

Employment of Non-production and Production Workers in India: A Brief Statistical Analysis

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Abstract. In the ASI framework, the data on production and non-production workers has been reported under the nomenclature of 'workers' and 'other than workers', respectively. In the changed policy environment especially in India after the year 1991, the Indian industries have been exposed to the environment of stiff competition both domestically and globally. Different firms in order to survive and grow are resorting to large scale restructuring at different levels. The dynamics associated with such restructuring are likely to increase the control of owners of capital over the production processes through their representatives, the managers, professionals and technocrats (Non-production workers). Thus, restructuring of workers between production and non-production category is likely to occur in many organizations. Using Annual Survey of Industry (ASI) data for the year 1973-74 to 2005-06 an attempt has been made in this paper to briefly discuss the structure of non-production and production workers in India with the help of some basic statistical tools.

Key Words: Production workers, Non-production workers, Workers, Other than workers, Ratio analysis, Average, Coefficient of variation, Compound annual growth rate.

1 Introduction

In the ASI framework, the data on production and non-production workers has been reported under the nomenclature of 'workers' and 'other than workers', respectively. The workers in the ASI framework consist of directly employed workers including men, women and children, and workers employed through contractors. The category of 'other than workers' in the ASI framework consists of supervisors, managers and other employees, which may refer to technocrats and other support staff related to sale, purchase, credit, finance, store, security, cafeteria, legal, medical, and R&D facilities. *The workers in ASI framework (Factories Act, 1948) are defined as the 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. Labour engaged in the repair and maintenance or production of fixed assets for factory's own use or labour employed for*

generating electricity or producing coal, gas etc. are included. Number of workers represents the average daily employment.¹

This category of workers is known as production workers (P) in the U.S. system of manufacturers. Thus, the non-production category of workers (NP) in the U.S. system of manufacturers or the category of ‘other than workers’ in ASI framework is a residual category which by implication includes those workers which have not been included in the category of workers in strict sense of the term. In the following sections the structure of non-production and production workers have been discussed with the help of averages, coefficient of variation (CV) and compound annual growth rate (CAGR).

2. Inter-temporal Analysis of Employment of Workers

Table – 1 and 2 give a broad year-wise picture of the composition of workers in terms of the total employees, non-production workers and the production workers in the Indian organised manufacturing sector from 1973-74 to 1990-91 and 1991-92 to 2005-06.

Pre-reform Period (1973-74 to 1990-91)

Table – 1: Composition of Workers during Pre-reform Period

Year	Total employee			Non-production workers			Production workers		
	Average	CV (%)	CAGR (%)	Average	CV (%)	CAGR (%)	Average	CV (%)	CAGR (%)
1973-74	228796	131.25		42540	101.51		186255	140.44	
1974-75	238314	134.48	4.16	48067	109.24	12.99	190248	143.83	2.14
1975-76	249758	136.94	4.48	52303	118.69	10.88	197455	145.66	2.96
1976-77	259054	134.48	4.23	54031	115.61	8.30	205023	142.56	3.25
1977-78	275549	133.15	4.76	59001	114.85	8.52	216548	141.59	3.84
1978-79	281952	129.92	4.27	60325	107.67	7.24	221627	139.46	3.54
1979-80	301333	126.19	4.70	65874	108.73	7.56	235460	134.77	3.98
1980-81	301289	127.35	4.01	62093	116.92	5.55	239196	133.6	3.64
1981-82	304106	124.82	3.62	62763	113.94	4.98	241343	130.58	3.29
1982-83	311606	121.47	3.49	63508	107.87	4.55	248098	127.93	3.24

¹ Average daily employment is computed by dividing total man-days worked during a year by the total number of working days during the year. Man-days are obtained by summing-up the number of workers attending in each shift over all the shifts worked on all days.

1983-84	302753	118.3	2.84	61498	104.15	3.75	241254	125.96	2.62
1984-85	302128	118.59	2.56	64672	103.56	3.88	237456	126.14	2.23
1985-86	288062	113.19	1.94	60463	100.17	2.97	227599	119.73	1.68
1986-87	285892	113.27	1.73	59771	98.58	2.65	226121	120.42	1.50
1987-88	299835	110.35	1.95	63433	97.24	2.89	236403	117.35	1.72
1988-89	300782	106.42	1.84	64629	95.97	2.83	236153	112.89	1.59
1989-90	313243	107.48	1.98	66278	96.05	2.81	246965	114.05	1.78
1990-91	316156	105.69	1.92	68534	93.78	2.84	247621	112.42	1.69

It can be observed from table – 1 that the average number of total employees and non-production workers has continuously increased from beginning till the year 1979-80. From the year 1980-81 both the averages have started fluctuating but they have maintained an increasing trend till the year 1990-91. On the other hand, the average of production workers has continued to increase till the year 1983-84 after which it also started fluctuating. But during later years also it has maintained an increasing trend even after 1983-84. It can also be observed from the columns of CV of total employees and production workers that the values of CV have remained proximate to each other during each year. The high value of CV reflects a wide variation in the distribution of a particular category of worker among different industries during a given year and it does not change much over time. The CV in the employment of non-production workers among different industries during each year is lower than the CV of the rest two categories of workers.

