Structural Transformation in India:
An Econometric Investigation

Deepak Kumar Behera[1]
Mitali Tiwari

Abstract

The structural transformation process is a much avowed outcome in developmental process. After a long time in the post-Independent development, it has begun to happen since 1983 and seemed have quickened in the post-Reforms period. However, there are several anomalies in this process such as lack of industrial employment, emergence of unorganized employment and so on. A structural transformation of employment should be about shifting from low productive-low wage sector to high productivity-high wage sector (with reasonable social security) which is however not in the offing. This paper mulls empirical evidence on these trends in employment, magnitude of structural transformation and the statistical determinants of this change, which gives interesting picture about the unfolding future.

Keywords: Structural Transformation, Industrial Employment, Productivity.

[1] Assistant Professor, Department of Humanities, National Institute of Technology Uttarakhand, Temporary Campus, Govt. Polytechnic, Srinagar (Garhwal)-246174, Uttarakhand, India; E-mails: dkbehera1982@gmail.com

Assistant Professor- Economics, Department of Humanities & Other Studies, Dr. Ram Monahar Lohiya National Law University, LDA Scheme, Kanpur Road, Lucknow, Uttarpradesh-226012, India; E-mails: tiwarimitali@gmail.com

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1. Introduction

The structural transformation is the defining characteristic of the development process, both cause and effect of economic growth. One of the processes to define the structural transformation is characterised by a shift of predominant share of agriculture to manufacturing activities and a moderate to high level of increase in the share of services both for the national product and the work force. This pattern has not only been observed historically, but also holds across the countries with different levels of development. In case of India, the major failure of the development process has been its inability to shift a high rate of occupational structure of labour force from agriculture to non-agricultural sector which could not generate a high employment growth in the economy. Although relatively high rate of growth of industrial and services sectors have led to a sharp declines in the share of agriculture in GDP from about 55 per cent in 1951 to around 15 per cent at present (Economic Survey, 2011), but it has not been accompanied by a commensurate increase in employment leading to a worsening in the employment situation in the post-reform period. This economy has undergone a significant shift from the dominance of the share of primary sector to that of service sector in the national income which has increased to around 56 per cent in 2009-10. This fast growth of service sector that is not preceded by any remarkable growth of manufacturing sector perhaps is one of the peculiar features of the transition in the Indian economy compared to the experience of developed countries. It can be considered as a perverse trend when no notable transformation in the occupational structure of the economy accompanies the relative growth of sub-sectors of the economy. However, in the post-Reform period there is some acceleration in the occupational transformation that is led by service sector, instead of the industrial sector. Third, an overwhelming share of modern sector is an informal economy, whose contribution to quality of work conditions and social security is extremely marginal. India's transformative trajectory is at a significant turn. It would be an interesting exercise to measure the magnitude of the transformation and the present paper undertakes this task. And secondly, we estimate some determinants of the structural transformation in the Indian economy.

2. Structural Transformation: Theoretical Perspectives

The path of economic development is historically associated with structural transformation of national economies. Economic growth is characterized by patterns of changing shares of different sectors in the national income and labour force. The most common structural transformation observed historically, as well as in the economic development of nations, have been mentioned in the works of Fisher (1939)2, Clark (1940)3, Kuznet (1971)4, Chenery and

[2] Fisher, A G P (1939), "Production, Primary, Secondary and Tertiary", *Economic Record*, Vol. 15, PP. 24-38.

[3] Clark, C. (1940), "The Conditions of Economic Progress", Macmillan, London.

[4] Kuznets, S. (1971), "Economic Growth of Nations: Total Output and Production Structure", Cambridge, Harvard University Press.

Syrquin (1975)5. The studies depict the shift of predominant share of agriculture to manufacturing activities and a moderate to high level of increase in the share of services both for the national product and the work force.

Kuznet demonstrated that growth is associated with changes in sectoral composition which is due to demand and supply side factors. Fisher and Clark argued that income elasticity of demand for agricultural products being low, with rising levels of income, the demand for agricultural products relatively declines; while on the other hand income elasticity for industrial sector is high and for services, it is still higher. As a result, the demand for industrial goods increases and, after reaching reasonably high levels of income, demands for services increases sharply. It is thus that the share of different sectors in the national product gets determined by the changes in the patterns of demand accordingly. On the supply side, agriculture being mainly dependent on a fixed factor of production, i.e. land, faces a limit on its growth due to operation of the law of diminishing returns. Industry on the other hand, offers large scope for use of capital and technology, thus augmenting its productivity. Although the constriction in labour supply can curtail the expansion of industry as well, yet it is possible to overcome it by introducing labour-saving technological changes. The same applies to services where application of technologies seems to offer much larger scope. Clark agreed that final demand will increasingly shift to services, but shift of labour force takes place due to high productivity of manufactured goods and low productivity of services. Kuznets (1971) also saw income elasticity of demand as the primary reason for changes in economic structure, but recognized that other factors like, technological and institutional also play an important role in accelerating these changes.

On the supply side, the key role of manufacturing is explained by Kaldor through his three famous laws, emphasizing strong causal relation between growth of manufacturing and growth of GDP, between growth of manufacturing output and growth of productivity in manufacturing and between rate of growth of manufacturing and growth of productivity in other sectors. Growth of services, according to him, was induced both by requirements of expanding industrial sector and rising levels of income.

As the structural changes in the national output accompany economic growth a similar shift is expected in employment too. Thus, with the decline in the share of agricultural output, a decline in the share of agricultural employment can also be expected by shifting of labour from agriculture to industry (i.e. the first phase of transformation) and then latter to services (which is considered as next phase of transformation).

