of the organized manufacturing sector in India from 2001 to 2015. It is observed that the tobacco industry has the highest SR value indicating that their female to male employment is higher. It is also observed that over the years,the SR value of the capital intensive industries namely coke and refined petroleum products industry, chemical industry, other nonmetallic mineral industry, basic metals industry, fabricated metal product industry,machinery and equipment industry other transport equipment industry and motor vehicles industry have registered a very low SR value (less than 0.1) while that of labour intensive industries namely food products, beverage, tobacco, textile, wearing apparel, leather , paper and wood industries have recorded SR value greater than 0.1. the industrywise mean values suggest that except the tobacco industry all other industries employ more male workers than female workers.

Table 4: Sex Ratio(SR) across industries in organized manufacturing sector during the period from 2001-02 to 2015-16

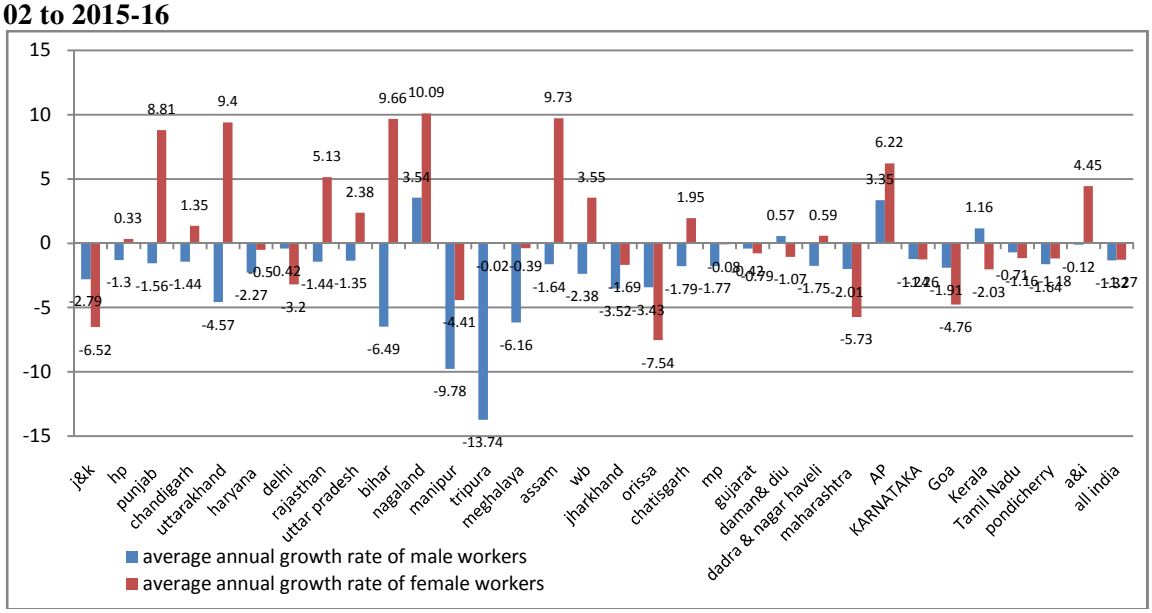
Industry	2001	2005	2011	2015	mean
FOOD PRODUCTS	0.19	0.37	0.14	0.36	0.26
BEVERAGE	0.09	0.11	1.79	0.18	0.54
TOBACCO PRODUCTS	3.70	1.39	0.22	4.35	2.42
TEXTILES	0.20	0.20	1.01	0.24	0.41
WEARING APPAREL; DRESSING AND DYEING OF FUR	0.69	1.30	0.55	1.05	0.90
LEATHER	0.64	0.46	0.09	0.75	0.49
WOOD AND OF PRODUCTS OF WOOD AND CORK, EXCEPT FURNITURE	0.06	0.13	0.10	0.10	0.10
PAPER AND PAPER PRODUCTS	0.02	0.10	0.11	0.15	0.09
PUBLISHING, PRINTING AND REPRODUCTION OF RECORDED MEDIA	0.56	0.11	0.05	0.13	0.21
COKE, REFINED PETROLEUM PRODUCTS	0.06	0.03	0.25	0.04	0.09
CHEMICALS AND CHEMICAL PRODUCTS	0.12	0.24	0.18	0.22	0.19
RUBBER AND PLASTIC PRODUCTS	0.06	0.09	0.10	0.10	0.09
OTHER NON-METALLIC MINERAL PRODUCTS	0.04	0.09	0.02	0.11	0.07
BASIC METALS	0.02	0.01	0.05	0.02	0.02
FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENTS	0.02	0.03	0.30	0.05	0.10
ELECTRICAL MACHINERY AND APPARATUS N.E.C.	0.07	0.13	0.02	0.14	0.09
MACHINERY AND EQUIPMENT, N.E.C.	0.04	0.03	0.06	0.03	0.04

MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS	0.02	0.04	0.03	0.06	0.04
OTHER TRANSPORT EQUIPMENT	0.01	0.02	0.03	0.03	0.02
FURNITURE	0.01	0.01	0.21	0.07	0.07
MANUFACTURING N.E.C	0.39	0.27	0.02	0.26	0.24

Source : computation based on ASI Data

A state level analysis over the period of 2001-02 to 2015-16 shows a declining trend in the average annual growth rate of both female and male direct workforces in majority of the states. Compared to a negative average annual growthrate in both male direct workers (-1.32%) and female direct workers (-1.27%), Tripura has recorded 13.74% decline in average growth rate of male direct workers while Orissa recorded a 7.54% fall in average growth rate of female direct workers. Nagaland, Andhra Pradesh, Kerala and Daman and Diu recorded a positive average growth rate of participation of male direct workers at 3.54%, 3.35%, 1.16% and 0.57% respectively. In terms of participation of female direct workers Nagaland shows the highest average annual growth rate at 10.09% followed by Assam at 9.73% , Bihar at 9.66%, Uttarakhand at 9.4% and Punjab at 8.81% respectively. The other states which registered a positive average annual growth in female direct worker participation are Himachal Pradesh(0.33%), Rajasthan(5.13%), Uttar Pradesh(2.38%), West Bengal (3.55%), Chattisgarh(1.95%), Andhra Pradesh (6.22%). An interesting fact is that Nagaland is the only state registering a positive growth rate in participation of both male and female direct workers.

Figure 5: Average Annual Growth of Male and Female Workers across states during 2001-02 to 2015-16



Source: Computations based on ASI Data

The unequal distribution of male and female in Indian labour market in terms of participation in the labour market is termed as Gender Segregation. It has been argued that gender based occupational segregation persists in the organized manufacturing sector of India. In this paper the measurement of occupational segregation has been done using the Duncan Index(ID) of segregation and Karmel and MacLachlan Index (IP) of segregation.

Duncan index(ID) : The ID measures the sum of the absolute difference in women's and men's distribution over occupations. It can be written as:

$ID = 1/2\sum \left| Mi/M\text{-}Fi/F \right|$

Where F_i and M_i are the number of females and males respectively, in the i_{tn} occupation and F and M are the total number of females and males, respectively, in the workforce. ID-index equals 0 in case of complete equality (where women's employment is distributed similarly to men's across occupations) and 1 in the case of complete dissimilarity (where women and men are in totally different occupational groups).

b) Karmel and MacLachlan Index (IP) :The KM index usually referred as IP index is defined as $IP = 1/T\sum \left| aFi\text{-}(1\text{-}a)\ Mi \right|$

where T represents total employment, Fi and Mi are defined as female and male employment in the ith occupation, respectively; and a is The proportion of males in overall workforce.

The IP-index can be interpreted as the proportion of the workforce which would need to change jobs in order to remove segregation - considering the female and male shares of occupations. The IP-index equals 0 in case of complete equality, and twice the male share multiplied by the female.The result in Table 5 shows that though there is diversity in result obtained from the two indices, the gender based segregation in occupation has somewhat intensified over the years as has been supported by all both the indices.

