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EDITORIAL

STATISTICS OF INDUSTRIAL GROWTH

The impact of Industry on Economy, on Society and on Environment has been well-recognized. Also accepted is the pivotal role of Technology and Human Capital on the performance of Industry and, consequently, its contribution to Economy and to Society. And we believe that Truth is revealed by Statistics. Of course, we must make sure that such Statistics are pertinent to contributions-desired or undesired-of Industry, that these have been compiled using appropriate operational definitions of various concepts and avoiding (to the best extent possible) response and recording errors, and that adequate care has been taken to ensure the validity of the findings emerging from such statistics in assessing Industrial growth and corresponding changes in Economy and in Society., without adding to the deleterious impacts on environment.

Traditional analysis of Industrial growth has been generally based on changes in different performance parameters of industrial activities that have taken place over a period of time, often relating these changes with changing behavior of possible explanatory factors. Growth or decline is taken to be indicated by some financial measures, which are supposed to quantify 'productivity'.

That increased productivity-even when noticed for several consecutive periods of time-is not, by itself alone, a mark of 'business excellence' has been pointed out by recent contributions in Management Science and well exemplified by experiences of some Industrial giants of yester years. The failure of models and techniques based on past and current data on the known factors of production and their financial outcomes to predict business performance in future led to the recent emphasis on Balanced Score Card developed by Kaplan and Norton about two decades back and on Business Excellence Models developed by a few organizations like the European Foundation for Quality Management (EFQM).

In the Balanced Business Score Card, performance of an industrial or business unit is viewed as the composite effect of four distinct contributory functions viz. Customer Orientation, Internal Business Processes (both Core and Supporting), Learning and Innovation, and Financial Results. In some sense, Financial Results can be looked upon as being determined by the first three functions. It is quite true that the first three functions do invite difficult problems in identifying and, subsequently, in quantifying the elements involved in them. Not that there have been no attempts towards this direction, but traditional economic analysis based on currently available official statistics have remained more or less aloof. Too much of subjectivity in the corresponding concepts, absence of emphasis laid by other developing or developed countries or international agencies engaged in this domain and lack of comparability with findings about industrial growth likely to arise if these 'latent' variables are taken into account, are some of the common arguments put forward by protagonists of the present practice.

The EFQM Business Excellence Model recognizes performance outcomes in terms of (1) Stake-holder Satisfaction (2) Impact on Environment (3) Impact on Society and (4) Financial Indicators like Earnings per Share, Return on Investment, Net Value Added, etc. And these outcomes are explained with the help of four drivers (call them 'factors' or 'contributors' if you so like) viz. (a) Leadership (b) Policy and Strategies (c) Resource Management (including People Management) and (d) Process Management.

As is clearly evident, data problems starting from development of suitable operational definitions continuing to development of suitable measures will plague any serious attempt to use this model for studying the growth prospects of any Industry. Most of the concepts involved-both those in the 'drivers' as also those in 'results' or 'outcomes'-do not admit of unique or even easily converging definitions. We have to remember that this Model has been quite successfully applied to study growth prospects of many European industries. One can surely find fault with the definitions and measures adopted in those studies. But should that deter us from at least giving the model a serious consideration that it deserves in our on-going pursuit to come up with adequate statistics to predict performance of Indian Industry, without relying too much and too rigidly on time series analysis on only easily quantifiable and manifest variables !

The Indian Statistical System had a headstart over many developed countries and has grown over the years to demand respect for its ability to accept new ideas and to act on them in a bid to take the System to greater heights in terms of providing better and more incisive pictures about our Economy and our Society. Let us hope that we will move forward to compile and use data on certain facets of Industry that we are currently failing to capture.

September 2014
Kolkata

S.P. Mukherjee
Editor-in-Chief

Industrial Investments in Kerala, Trends, Constraints and Future Prospects

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Abstract

Kerala is one of the least industrialised states although it has all the potential of being one. Historically speaking the state has attracted very little industrial investments especially in manufacturing. The problem has become even more acute over the last decade. The paper presents trends in industrial investments in Kerala and then attempts to provide an explanation of low investments in terms of four constraints: land, labour, environmental consciousness of the civil society and attitude of the bureaucracy. Given the constraints, the paper also delves into the type of service sector industries that the state may encourage.