The first phase of transformation can be understood by the popular theory of Unlimited Supplies of labour led by Lewis (1954)[6] wherein he gives the example of dualistic economy characterized by modern industrial sector where production involves use of capital and labour, and a large traditional agricultural sector using only labour and simple tools and natural resources. Workers in the modern sector are employed in regular wage basis, while workers in the traditional sector are mostly self employed. In the modern sector, capitalist entrepreneurs

[5] Chenery, J M and M. Syrquim (1975), "Pattern of Development 1950-1970", Oxford University Press, London.

[6] Lewis, W. Arthur (1955), "The Theory of Economic Growth", Homewood, Richard Irwin.

organise production for profit and save a part to undertake investment in future, whereas, producer in the traditional sector are subsistence-oriented (self consumption oriented) and do not save or invest. In particular, capital goods are produced only in the modern sector while basic wage goods, such as food, are typically produced only in the traditional sector. The traditional sector is a reservoir of surplus labour in the sense that part of existing work force could be transferred out to the modern sector without decreasing the output in the traditional sector. This leads to the fact that economic growth only occurs in the modern sector due to uses of capital accumulation, which leads to employment growth. Employment growth can only occur in the modern sector where employment is wage paid. The real wage in the modern sector is substantially higher than the average real earning of workers in the traditional sectors. This is rendered feasible by the fact that output per worker is also substantially higher in the modern sector than in the traditional sector for given wage. In these circumstances, transfer of workers from the traditional to the modern sector not only reduces surplus labour in the economy but also increase the average productivity and income of workers. If such process is allowed to continue till a point is reached where there is no surplus labour left in the traditional sector, a labour surplus economy reaches the turning point where full employment is achieved.

After the first phase of transformation from traditional agricultural sector to modern industrial sector, the next phase of transformation starts by increasing the employment share in services. Different economists have mentioned about such shifts. Fisher argued that services are "luxuries" with an income elasticity of demand greater than unity and, therefore, at higher income levels an increasing share of expenditure is absorbed by them, which leads to high share of services in output and labour force. Clarke argued that demand for manufactured goods saturates and with continuing decline in the demand for agricultural products, the demand for services rises. Later economists like Bamoul (1967) and Fuchs (1968)[7] see a rise in the share of services in employment primarily due to productivity differentials between industry and services sectors, demand shifts playing a minor role. Increase in the share of services in employment is also explained in what is seen as change in the "inter-industry division of labour". Industry has increased the use of services as intermediate inputs and many of the processes and activities of a 'service' nature, which were carried out by manufacturing firms as part of their activity and, therefore, accounted for as part of manufacturing and industry, are increasingly outsourced to enterprises included in the 'service' category (Papola, 2005, pp.7). In this way, labour from industry will shift to services.

3. Structural Transformation: Indian Experience

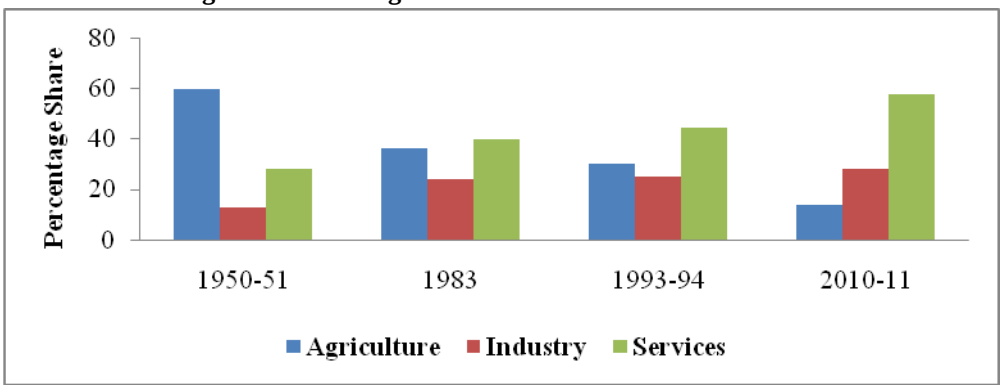
Indian economy when it embarked on the development process after Independence in 1950, with about 60 per cent of GDP accounted for by agriculture, industry contributing about 13 and services about 27 per cent, it was structurally comparable to the economy of the Great Britain in late eighteenth century, and of Germany at the beginning of the nineteenth century, of the United States and Italy of mid-nineteenth century and of Japan in 1900. Similar comparisons hold in respect of the share of labour force in different sectors: agriculture accounted for about 75 per cent, industry for about 11 and services 16 per cent of total employment in 1950, in India. This is comparable with the United States of 1841, with 72 per cent workers in agriculture, 12

[7] Fuchs, V. R. (1968), *The Service Economy*, New York, NBER.

per cent in industry and 16 per cent in services, or Japan of 1880 with the respective shares of employment in the three sectors being 65, 15 and 20 per cent (Papola, 2005).

What India has achieved in terms of structural transformation in income in a span of sixty years is much quicker than what developed countries have taken in the historical course. The share of agriculture in GDP in India has declined from around 60 per cent in 1950-51 to 36.38 per cent in 1983 and further declined to 14 per cent in 2010-11. That of industry increased from 13 to 24 and reaches to 28 per cent and of services from 28 to 40 and further rises to 58 per cent (see Figure.1). The difference is while most developed countries entered the phase of predominance of services in their economies after going through a phase of industrialisation, India's industry failed to show similar growth and it arrived into service sector dominance straight away.