Table 5: Occupational Segregation across industries over time

	duncan index(ID)	**Karmel and MacLachlan Index (IP)**
2015	0.41	0.38
2012	0.37	0.11
2008	0.38	0.12
2002	0.01	0.19

Source: author's computation based on ASI data

Contractualization inorganized manufacturing sector

The employment of contract workers rather than direct/ permanent employees is gaining rapid popularity among most of the organizations in the present era for the functioning of the day to day activities. The onset of globalization rendered competition is one of the most important ingredient for development, expansion and survival of industries. Some of the studies have observed that employers in this globalised economic environment

consider stringent labour laws as impediments and flexible labour strategies as favourable for the successful implementation of structural adjustment programmes, preventing private sector or foreign investor from entering into business (Sachs *et al,*1999, Sood, Nath and Ghosh, 2014). This has resulted in the segmentation of labour market. In one segment, there are permanent/direct workers who are directly recruited by the employer enjoying the benefits of protective labour laws, job security as well as social security. The other segment comprises of contract and casual workers who are available from the market on the prevailing market price through certain agencies/contractors. Their recruitment is based on flexible labour strategies with minimum or no job as well as social security. Employers enjoy the freedom to hire contract workers for a fixed term even for perennial activities and discontinue their services when not needed.

Employers favour hiring contract workers inspite of the risk of lower worker loyalties and lousy pay on various accounts. The non commitment to fringe benefits like annual leave with wages, gratuity, bonus, etc and greater flexibility of contract workers to adjust the number of workforce based on economic efficiency result in better utilization of resources, optimization of profit and bringing cost effectiveness, despite. In particular, employers prefer hiring contract workers to meet short run or seasonal production needs and then firing them after completion of the projects. Contract workers find greater acceptance in situations where special kind of skilled workers for technical work may be required on a sporadic basis. Employing contract workers through contractors minimizes the monitoring cost as such hiring is bound by contacts specifying the terms and conditions to be followed for completion of specific job in lieu of forfeiture of payment for the work.

The debate surrounding insecurity in employment of casual worker points to the fact that owing to most disadvantageous situation of casual workers, a large majority of the casual labourers earn wages and employment benefits much lower than those of regular workers, and they also reflect the a high incidence of poverty and lowest labour standard in the country (Ghosh, 2003). Neethi (2008) has observed that contractualisation prevails in almost all industry groups and it is highly region-specific and industry-specific factors have their influence in determining contract work intensity. With the overall economic goals of achieving socio economic equality and balanced economic development, this exploitation of contract workers has attracted considerable attention among the researchers in the age of globalization and calls for a study of the recent trend in the contractualisation of employment in Indian manufacturing industries.