The relatively low value of CV of the non-production workers is a testimony to its being quasi fixed factor in the short run. In other words, the size of employment of non-production workers does not vary much in the short run in response to some fluctuations in business activities.

Further, the growth rate (CAGR) of all the three categories of employees has been positive throughout the period of analysis; notwithstanding the fact that it has declined over the years. It should be further noted that the CAGR of non-production workers has always been higher than the CAGR of total employees which in turn has remained higher than the CAGR of the production workers.

Post-reform Period (1991-92 to 2005-06)

Table – 2: Composition of Workers during Post-reform Period

Year	Total employee			Non-production workers			Production workers		
	Average	CV (%)	CAGR (%)	Average	CV (%)	CAGR (%)	Average	CV (%)	CAGR (%)
1991-92	318430	102.81		69828	93.69		248602	109.05	
1992-93	338355	102.39	3.08	76172	93.22	4.44	262184	108.69	2.70
1993-94	337463	101.90	1.95	76524	94.18	3.10	260939	107.53	1.63
1994-95	351201	99.10	2.48	78629	92.72	3.01	272572	104.49	2.33
1995-96	385430	99.45	3.89	87994	91.81	4.73	297435	104.96	3.65
1996-97	379615	97.63	2.97	85674	93.45	3.47	293941	102.38	2.83
1997-98	378364	100.17	2.49	84441	93.97	2.75	293923	105.38	2.42
1998-99	378228	100.4	2.17	96963	109.00	4.19	281265	105.44	1.56
1999-00	359242	102.63	1.35	83187	100.38	1.96	276055	107.00	1.17
2000-01	349411	103.50	0.93	78587	100.03	1.19	270824	108.13	0.86
2001-02	338725	101.63	0.56	75899	99.33	0.76	262827	106.18	0.51
2002-03	347130	99.40	0.72	75176	98.17	0.62	271955	103.49	0.75
2003-04	343995	99.55	0.60	75321	97.18	0.58	268674	103.91	0.60
2004-05	368752	96.89	1.05	78114	94.37	0.80	290638	100.89	1.12
2005-06	397314	94.20	1.49	82907	93.30	1.15	314407	97.75	1.58

A perusal of table – 2 reveals that the average number of total employees, non-production workers and production workers were 318,430, 69,828 and 248,602 respectively during the year 1991-92 which increased to 397,314, 82,907 and 314,407 respectively during the year 2005-06. The year 1998-99 has depicted the highest average value of non-production workers which is equal to 96,963. The CV of employment for different categories of workers during post-reform period has shown similar pattern as that during the pre-reform period. The only remarkable point is that the CV of total employees as well as production workers has declined significantly during the post-reform period. The CV of non-production workers did not change much during post-reform as compared to pre-reform period. The only exception was the period 1998-99 during which the CV depicted its highest value i.e. 109 per cent which also coincided with the highest average number of the non-production workers i.e. 96,963. It shows that during post-reform period the employment of all categories of workers has increased which is also associated with increased consistency in the employment of such workers across different industries.

During post-reform period the CAGR of all three categories of workers has largely shown a declining trend from 1991-92 to 2005-06. The highest and the lowest value of CAGR of total employees have been noticed during the year 1995-96 (3.89%) and 2003-04 (0.60%) respectively. The non-production workers have shown their highest and the lowest CAGR during the year 1992-93 (4.44%) and 2003-04 (0.58%) respectively. For production workers the highest and the lowest CAGR were found during the year 1995-96 (3.65%) and 2001-02 (0.51%). It may further be noted that the CAGR of non-production workers has always superseded the CAGR of other two categories of workers till the year 2001-02 but this trend has reversed after that. During the subsequent years the CAGR of production workers has remained higher than the CAGR of non-production workers as well as the total employees.

3. Inter-temporal Ratio Analysis of Employment of Workers

The changes in the ratio of non-production workers to production workers or the total employees may be used as an indicator of *skill intensity* in a firm, industry or the sector as a whole. Table – 3 and 4 have been used to analyse the *skill intensity* for aggregate manufacturing industries using the ratio of non-production workers to production workers (NP/P) and non-production workers to total employees (NP/L) for the pre and post-reform periods. The CV of the above ratios has also been computed to observe the inter-industry variation in this ratio for different years.

Pre-reform Period (1973-74 to 1990-91)

Table – 3: Ratio of Non-production to Production Workers during Pre-reform Period

Year	Ratio of Non-production to Production workers (NP/P)			Ratio of Non-production to Total employees (NP/L)		
	Average	CV (%)	CAGR (%)	Average	CV (%)	CAGR (%)
1973-74	0.28	31.44		0.21	25.96	
1974-75	0.30	28.91	7.40	0.23	23.20	5.92
1975-76	0.31	30.65	6.10	0.24	24.51	4.66
1976-77	0.32	33.32	4.84	0.24	26.38	3.59
1977-78	0.33	34.15	4.54	0.24	26.93	3.34
1978-79	0.35	34.44	4.42	0.25	27.24	3.24
1979-80	0.34	34.38	3.45	0.25	26.68	2.54
1980-81	0.32	39.63	1.87	0.23	31.23	1.27