Figure.1. Percentage Shares of Sectoral Incomes in India



Source: computed from various reports from National Account Statistics

The acceleration in growth of GDP in India is not accompanied by a commensurate growth in employment. This asymmetry is noted by plethora of studies like Rao (1979), Bhattacharya and Mitra (1997), Kuldeep and Dhindsa (2000), Gandhi and Gansan (2002), Papola (2005), and Dev (2008), which is also evident from the data (see Table.1). However, there is some increased movement in the structural transformation in the last three decades since 1983, as 23.21 per cent shifted away from agriculture. This is much higher magnitude of shift compared to what was achieved in the first 30 years after Independence where only 4.7 per cent could come out of agriculture. There is an increased share of agricultural workers are moving out of agriculture and joining non-agricultural sector every decade. In the next three decades, if this rate of transformation persists, then the share of agricultural labour may fall below 10 percent, a feature akin to developed countries? We, therefore, raise three concerns regarding this change. One, it is the service sector that absorbed more labour than the industrial sector[1]. Second, the shift of labour has taken place from informal sector of agriculture to informal sector of the non-agriculture. Third, there is a large share of self-enterprising workers within non-agricultural share, whose productivity tends to be generally less in most occupations. Fourth, can the so-called modern, yet unorganized, sector absorb the substantial surplus labour that exists in agriculture?

This is partly due to the status of employment structure in the economy. As we knew that majority of work force in the labour market is in the agricultural sector, 31.97 per cent are self employed and 21.48 per cent are casual labourer in 2009-10 (see Table.2). As it can be seen from the above table, after a sharp increase in share of self employed category in agriculture in 2004-05, it has shown a declining share by 2009-10. With a decrease in self employed workers, share of casual labour has gone up in agricultural sector. But in the non-agricultural sector, only casual labourer and regular wage salaried category of work force have increased their share in 2009-10 compared to the previous years.

Table.1. Percentage Share of Employment and Income in Agriculture and Nonagricultural Sector

Year	**Employment**				Shift in Labourforce away from Agriculture	**Income**			
	Agriculture	Non-agriculture				Agriculture	Non-agriculture		
		Industry	Services	Total			Industry	Services	Total
1972-73	74.58	06.75	18.67	25.42		41.01	23.34	35.65	58.99
1983	68.51	13.83	17.67	31.49	6.07	36.24	24.15	39.61	63.76
1987-88	64.97	15.93	19.10	35.03		31.72	25.23	43.05	68.28
1993-94	63.84	15.01	21.16	36.16	4.67	30.01	25.15	44.84	69.99
1999-00	60.27	16.22	23.50	39.73		24.99	25.31	49.69	75.01
2004-05	56.50	18.70	24.79	43.50	8.23	20.22	26.23	53.55	79.78
2009-10	51.76	21.93	26.30	48.23	4.73*	14.5	28.1	57.4	85.5

Source: computed from various rounds of NSS reports and various issues of NAS. *for 5-year period

Table.2. Percentage Share of Employment by Status to Total Employment

Category	**Self Employed**		**Casual Labour**		**Regular Wage Salaried**	
	Agriculture	**Non-agriculture**	**Agriculture**	**Non-agriculture**	**Agriculture**	**Non-agriculture**
1993-94	38.90	15.75	25.06	6.92	0.95	12.41
1999-00	35.70	17.22	25.32	7.59	1.01	13.16
2004-05	37.62	19.52	20.24	8.33	0.71	13.57
2009-10	31.97	19.18	21.48	11.76	0.51	15.09

Source: computed from various round of NSSO report.

During 1993-93 to 2009-10, the proportion of self-employment has decreased, and it is the lowest proportion for all workers since 1993-94. Casual workers have increased significantly in the rural areas compared to 2004-05, perhaps because of the impact of the NREGA. For regular-salaried workers, there has been a marginal increase. This suggests there must have been a transfer of the labour force from the agricultural sector to the modern sector. But overall there has been a declining growth of employment in modern sector. This suggests a slow process of transformation from agriculture to non-agriculture.

There is an increasing trend of non-farm sector in India in general, but the increase in non-agricultural work has been much less than the decline in agricultural employment. So there is a need for much faster growth of non-agricultural employment, even within rural areas. It is because, majority of population are in rural areas and costs of migration would be much less.

(see Figure.2). However, the evidence in current trends does not seem to suggest this. There is an increased share of self-employed can imply that more are opting cultivation, with small and marginal farm households dominating, this structure can house lot of disguised unemployment.

Figure.2. Income and Employment Share of Rural Economy in India

Note: Income is Net Domestic Product at current prices.
Source: Estimated by taking data from NAS and NSS

Table.3. Percentage Share of Employment by Nature in Non-Agricultural Sector

Sector	Organised Sector				Un-Organised Sector			
	1983	1993-94	2004-05	2009-10	1983	1993-94	2004-05	2009-10
Mining & Quarrying	54.96	41.65	42.88	45.91	45.04	58.35	57.12	54.09
Manufacturing	19.41	16.04	10.06	11.93	80.59	83.96	89.94	88.07
Electricity, Gas and Water	89.9	70.38	75.15	63.86	10.1	29.62	24.85	36.14
Construction	17.48	10.03	3.69	2.15	82.52	89.97	96.31	97.85
Trade, Hotel & Restaurant	2.05	1.62	1.13	1.32	97.95	98.38	98.87	98.68
Transport, Storage and Communication	38.32	29.16	15.27	13.20	61.68	70.84	84.73	86.80
Finance, Insurance, Real Estate and Business Services	50.72	42.51	24.83	29.00	49.28	57.49	75.17	71.00
Community, Social and Personal Services	36.92	30.49	29.44	28.84	63.08	69.51	70.56	71.16
Total Non-Agriculture	**23.80**	**19.16**	**12.54**	**12.15**	**76.20**	**80.84**	**87.46**	**87.85**
Total Sector	**7.93**	**7.31**	**5.78**	**6.16**	**92.07**	**92.69**	**94.22**	**93.84**