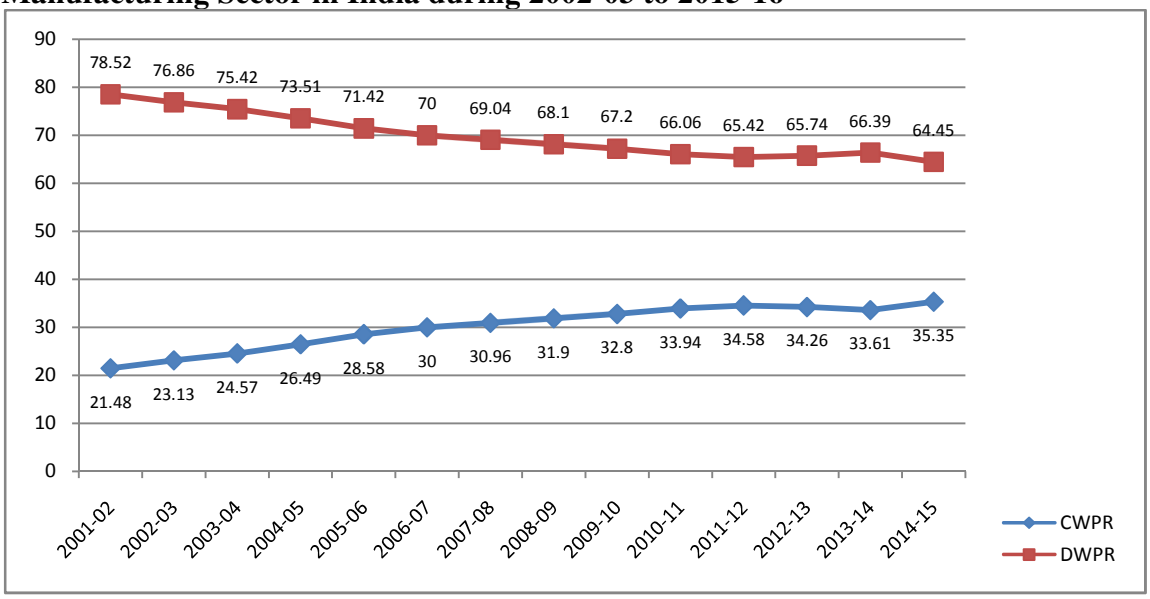
In this segment a broad view of the structure of casual workers to the total employment for disaggregated industry level needs to be studied. In this paper, the contract workers participation rate is defined as the proportion of contract workers employed in the total workers and contributing in the organized manufacturing process. The contract worker participation rate is used as a measure of the incidence of ‘contractualisation’ in the labour market. Thus,

Worker participation ratio (WPR)= total workers/ total persons engaged x100
Contract Workers Participation Rate (CWPR) = Total Contract Workers/Total Workers ×100

The estimates based on annual survey reports show that while the overall workforce participation of workers has marginally increased over the years in the manufacturing sector , the directly employed workers have steadilydecreased over the years from 78.52% in 2001-02 to 65.42% in 2011-12. In 2012-13, the directly employed worker participation ratio registered a marginal rise to 65.74% in 2012-13 and further to 66.39% in 2013-14 but thereafter it steadily declined to 64.45% in 2015-16.

An interesting fact to be noted is that while the directly employed worker participation ratio showed a declining trend the work participation ratio of contractual workers showed a rising trend over the years. According the nationwide annual survey results, the contractual worker participation has increased from 21.48% in 2001-02 to 35.58 % in 2011-12. The ratio fell to 34.26% in 2012-13 and further to 33.61% in 2013-14 but thereafter it rose to 35.4% in 2015-16.

Figure6: Contract and Direct Worker Participation rate in Organised Manufacturing Sector in India during 2002-03 to 2015-16



Source: Author's computation from ASI data

Table 6 gives the annual growth rate of WPR, CWPR and DWPR from 2002-2015. From the data it can be seen that though the number of workers has increased over the years, annual growth rate of contractual worker participation ratio has fluctuated over the years and have shown a declining trend from 2005-06 to 2013-14 but drastically increased in 2015-16. The annual growth rate of direct worker participation on the other hand has

been negative from 2002 to 2015 with the exception of 2012-13 and 2013-14 when the growth rate was marginally positive at 0.49% and 0.99% respectively.

Table 6 : Annual Growth Rate of Workforce participation ratio of workers, Contact workers and Directly employed workers from 2001-02 to 2015-16

	Annual growth rate of WPR	Annual growth rate of CWPR	Annual growth rate of DWPR
2001-02	0.08		
2002-03	1.00	7.68	-2.11
2003-04	-0.38	6.23	-1.87
2004-05	0.93	7.81	-2.53
2005-06	-0.02	7.89	-2.84
2006-07	-2.24	4.97	-1.99
2007-08	2.79	3.20	-1.37
2008-09	-1.21	3.04	-1.36
2009-10	0.23	2.82	-1.32
2010-11	0.43	3.48	-1.70
2011-12	-0.35	1.89	-0.97
2012-13	-0.14	-0.93	0.49
2013-14	-0.61	-1.90	0.99
2014-15	0.43	5.18	-2.92
2015-16	0.51	0	0.00