1981-82	0.32	42.01	1.71	0.23	32.55	1.14
1982-83	0.30	38.34	0.90	0.23	30.86	0.60
1983-84	0.32	48.79	1.52	0.24	37.14	0.92
1984-85	0.32	40.25	1.37	0.24	30.96	0.94
1985-86	0.33	49.90	1.35	0.24	35.30	0.84
1986-87	0.33	48.46	1.40	0.24	35.56	0.89
1987-88	0.34	46.95	1.37	0.24	34.96	0.89
1988-89	0.33	46.12	1.22	0.24	34.52	0.79
1989-90	0.34	51.39	1.28	0.24	36.67	0.80
1990-91	0.35	52.29	1.32	0.25	36.42	0.84

Table – 3 shows the relative employment of non-production to production workers (NP/P) and again of non-production workers to total employees (NP/L) during pre-reform period. It may be observed from the table that NP/P ratio has been fluctuating within a range of 0.28 (1973-74) and 0.35 (1990-91). During the same period the values for NP/L were 0.21 and 0.25 respectively. It may also be observed from the above table that during each year the proportion of employment of non-production workers to production workers and total employees among different industries has varied during the period from 1973-74 to 1990-91. But this variation in the relative employment of non-production workers vis-à-vis the production workers or the total employees has an increasing tendency over the period from 1973-74 to 1990-91. Considering the pattern of CAGR of NP/P it may be stated that the NP/P intensity in Indian manufacturing has depicted a declining trend during the pre-reform period.

Post-reform Period (1991-92 to 2005-06)

Table – 4: Ratio of Non-production to Production Workers during Post-reform Period

Year	Ratio of Non-production to Production workers (NP/P)			Ratio of Non-production to total employees (NP/L)		
	Average	CV (%)	CAGR (%)	Average	CV (%)	CAGR (%)
1991-92	0.35	50.98		0.25	36.03	
1992-93	0.38	62.21	4.05	0.26	38.76	2.15
1993-94	0.36	49.09	1.18	0.26	34.88	0.93
1994-95	0.36	51.71	0.84	0.25	36.18	0.57
1995-96	0.35	42.20	0.18	0.25	31.98	0.35
1996-97	0.34	38.64	-0.59	0.25	31.07	-0.18

1997-98	0.35	42.33	-0.08	0.25	33.12	0.08
1998-99	0.41	57.91	1.88	0.27	40.09	1.14
1999-00	0.36	41.76	0.16	0.25	32.57	0.24
2000-01	0.35	41.26	0.05	0.25	32.35	0.15
2001-02	0.35	42.79	0.04	0.25	33.52	0.11
2002-03	0.35	48.87	-0.01	0.25	36.41	0.00
2003-04	0.35	46.63	-0.04	0.25	35.21	0.00
2004-05	0.33	45.99	-0.41	0.24	35.15	-0.26
2005-06	0.31	41.20	-0.75	0.23	32.79	-0.48

A perusal at table – 4 reveals that the ratio of non-production to production workers (NP/P) as well as total employees (NP/L) is fluctuating a lot during the post-reform period. The NP/P was 0.35 in the year 1991-92 which increased to 0.41 in the year 1998-99.² After the period of 1997-98 the relative use of the non-production workers (NP/P) has either remained constant or fallen marginally. It has a tendency to stabilise around 0.35 from 2000-01 to 2003-04. After that the ratio has marginally declined. A similar but obvious trend is also observed when this NP worker intensity is viewed with respect to NP vs. total employees (NP/L). The ratio NP/L has mostly fluctuated around 0.25 during the post-reform period. The CV of NP worker intensity (NP/P) in different industries though not very high, has marginally declined from 50.98 per cent (1991-92) to 41.20 (2005-06). A similar trend is observed in the CV of the other index of skilled worker intensity (NP/L). The CV of NP/L has also marginally declined from 36.03 (1991-92) to 32.79 during the year 2005-06. The behaviour of CV points towards the fact that the relative use of non-production workers in different industries has remained more or less stable and consistent during post-reform period except the years 1992-93 and 1998-99. The CAGR of NP/P and NP/L for different years have depicted a declining trend. During later years of the reform period, the CAGR of NP/P and NP/L has even turned negative.

4. Summary and Conclusion

During the pre-reform period the average number of all three categories of employees has shown an increasing trend. The CAGR of above employees has remained positive but it has shown a declining trend during the pre-reform period. The CV of all three groups has also

² The year 1998-99 appears to be an abnormal year; therefore the value of NP/P has abruptly shot up.

declined. However, the CV of non-production workers has always remained lower than the CV of total employees and production workers. During the post-reform period also, the average number of total employees, non-production workers and production workers has increased. The CAGR in all three cases has largely shown a declining trend. The CAGR of non-production workers has remained higher than the CAGR of other two categories of employees till 2001-02. Further, after that the CAGR of production workers has taken the leading position. Although the CV of total employees and production workers has declined during the post-reform period, these are still higher than the CV of non-production workers except during the year 1998-99 when the situation is reversed.

5. References

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