Source: Organised Sector Employment data are computed from Ministry of labour & Employment, Director General of Employment Training (DGET); Unorganised sector Employment are computed through residual approach

By status of employment in agriculture and non-agricutural sector, the share of informal sector employment in agriculture constitutes 97.6 per cent of total workers in the sector, consisting mainly self-employed and casual labour (see Table.4). It is 71.6 per cent of non-agriculture are unorganized and 28.4 percent in organized sector. Out of the unorganized employment, about 60 per cent in both are self-employed, where the regular salaried employment is about 18 per cent for both.

What transpires from reading the structure of employment is that overwhelming share of workers is in lowly paid, insecure informal sector sans any social security. Hence quality of employment in India is generally very poor. It is not capable to lifting the standard of living of people in any substantial terms. If the transformation that is taking place is from agricultural informal sector into non-agricultural informal sector, then substantially the value addition of this process can only be poor.

Table.4. Size and Distribution of Organised and Un-organised Sector Workers by Industry and Status during 2004-05 (%)

	Agriculture			Non-Agriculture			All		
	Org	**Un-org**	**Total**	**Org**	**Un-org**	**Total**	**Org**	**Un-org**	**Total**
SE	38.1	64.8	64.2	5.1	62.8	46.4	8.3	64.1	56.5
RW	20.1	0.6	1.1	74.3	17.4	33.6	69	6.7	15.2
CL	41.8	34.6	34.7	20.7	19.8	20	22.7	29.2	28.3
TOTAL	100	100	100	100	100	100	100	100	100
% to Total	2.4	97.6	100	28.4	71.6	100	5.8	94.2	100

Source: National Commission for Enterprises in the Unorganised Sector, 2007

3.1. Estimating Rate of Structural Transformation in India

The dynamic change in structural transformation can captured more rigorously from estimating the rate of change of structural transformation (RST). If L_t is the total workforce of the economy and L_n is the non-agricultural (sum of industry and services) workforce, then the share of the non-agriculture is given by L_n/L_t, which is also a measure of the degree to which a developing economy has diversified its production base. The rate of structural transformation may then be defined as the increment in L_n/L_t ratio per annum. Then the rate of structural transformation is:

$$RST = \frac{L_n}{L_t}(L_n^{'} - L_t^{'}) \quad \text{..... (1)}$$

The above equation has derived as in the following:

Let `t' is the time period, and then the first difference of L_n/L_t with respect to time will be;

$$\frac{d(\frac{L_n}{L_t})}{d\tau} = \frac{L_t \frac{dL_n}{d\tau} - L_n \frac{dL_t}{d\tau}}{L_t^2} \quad \text{..... (2)}$$

Using the approximation $\partial\tau = \Delta\tau = 1$ year, the above equation will be rewrite as;

$$\Delta(\frac{L_n}{L_t}) = RST = \frac{\Delta L_n}{L_t} - \frac{L_n \Delta L_t}{L_t^2} \quad \text{..... (3)}$$

$$RST = \frac{L_n}{L_t}(\frac{\Delta L_n}{L_n} - \frac{\Delta L_t}{L_t}) \quad \text{..... (4)}$$

$$RST = \frac{L_n}{L_t}(L_n^{'} - L_t^{'}) \quad \text{..... (5)}$$

Thus the rate of transformation contemplated as rate of change of ratio of non-agricultural employment to total employment over period, is the ratio multiplied by the difference between the incremental change in non-agricultural and total employment. We have estimated the RST for two types of transformation: (a) from agricultural to non-agricultural and (b) from informal sector to formal sector[2].

The estimated rate of structural transformation is given in table no.5. The Rate of Transformation in terms of output has really accelerated. Compared to the pre-Reform period (1973-91), it has accelerated from 0.56 percent to 0.863 percent during 1991-10.

Table.5.Rate of Structural Transformation in India

Sector	**1973-74 to 1990-91**	**1991-92 to 2009-10**	**1973-74 to 2009-10**
Output Transformation Rate			
Agricultural output to Total Non-agricultural output	0.560	0.863	0.708
Employment Transformation Rate			
Agricultural work move to Non-agricultural work	0.570	0.586	0.578
Agricultural work move to Unorganised Non-agricultural Work	0.598	0.705	0.65
Agricultural work move to Organised Non-agricultural Work	-0.023	-0.108	-0.064
Total Unorganised Sector Work to Organised work	-0.026	-0.114	-0.069

Source: computed

While there is no commensurate growth in RST in occupational terms, nevertheless, there has been some transformation in the recent period. The RST of agricultural work to non-agricultural work has increased marginally from 0.57 to 0.586. This is even faster when we consider agricultural work to unorganized non-agricultural work, where it has increased from 0.598 to 0.705. Whereas, it has clearly worsened regarding RST of agricultural to organized work, it declined from -0.023 to -.108 percent. Similarly, it has equally worsened in case of unorganized work to organized work, from -0.026 to -0.114 percent between the pre- and post-Reform periods.