Source: Computations based on ASI Data

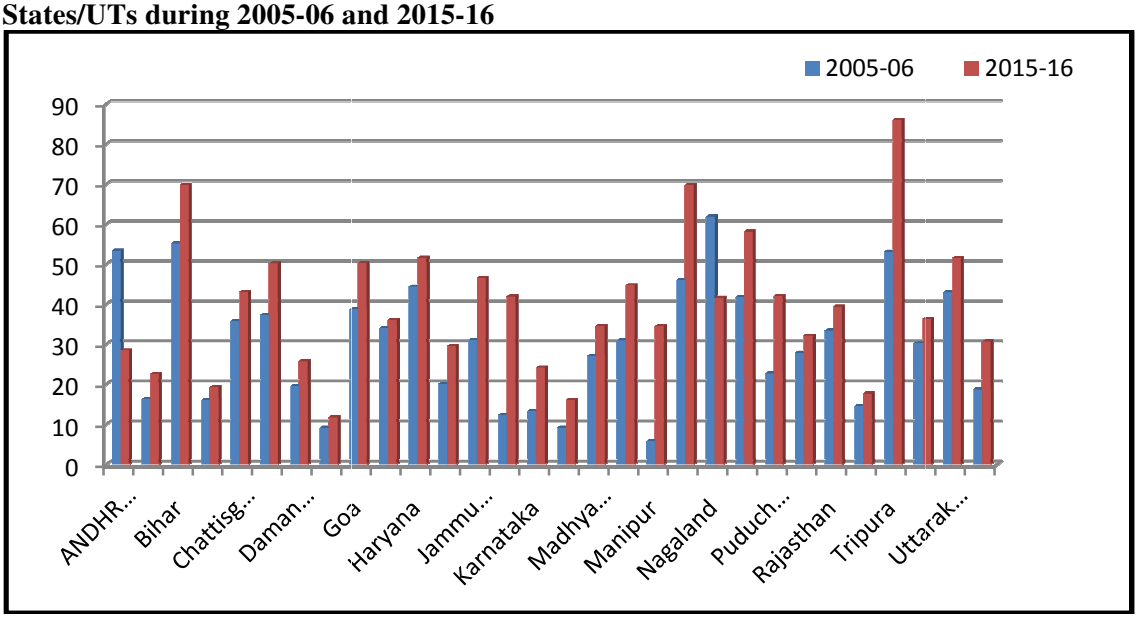
Figure 7 presents the interstate participation of contract workers with respect to major States/UTs in India in2005-06 and 2015-16. From the figure, it is evident that there is a significant variation with respect to the participation of contract workers in major States/UTs in India.

Top five states with significantly high incidence of contract workers engaged in the organized manufacturing sector in 2015-16 are Tripura(86.06%), Bihar (69.85 percent),Meghalaya (69.78 percent), Telengana (64.26%) and Odisha (58.16%),. However, Delhi (11.75 percent), Kerala (16.06 percent), Tamil Nadu (17.72percent), Chandigarh (19.31 %) and Assam (22.62 percent) have been identified as the bottom five states where significantly low proportions of contract workers have been engaged in the organized manufacturing process. It has also been observed that among the 5 most industrialized States/UTs and major contributors to the country's manufacturing sector, Maharashtra (44.72 percent), Gujarat (36.03 percent) and Uttar Pradesh (36.31 percent) recorded significantly higher proportions of contract workers in the organized manufacturing sector as against the national average of 35.58%. Tamil Nadu (17.72 percent) and Andhra Pradesh (28.50 percent) have significantly low proportions of

contract workers have been engaged in the organized manufacturing sector.