1. Introduction

1.1 The industrial sector in India is one of those sectors that have been at the forefront of economic liberalization. In fact the very first formal policy document on the new economic reforms is the New Industrial Policy Statement of 1991, which sought to reduce barriers to entry by delicensing virtually the entire industrial sector. Consequently there has been a surge in industrial entrepreneurship in India in the form of a large number of new company formations (Mani, 2011). A number of new technology-based industries have sprung up over the last twenty years or so: the larger Information and Communications Technology industry, the Biotechnology and the renewed Automotive Industry are cases in point. Although the industrial investment intentions have increased, significantly, since 1991, its regional spread has been very unequal. Contrary to intuition, Orissa and Chhattisgarh have attracted the maximum amount of investment intentions during the period since liberalization. States like Kerala are at the bottom of the table: during the period August 1991 through March 2014, the state has managed to implement only 81 proposals involving Rs 1019 crores[1]. At this figure, it is only 0.19 per cent of what has come to rest of India. The fact that Kerala is not industrialized has been baffling policy makers and scholars alike. This is because the state is one of the fastest growing ones in the country in terms of growth rates in Gross State Domestic Product

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[1] Department of Industrial Policy and Performance (2014 a)

(GSDP). With a large chunk of remittances being received from Keralite workers in the Middle East, the state also ranks number one in monthly per capita consumption expenditure. Further, the state has a highly literate work force. The relatively speaking high migration rate from Kerala, both internal and international, would have made it easier for Keralites to gain access to new ideas about industrial ventures etc. Further, the state has been ranked very high in terms of certain investment climate survey (India Brand Equity Foundation, 2013). But, on the contrary, the degree of entrepreneurship from the state is at a very low level and it has continued to be so for a very long time. This is despite the fact that some of the most successful companies in India have been established and run by Keralites, but of course, located outside the state or outside the country [2]. Further the rich natural resources, which the state is blessed with, Natural Rubber for instance, the state does not have any serious value adding activities in these resources.

1.2 Rest of the paper is organised as follows. Section 2 has a brief but critical engagement with the literature, which attempts to explain the so-called 'industrial backwardness' of the state. Section 3 attempts to map the prevailing industrial structure of Kerala in terms of various quantitative aspects. Section 4 traces the trends in actual industrial investments to the state after 1991 and attempts to show that the state has very little industrial investments both in an absolute and relative sense. Section 5 lists our own explanations for the low level investments in the state. Section 6, given the constraints to industrializations, discusses the prospects of three industries in which the state has considerable investment potential. Section 7 sums up the main findings of the paper and identify some policy prescriptions for improving the industrial investment climate in the state.

II. An engagement with the literature on Kerala's industrial sector

2.1 One of the earliest studies on Kerala's industrial sector is by Subrahmanian and Pillai (1986). The study is almost entirely about explaining the industrial performance of the state during the decade 1969-1979 when value added of the factory sector in Kerala grew considerably less than the all India average. The researchers then attempt to provide some explanations

[2] Although there a number of such successful ventures mention must be made of MRF, which is the leading automotive tyre company in India and Lulu Hypermarket, which is one of the leading multi brand retailing units in Middle East and Africa. Keralite entrepreneurs established both these enterprises.leading automotive tyre company in India and Lulu Hypermarket, which is one of the leading multi brand retailing units in Middle East and Africa. Keralite entrepreneurs established both these enterprises.