In conclude, first of all, output transformation is lot quicker than in employment for the past quarter century in India, which further accelerated in the post-reform period. Second, the occupational transformation from agriculture to non-agriculture has marginally increased, while from agriculture to un-organised non-agriculture has remarkably improved. Thus it suggests that now there is a movement in the occupational transformation, but it is totally in terms of movement towards unorganized (modern) sector.

3.1.1. Factors behind Pace of Transformation of Employment:

Occupational transformation in India has been evidently slow. There are several factors behind such slow movement. While the list of factors that affect structural transformation is exhaustive, we shall discuss some of them here, in terms of supply-side and demand-side. We shall however, include several others in our econometric exercise in the subsequent section.

3.1.1.1. Supply-side Factors

3.1.1.1a. Population Growth and Labour Supply

One of the important factors that can slow down rate of transformation is the growth of backlog of labour on the supply side which is to be accommodated in the modern sector, which in turn depends on population growth rate. On the supply side, population growth rate and the associated factors, *inter alia*, is an important factor determining labour supply. The size of net working population is directly determined by, by age and sex, fertility, mortality, and migration patterns; and participation rates tend to determined economically, socially and culturally.

The interrelationship between population growth and labour supply are characterised under four main points, such as: first, population growth tends to have a lagged effect on labor supply[3] [Bloom and Freeman, 1986]. Second, increase in fertility rate with increased dependency rate will increase labour supply up to a point and decline later, along with demographic transition. Third, work participation rates, which also influence labour supply, are determined by economic, cultural and social aspects.

Tabe.no.6. Demographic Trends in India, 1951-2011

Year	Population Growth	Birth Rate	Death Rate	Net-Migration	Infant Mortality Rate	Life Expectancy	
						Female	Male
1951	1.25	40.9	22.8		146	31.7	32.4
1961	1.96	40.0	17.6		129	40.6	41.9
1971	2.22	37.8	15.4		110	44.7	46.4
1981	2.20	34	13		92	54.7	54.1
1991	2.14	30	10		75	60.9	59.7
2001	1.95	26	9	-0.08	70	61.8	60.4
2011	1.62	22.5*	7.3*	-0.05*	30*	72.6*	67.5*

Note: Birth Rate: the average annual number of births during a year per 1,000 persons in the population; Death Rate: the average annual number of deaths during a year per 1,000 persons in the population; Infant Mortality Rate: the number of deaths of infants under one year old in a given year per 1,000 live births in the same year; Net-Migration: is the difference of immigrants and emigrants of an area in a period of time, divided (usually) per 1,000 inhabitants (considered on midterm population). A positive value represents more people entering the country than leaving it, while a negative value mean more people leaving than entering it; Life expectancy: the number of years that an individual is expected to live.***** year 2009 data. **Source:** Lal (2006) and SRS (2011), Census of India.

In case of India, decline in the death rate has been faster than the fall in birth rate which increases the population growth till 1981. Since 1951 to 1971, the population growth has significantly increased in the country, increasing the bottom segment[4]. Partly due to family programming and partly to natural transition, decline in birth more than death rate became possible by 1981. And after 1981, the population rate has declined successively from 2.2 per cent in 1981 to 1.95 percent in 2001 and further declined to 1.62 percent in 2011[5] (see Table.6). The urban population rates rose due to the growth of urbanization and increasing migration from rural areas. The urban population share has increased from 24 percent during 1981 to 31 percent during 2011. It is believed that more than half of all India's population growth by 2026 is likely to end up living in the urban sector. This has important ramifications for transformation. Gender

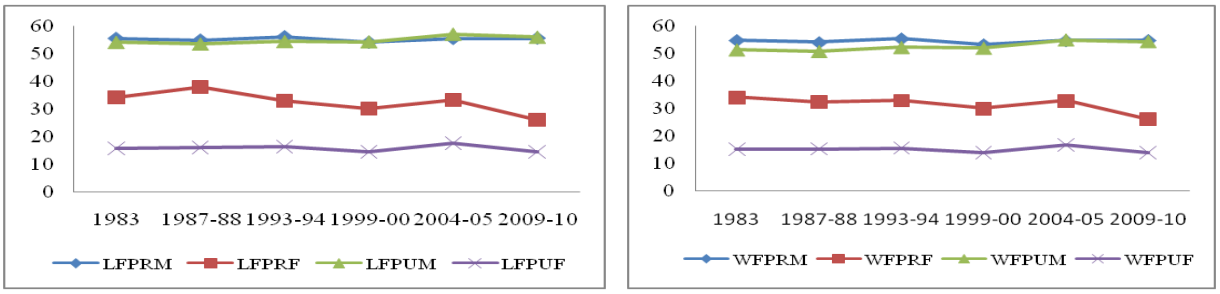
specific interstate migration trends reveal that females are becoming increasingly represented in all types of migratory movements. Apart from the large exodus observed due to marriage, younger females are also seen to be migrating to urban areas for educational purposes. The prime reason for male migration remains employment and business (Perveen, 2004).

The population explosion in the early phase of development is perhaps a natural phenomenon, as happened in the Europe during 1840-1911, however, its impact on structural transformation is resolved partly from export of populations to its colonies and partly absorbed the labour force into the industry favoured by lower capital-labour ratio. India, a late entrant into industrial development, lack both these alternative, making the transformation a frustratingly slow process.