The top 5 states with significantly high incidence of contract workers engaged in the organized manufacturing sector in 2005-06 are Bihar (55.24%), Andhra Pradesh (53.43%), Tripura (53.15%), Meghalaya (46%) and Haryana (44.45%). Manipur (5.82%), Delhi (9.21%), Kerala (9.22%), Jharkhand (12.33%) and Karnatak (13.38%)a have the lowest proportion of contract workers engaged in organised manufacturing sector. Manipur registered the highest proportionate increase in contract workers followed by Jharkhand. Andhra Pradesh and Nagaland have shown a fall in the incidence of contract workers over the years.

Figure 7: Contract Workers in Organised Manufacturing Sector with respect to Major States/UTs during 2005-06 and 2015-16



Source: Computations based on ASI Data

At the disaggregate level the trend in contractualisation are observed for 22 two digit industries.

It is interesting to see the industry wise variation in contract workers' participation. Table 8presents the descriptive figures of employment structure of contract worker for different industries over 3 different time periods. The industry wise variation in contract workers' participation is significantly evident. According to 2015-16 data, Industrial activities, namely, manufacturing of coke, refined petroleum products has recorded the highest proportion of contract workers are engaged in the production process (65.5%) followed by other non-metallic mineral products (61.6%) and tobacco (56.3%) . on the other hand, Industrial activities, namely, manufacturing of wearing apparel (10.9%) recorded the lowest proportion of contract workers followed by printing & reproduction of recorded

media (16 %) and textiles (16.1%). Also most of the capital intensive manufacturing industries like coke and refined petroleum products, chemical and chemical products, rubber and plastic products, basic metals, other nonmetallic products, computer, electronic and optical products, electrical equipment, motor vehicles, trailers and semi-trailers has registered a steady increase in contract worker participation in 2015-16 from 2001-02. Computer, electronic and optical products industry has recorded the highest growth rate in contract worker employment (14.2%) followed by other transport equipment industry which recorded a 10.7% growth rate in contract worker employment during 2001-2015. Interestingly the agro and material based industries like industries manufacturing food products, wearing apparel, tobacco, paper and paper products have recorded a increase in the contract worker participation from 2002-03 till 2009-10 but then the participation rate fell . The food products industry has recorded a negative growth rate of contractual worker (-0.4%). The incidence of contractualisation in the organized food products manufacturing sector increased from 33.4% in 2001-02 to 41.3%in 2009-10 but then declined to 29.1% in 2015-16. Similar phenomenon is observed in tobacco manufacturing sector where the contract worker participation rate increased from 61.5% in 2001-02 to 67.8% in 2009-10 and 72.8% in 2014-15 but thereafter it registered a sudden drop in 2015-16 to 56.3%. However the incidence of contractualworkers has been the maximum in the tobacco industry which registered 10.3% growth rate in contract workers.

Table 8: **Contract Worker Participation Ratio in the Organised Manufacturing Sector with respect to Industrial Activities during 2001-02, 2009-10 and 2015-16.**

Industry	**2001-02**	**2009-10**	**2015-16**	**Average annual growth rate of contract worker participation**
Food products	33.4	41.3	29.1	-0.4
Beverage	37.7	49.2	51.5	2.4
Tobacco	61.5	67.8	56.3	10.3
Textile	11.6	16.0	16.1	3.1
Wearing apparel	19.0	16.6	10.9	4.9
Leather & related products	12.4	20.6	19.4	4.8
Wood except furniture	12.4	18.5	23.5	6.6
Paper and paper products	30.5	28.9	30.0	0.8
Printing and reproduction of recorded media	23.1	38.3	16.0	5.8
Coke and refined petroleum products	26.6	50.3	65.5	7.1
Chemicals and chemical product	21.8	31.3	42.0	5.1
Rubber and plastics products	15.9	28.8	35.6	6.3
Other non-metallic mineral products	29.0	46.3	61.6	5.8
Basic metals	27.2	40.0	45.2	3.8