for it. They find no empirical justification for the popular hypothesis that regional factors as exemplified by high wage costs and militancy of trade unions are the real reasons for this industrial backwardness of the state. On the contrary, they find that Kerala has one of the lowest wage rates and the share of wages in value added has been decreasing over time. Therefore discounting the negative impact of region-specific factors they find more evidence in support of an industrial structure hypothesis. The hypothesis is that Kerala's industrial structure is dominated by slow growing natural resource-based industries like food products and chemicals etc. and it is this inability of the state to diversify itself into fast growing industries that has kept its industrial structure locked-in a set of slow growing ones. In short it is the structure of industries in Kerala that causes the industrial growth rate in the state to diverge from the national pattern. Engineering industries, which are usually very dynamic, does not have any sizeable presence either in terms of employment or value added. Given the structure of industries there was very little scope for inter-industry linkages and agglomeration economies. A similar view is expressed by Thomas (2005) as well although in a more forceful manner by tracing the path-dependent nature of industrialization in the state. Albin (1990) who also analysed the divergence in the growth rate of Kerala's manufacturing sector from that of other states and all India reached the conclusion that regional factors are far more important than structural factors in explaining this observed divergence in Kerala's growth performance from the national pattern. The main contribution of her study is that she broadened the structural factors to include apart from industrial composition, variations of the industrial sector in terms of its organisation- household industries, organised industries and size of factories. Although the study identifies regional factors as the main explanatory variable, it does not, however, spell out the regional factors in great detail. In short the existing literature is primarily concerned with explaining the divergence in the rate of growth of the manufacturing sector in Kerala from the growth performance of the sector in India as a whole. It does not, however, discusses neither trends in investments in the industrial sector nor it attempts to provide explanations as to why Kerala does not attract much industrial investments not just in the recent past but historically as well. In fact our argument is that the concept of industrial backwardness of the state used in the literature is a misnomer as it refers to an

economic status (outcome) as reflected in outdated technology/industries[3] . The main problem of the industrial sector in Kerala, in our view, is the inability of the state to attract sizeable chunks of investments especially at a phase when industrial investments in the country have been rising. This is really the gap in the literature that the present paper is seeking to fill in. It does this in two broad stages. First, it shows, in very clear terms, that Kerala has received very little industrial investments both in terms of proposals and then in terms of conversion of these proposals to actual investments on the ground. Second, it attempts to provide some explanations for this state of affairs. While doing so, it re evaluates some of the already expressed hypotheses in the literature by confronting it with fresh empirical data.

III. Profile of Kerala's current (c2012) industrial sector

3.1 The manufacturing sector in Kerala is very small as it accounts for only about 8 per cent of the Gross State Domestic Product (State Planning Board, various issues). It is also small when compared with the country's manufacturing sector (Table 1). Within the manufacturing sector, the unregistered one has a large share [4]. The growth performance of the sector too has been erratic with violent year-on-year fluctuations in its growth rate. On an average the manufacturing sector in the state has grown at a lower rate at 5.17 per cent in nominal terms during the period 1998-99 through 2011-12 than its counterpart in India as a whole, which grew at around 12.18 per cent in nominal terms (Annexure 1). However the sharp year-on-year fluctuations in growth rates of the manufacturing sector in Kerala dents our faith in these average growth rates. In short, the organized manufacturing sector in Kerala is very small, both in absolute and relative terms.

3.2 Two hypotheses have been put forward to explain the missing middle phenomena. The first one is in terms of labour regulations, where factories tend to remain small by employing contract workers or through sub- contracting as a way of escaping from labour regulations that may kick-in when the factory crosses a certain threshold (in terms of employment). Empirical evidence for this evasion of compliance (with regulations of

[3] Private communication with M H Suryanarayana

[4] The unregistered sector account for, on an average, 57 per cent of the GSDP of the manufacturing sector

Factories Act) has been found by Chatterjee and Kanbur (2013) and Ramaswamy (2013). The second hypothesis is in terms of factories adopting labour saving technologies and thus becoming smaller in size over time. The latter hypothesis has not been subject to any detailed empirical scrutiny. A proxy for measuring this is the capital to output ratio. An improvement in this ratio (implying smaller units of capital to produce one unit of output) indicates improvement in efficiency that can be the result of the factory adopting less labour-intensive technologies. In the case of Kerala this ratio has declined over the years from 0.29 in 1998-99 to 0.14 in 2011-12 implying technological improvements. We must add that this is a preliminary finding and it requires some additional testing before we can reach firm conclusions as to which of the two hypotheses is more applicable in explaining the reduction in factory size over time.