3.1.1.1b. Labour Force Participation Rate and Work Force Participation Rate

The consolation factor regarding of population growth rate is that it has declined in the recent times considerably, but with the successive increase in the absolute number of working-age population (age 15-59) and urbanisation, the participation rate in the labour market has increased. Figure.3 depicts about the labour force and work force participation rate in the India, and we see that both labour force participation rates (LFPRs) and work force participation rates (WFPRS) have increased in males and females irrespective of the location of residence[6]. During post-reform phase, LFPRs has increased in both urban males and females and only rural females; where WFPRs was declined for both males and females in rural areas whereas there is an increasing WFPRs in males and females in urban areas. Urban female WFPRs have remained markedly lower than the rural. This difference partly reflects the greater difficulty of combining work with household duties in urban areas instead of in villages where work on the family farm or in the family enterprise tends to be the predominant activity. An important implication for transformation is that there is an increased need to create urban employment.

Figure.3. Labour Force and Work Force Participation Rates by Gender and Areas



3.1.1.2. Demand-side Factors

The employment creation in the non-agricultural sector, on the demand-side, depends on rate of labour productivity and capital-labour ratio. In India, there has been a remarkable growth of non-agricultural sector employmnet during 1983-04, compared to agricultural sector. There is a marginal slow down in employment growth of non-agriculture the post-reform perdiod of 1993-09 (see Tabel.7). There is also a faster growth of labour productvity in of non-agricultural

sector (5.12 per cent in post-reform phase) associated with an increase in higher output growth (8.24 per cent), but with marginal decline in employment growth (3.12 percent) in the sector compared to its previous decade.

While looking at factor composition[7], it is observed that capital-labour ratio has gone up from 4.67 per cent in pre-reform period to 5.5 per cent during post-reform period. The increase in capital-labour ratio can largely explain the decline in employment. Thus, on the demand-side, if the increase labour productivity can augment employment, the rise in capital-labour ratio can dampen the same and net effect depends on the relative strength of each.

Table.7. Growth Rate of GDP, Employment, Labour Productivity and Capital-Labour Ratio (at 1999-00)

Year		1983-93		1993-09	
		Agriculture	**Non-Agriculture**	**Agriculture**	**Non-Agriculture**
GDP		3.76	5.78	2.77	8.24
Employment		1.47	3.62	-0.04	3.12
Labour Productivity		2.29	2.16	2.73	5.12
Capital-Labour Ratio		0.78	4.67	3.62	5.55
Real Wages*	Casual	2.78	4.19	1.31	0.76
	Regular	5.38	0.56	5.01	0.21

Note: * for 1993-99 and 1999-04

Source: computed from various rounds of NSS reports and issues of NAS.

4. Determinants of Structural Transformation: An Econometric Estimation

We have noted that the occupational structural transformation in India had been slower compared to income transformation, nonetheless, there is evidence that in the recent period it has quickened than earlier. In order to know the strength of various factors that may determine its movement we shall undertake a simple econometric exercise. The list of variables that are considered to have impact on rate of employment transformation are urbanisation, non-agricultural income, non-agricultural investment, technology used in non-agricultural sector, non-agricultural informal employment, rural-urban wage differential (Todaro model hypothesis), and skilled labour. Such variables are now presented in the following equation.

$$STR_{AE\rightarrow NAE} = \alpha + \beta_1(UP) + \beta_2(Y)_{NA} + \beta_3(GCF)_{NA} + \beta_4(K/L)_{NA} + \beta_5(UE)_{NA} + \beta_6(RW) + \beta_7(HC) + \beta_8(L_{91}) \quad \text{…….. (6)}$$

Where,

STR = Structural Transformation i.e. share of non-agricultural employment to total Employment.

UP = Urbanisation i.e. share of urban population to total population

Y = Share of Non-agricultural sector GDP i.e. non-agricultural GDP to total GDP

GCF = Share of gross capital formation in non-agricultural sector, i.e. non-agricultural total investment to total investment

K/L = Share of capital-labour ratio in non-agricultural sector

UE = Share of unorganised sector employment in non-agricultural sector, i.e. unorganised sector employment in non-agricultural sector to total employment

RW = Rural-Urban real wage differential, i.e. difference between real wages in Casual workers between rural and urban areas at 1999-00 prices.

HC = Human capital i.e. literacy rate

L_{91} = liberalisation dummy

NA = Non-agricultural sector

AE = employment in agricultural sector

NAE = employment in non-agricultural sector

The equation in 6 is for structural transformation on employment can be estimated for the both the categories, first, for agriculture to non-agricultural sector, and second from informal to formal sector. The specification for the latter is as in the following:

$$STR_{UE \to OE} = \alpha + \beta_1(UP) + \beta_2(LP)_{Org} + \beta_3(GCF)_{Org} + \beta_4(K/L)_{Org} + \beta_5(HC) + \beta_6(L_{91}) \quad \ldots\ldots\ldots (7)$$

Where,

$STR_{UE\text{-}OE}$ = Structural Transformation i.e. share of organised sector employment to total Employment.

UP = Urbanisation i.e. share of urban population to total population

LP = share of labour productivity in organised sector

GCF = share of gross capital formation in organised sector

K/L = share of capital-labour ratio in organised sector

HC = Human capital i.e. literacy rate

L_{91} = liberalisation dummy

On the positive side, we expect aggregate non-sector's income, gross capital formation in non-agriculture, rural-urban wage differential, urban employment creation, human capital and liberalization dummy and on negative side the share urban population, capital-labour ratio to exert their influence on the rate of structural transformation.