Fabricated metal products, ex machinery and equipment	30.0	38.4	41.9	3.3
Computer, electronic and optical products	7.6	41.4	39.2	14.2
Electrical equipment	16.8	35.3	41.3	6.9
Machinery and equipment n.e.c.	11.5	27.1	33.8	8.7
Motor vehicles, trailers and semi-trailers	22.6	39.3	49.0	6.1
Other transport equipment	15.0	37.7	49.6	10.7
Furniture	21.9	30.3	32.1	5.2
Other manufacturing	12.3	15.5	21.4	5.4

Source: Computations based on ASI Data

From the above analysis it is observed that almost all industries registered an increasing trend in the growth of contractual workers in the organized sector of India. To understand whether the growth of employment of direct and contract workers depends on the size of industry, panel regression analysis is done. The number of workers employed which is considered an indicator of industry size is regressed on the ratio of permanent(direct) to casual worker. Both fixed effects and random effects model is used and hausmantest accepts the fixed effect model. The result shows that the ratio of permanent(direct) to casual worker is negatively related with the number of total employment. (table 9).The important implication of the results in Table 9 is that in large industry the share of casual/contract labour will be higher in total employment.

Table 9 Panel regression of the ratio of permanent and contractual labour on the number of total labour employment (number_worker)

Fixed-effects (within) regression Number of observations = 88
Number of groups = 22

R^2: within = 0.2256
between = 0.0061
overall = 0.0021

F (1, 64) =
18.65
corr (u_i, X) = –0.7790 Prob > F =
0.0001

direct_contract_lab	Coefficient	t	P > | t |
number_worker	–.0000108	– 4.32 *	0.000
constant	7.635263	7.90 *	0.000

Random-effects GLS regression

Wald chi2(1) = 4.32

corr (u_i, X) = 0 (assumed) Prob > chi2 = 0.0377

direct_contract_lab	Coefficient	z	P > | z |
number_worker	–3.27e–06	–2.08 **	0.038
constant	4.905621	5.83 *	0.000

Hausman test accepts fixed effects model

* indicates significant at 1% level.

** indicates significant at 5% level.

Conclusion

Both at industry level as well as at state level, variation in terms of employment distribution has been observed. A significant finding at industry level is that the capital based industries have not been promising in terms of their share in total employment in organized manufacturing sector in India. At the regional level, the southern zone of India is the leader in terms of employment generation with Tamil Nadu having the highest share of total employment. The northeastern region has recorded a significant decline in incidence of total employment while the central region of India remained more or less stagnant in terms of total employment generation. An interesting finding is though the north east region has shown abysmally poor performance in terms of incidence of total employment, the relatively high average growth rate of employment of the states in this region gives an encouraging perspective to policy planners to devise pro employment strategies.

The incidence of rural as well as urban employment has remained almost stagnant over the years in the organized manufacturing sector.However, the growth rate of rural employment remains higher than that of urban employment in general over the years with the exception of 2009-10.

The female work participation ratio has not improved much over the years with the national estimate showing a declining trend.The sex ratio in total employment has remained more or less stagnant over the years at around 0.25 from 2000 to 2015. A state level analysis over the period of 2001-02 to 2015-16 shows a declining trend in the average annual growth rate of both female and male direct workforces in majority of the states.An interesting fact is that Nagaland is the only state registering a positive growth rate in participation of both male and female direct workers. Another conclusion that is drawn from our study is that the capital intensive industries employ more male workers to female workers. The labour intensive industries on the other hand show a relatively

better participation of female workers compared to the capital intensive industries. The distribution of male and female workers also has been unequal and this inequality has widened over the years.

The study on contract worker participation reveals that incidence of contract workers has increased over the years while that of direct workers has declined over the years. The annual growth rate of direct workers has remained negative while that of contract workers was positive throughout the period from 2002 to 2015. However, 2012-13 and 2013-14 recorded positive annual growth rate in direct workers and negative annual growth rate in contract workers. Industrywise data showed that tobacco industry has the highest growth rate of contractual workers.

An important finding is that large firms employ more contract workers than small firms.The reason of employing casual workers in higher proportion in large firms can be stated as that the firms can avoid the liability of financial burden on welfare benefits of labour like gratuity, provident fund etc.

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