To estimate the above model, for the period 1972-73 to 2009-10, the data required for estimation are collected from various sources. First, output, gross capital formation and net fixed capital stock at 1999-00 prices data are collected from National Account Statistics, Central Statistical Office, Government of India. Second, population and employment data are compiled from various periodic estimates of NSSO and Census data. As we know that there is no continuous data set available for employment in India, the present study makes an interpolation to construct a time series data on employment. For organised sector employment, data is taken from *Employment Market Information* (EMI) series of the Director General of Employment and Training publishing in the *Annual Employment Reviews*. Employment for unorganised sector is obtained by the residual method by subtracting the total employment to organised sector employment. Third, wage data are compiled initially from rural labour enquiry and latter merged with the quinquennial employment and unemployment surveys conducted by the NSS[8]. Fourth, literacy data is collected through various sources such as Census data, selected education

statistics and NSSO report on literacy rate. Beside NAS and NSSO, extensive use has been made of other relevant secondary sources like Handbook of Statistics on Indian Economy published by Reserve Bank of India (RBI), Agricultural Statistics published by Ministry of Agriculture and various official reports. Some of the mid year values of certain variables has been calculated by interpolation method to fill the data set for making it into time series framework[9]. In order to examine the above model specification equation, simple Ordinary Least Square (OLS) technique is employed.

4.1. Empirical Results

The estimation results for agricultural to non-agricultural employment transformation and unorganised sector to organised sector employment transformation are presented in table.8 and 9.

4.1.1. *Employment Transformation from Agriculture to Non-agricultural Sector*

Let's first look at the estimation of quantitative employment transformation from agriculture to non-agricultural sector which is presented in table.no.8. It has a reasonable goodness fit with an explanatory power of 0.77. The estimated coefficients of all the variables are found to be significant and have expected signs. Estimated results corroborate the view that the transformation from agriculture to non-agricultural employment has positively influenced by non-agricultural income, non-agricultural investment, non-agricultural informal sector work force, rural-urban real wage differential and human capital and variables like urban population and non-agricultural capital-labour ratio have negatively influenced the transformation in the economy. From the result, we found that, first, share of non-agricultural informal sector work force has the highest coefficient value, suggesting one unit increase in share of non-agricultural informal sector work force will lead to 0.641 unit increase in share of employment transformation rate from agriculture to non-agricultural sector. Second, human capital has the second highest coefficient value of 0.047. Third, one percent increase in share of non-agricultural income leads to 0.042 unit increases in employment transformation in the economy. Fourth, investment which determines the employment transformation by Lewisian model suggests only 0.027 unit increase by each unit share of investment. Fifth, wage differential which determines the rural-urban migration by Harris-Todaro model suggests a positive impact to the employment transformation from rural agriculture to urban non-agricultural sector. On the other hand, urban population and share of capital-labour ratio in non-agricultural sector decreases employment transformation by 0.072 and 0.032 respectively. Liberalisation dummy positively affects the employment transformation in the economy but the coefficient is very negligible. From the above explanation, it can be observed that due to informal sector growth in terms of employment and growth in non-agricultural sector income has some deterministic influence on employment transformation from agricultural sector to non-agricultural sector.

Table.8. Effects of Employment transformation from Agriculture to Non-agricultural sector in India

Dependent Variable: *STR*		
Independent Variable Name	**Coefficient**	**'t' statistics**
Constant	0.183*	5.86
UP	-0.072*	-2.16
Y_{NA}	0.042*	2.54
GCF_{NA}	0.027*	4.44
K/L_{NA}	-0.032*	-5.41
UE_{NA}	0.641*	19.69
RW	0.001*	2.40
HC	0.047*	2.04
L_{1991}	0.0001*	1.96
R^2	*0.77*	
Durbin-Watson (DW) Test	*1.65*	
Prob (F-Statistics)	*0.000*	
Number of Observation	*38*	

Note: * at 5% significant level

4.1.2. *Employment Transformation from Unorganised Sector to Organised Sector*

Now we move to estimating the determinants of structural transformation from informal to formal sector. The results of the estimation are presented in table no.9. The estimations indicate satisfactory goodness of fit with an R-square of 0.75. We know that the rate of transformation of this type is negative and we are interested to see the determinants. According to the estimation, the employment transformation from unorganised to organised sector is positively influenced by investment and human capital and negatively influenced by labour productivity, urban population and capital-labour ratio. This suggests that first, human capital has the highest and positive coefficient of 0.007 unit share. Second, capital formation has the coefficient of 0.001, suggesting a share of organised sector employment increases for one percent rise in share of investment. On the other hand, with the increase in urban population, quality of employment transformation has declined by 0.024 unit share. Employment has a negative coefficient share with respect to labour productivity and capital-labour ratio in organised sector at 0.008 and 0.002 unit of share respectively. The overall result suggests that it is the human capital and investment in organised sector which has some deterministic influence on quality of employment transformation in the economy.

Table.9. Effects of Employment transformation from Informal to Formal sector in India

Dependent Variable: *STR*		
Independent Variable Name	**Coefficient**	**'t' statistics**
Constant	0.095*	13.37
UP	-0.024*	-6.47
LP	-0.008*	-3.46
GCF	0.001*	2.13
K/L	-0.002*	-2.63
HC	0.007*	2.96
L_{1991}	-0.002*	-2.62
R^2	*0.75*	
Durbin-Watson (DW) Test	*1.64*	
Prob (F-Statistics)	*0.000*	
Number of Observation	*38*	

Note: * at 5% significant level

5. Conclusion

To summarise, we observe that structural occupational transformation process in India seemed to have begun since post-Reforms period. The transformation is led by a growth of service-sector employment, not industry-led. It has begun since 1983, much prior to 1991 Reforms, but slightly slowed down during 1993-04, but has picked again at much faster pace. If the present trends continue, the agricultural dependent workers might decline substantially in the coming two decades.

However, there are certain anomalies in this transformation. The structural transformation is significant only vis-à-vis agriculture and unorganized non-agricultural sectors. There is a negative movement towards organized sector. Hence, the so-called modern sector's employment is not substantially better than that of traditional, except for a marginal improvement. Quite disturbing aspect is that we foresee a growth of a mammoth unorganized employment for the future located in more in services and less in industry, with a substantial self-employed people.

Structural transformation of employment is not just about a change from agriculture to non-agricultural sector work, but is about shifting from low productive-low wage to high productivity-high wage work (with reasonable social security). If some farmers move out from his work and become a rickshaw pullers or street vendors in urban areas, it is hardly a structural transformation.

Our econometric estimation suggested that this transformation is positively influenced by factors such as growing share of non-agricultural income, non-agricultural investment, rural-urban real wage differential and human capital. The two major factors that are slowing down this process is growing (urban) population and capital-labour ratio. The substantive employment transformation i.e. from unorganised to organised sector, is a positive influenced by investment and human capital and negative influenced by labour productivity, urban population and capital-labour ratio in organised sector.

This imply that the new employment opportunities are likely to generate in the unorganised sector belonging to poor work conditions without any social security in the coming times. Even within the organised sector an increasing number of workers are being employed in a 'flexible' manner on casual or contract basis, without the social security benefits available to regular workers. Thus quality of work creation, in terms of earnings and social security, may become further scarce, the share of the unprotected workers will be on increase. The challenge of poverty and unemployment would only worsen. Provision of a minimum social protection to this large mass of workers is, therefore, likely to emerge as a much greater challenge. It would only sharpen the class struggle with the market driven high-growth-informal-employment.

End Notes:

[1] The fact that the earnings level in the tertiary sector has been significantly above that in manufacturing, suggesting that growth in the services sector has been productivity-led rather than employment-led (Mazumdar and Sarkar, 2009).

[2] The classical notions of structural transformation implicitly assume it as transformation from a traditional to modern where the latter is a formal sector. However, if the labour transition is happening from informal agricultural to informal modern sector, then the qualitatively this transformation is deferent. To capture the qualitative dimension, we estimate the transformation from informal to formal sector.

[3] If population growth is due to high fertility rate or of an age distribution that is heavily concentrated in the child-bearing year, the growth in any year will have its impact focused at age 0 of the age distribution. Thus, it will take at least 10 to 15 years before the effects of a particular year's population growth even begin to be felt in the labor force. On the hand, if population growth is mainly the result of substantial in-migration, its principal effect on labor supply will not be lagged since the propensity to migrate tends to be relatively low before the teenage years. Population growth resulting from an excess of births over deaths in rural portions of an economy may create pressures for migration to urban areas, then the migrants tend to be of working age population growth in the urban areas will have an immediate effect on labor force growth.

[4] In order to reduce the poverty so as to control the population pressure, Sanjay Gandhi believed that India's problems of poverty could be solved by corrective sterilization of the poor. The resulting civil resistances provoked by mass sterilization camps and by the emergency declare by his mother, Prime Minister Indira Gandhi, in the mid 1970's led to the virtual abandonment of `forced' family planning programmes in India. See Lal, Deepak (2006)

[5] Such decline in population growth is well supported by the introduction of different socio and economic planning in the country, such as: rise in the mean age at marriage and decline in the age-specific marital fertility rate due to the spread of contraceptive practices, specific incentive for female child, free education for single child etc. With successive decline in death rate due to better health and more access to medical services, life expectancy has been increasing. Particularly, female life expectancy has been rising with the rising in sex ratio where historical sex bias towards male child has been declining.

[6] The data for 2009-10 reveals that except for rural males, all the other segments of the population have shown a declining WPR rate since 2004-05. The decline in female participation is due to the fact that women are now attaining higher education, particularly in urban areas. It has also been seen that urban female WPRs have remained markedly lower than the corresponding rural figures. This difference partly reflects the greater difficulty of combining work with household duties in urban areas as opposed to villages wherein work undertaken by women on the family farm or in the family enterprise tends to be the predominant activity. With the gradual disappearance of

rural–urban differences in occupational structures, and the growing diversification of rural employment, the disparities in WPRs between the different population segments are bound to diminish.

[7] Technology, which is assumed to be neutral in the Lewisian model, has a greater role to play for the development of modern sector. As we know that the capital-labour ratio is associated with a unique saving ratio and a unique capital-output ratio and hence with a unique rate of output growth, then with the increase in capital-labour ratio will increase the output growth much faster rate with the increase in saving ratio. But on the other hand, with the introduction of more and efficient capital, there will be more substitution of labour for capital.

[8] Initial rural labour enquiries were conducted by the ministry of labour and the first two enquiries were called agricultural labour enquiries since wages and earnings of only agricultural labour households were canvassed. However, since 1963-63, the scopes were extended to include rural labour households and are thus called rural labour enquiries. Since 1977-78 the responsibility of canvassing the wage schedule was handed over to NSSO and the rural labour enquiries were merged with the quinquennial employment and unemployment surveys.

[9] The similar exercise has also been made by Pattanik and Nayak (2011).

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