IV. Trends in industrial investments in Kerala

4.1 All these have meant that Kerala has remained industrially speaking stultified. We measure industrial investments in terms of the number of Industrial Entrepreneur Memorandums (IEMs)[5] registered with the Secretariat of Industrial Assistance (SIA) within the union Ministry of Industry and Commerce rather than in terms of Gross Fixed Capital Formation as the former gives us data on both proposed and actual investments (Annexure 2), but essentially in large industrial ventures. Moreover the data are available across all the states, month-wise, and are available for the most recent period[6]. The IEM data on proposed and actual investments are published by two sources: for large enterprise sector it is by the SIA[7] and for Micro, Small and Medium enterprises (MSME)[8] it is by the Development

[5] Although consequent to the New Industrial Policy Statement of 1991 an industrial license is not required for establishing an industrial undertaking in almost all industries, any unit exceeding a threshold level of investment of Rs 10 crores in the case of manufacturing and Rs 5 crores in the case of service industries is required to file an IEM with the SIA. (http://www.doingbusinessinmaharashtra.org/Industrial_Entreprenuers_Memorandum.aspx). It is also clarified that an IEM 'was intended purely for statistical purposes and to conduct a limited post-facto check to see whether the proposed manufacturing activity requires an industrial licence or not. It was also clarified that the procedure was not in the nature of any registration involving scrutiny of the memorandum, etc.'. See the Press Note from the Ministry of Commerce and Industry, http://pib.nic.in/newsite/erelease.aspx?relid=79736 (accessed on May 30, 2014).

[6] For instance in May 2014, data are available up to March 31, 2014. See SIA Statistics, http://dipp.nic.in/English/Publications/SIA_Statistics/SIA_Statistics.aspx, (accessed on May 30, 2014).

[7] The data for large ventures are available in Department of Industrial Policy and Performance (2014a and b)

[8] The data for the MSME sector are available in Development Commissioner for MSME (2014).

Commissioner MSME . There are two major differences between the two sources of data. First the SIA data is available from 1992 onwards (although the data from 1992 to 2007 is cumulative and then year-wise from 2008 onwards) where as the MSME data is available only from 2007-08. Second, the SIA is available in both number and value of IEMs proposed and implemented while the MSME database reports only the number of EMs proposed. The quality of IEM data has been called into question. An IEM has two parts, A and B. Part A refers to proposed investments and has to be filed with Secretariat of Industrial Assistance (SIA) of the Department of Industrial Policy and Performance while proposing investment in an industrial undertaking and Part B has to be filed again with the SIA at the time of commencement of commercial production after the proposed investment project has been implemented. Nagaraj (2002) is of the opinion that while entrepreneurs seems to be adhering (relatively speaking) to the filing of Part A of IEMs in larger numbers; they appear to be less regular in filing of Part B. This means that while the data on Part A that refers to investment intentions are more reliable, Part B that refers to actual investments is less reliable. Given this, we have used both proposed and actual investments while we analyse the investment data for large enterprises and proposed investment data for MSMEs. We discuss the findings from the two sources separately as they deal with two separate types of enterprises in terms of investment thresholds.

4.2 Investments in the large enterprise sector

4.2.1 There has been considerable concentration in the distribution of industrial investments across the different states in the country. The Herfindhal Index computed on the basis of state-wise shares in industrial investments increased from 0.135 during 1992-2008 to 0.253 during 2008-2013. This substantiates the concentrated nature of industrial investments happening only in a few states within the country leading gross regional imbalances in the degree of industrialization. One third of the total investments have been accounted for by Gujarat and two-thirds of the total is by just five states. These five states are Maharashtra, Gujarat, Tamil Nadu, Andhra Pradesh, and Karnataka.

4.2.2 Kerala, as noted earlier, attracted very little industrial investments since the onset of economic liberalization (Annexure 3 for proposed and

Table 4 for actual investments). Her record on this is very poor both in the absolute and relative senses of the term. However there has been a significant jump in proposed investments (Annexure 3) in 2013, which is very likely to have been precipitated by the Emerging Kerala investors' meet of September 2012. Success will very much depend on the conversion of these proposals to actual investments. In fact to make matters worse, no large industrial projects were implemented since 2007 (excepting for 2009).

4.2.3 Foreign companies too have shied away from the state and according to recent data from the Secretariat of Industrial Assistance[9], Kerala has attracted only 981 million dollars of FDI equity inflows which works out to about 0.5 per cent of FDI (cumulatively during April 2000 through March 2014), that has come to rest of India.

4.2.4 But there is a silver lining in the cloud. Kerala has a better record in implementing its industrial proposals than the national average. During the period 1992 through 2013, Kerala has managed to implement 13 per cent of its proposals while the national average is 11 per cent. Similar figure for Andhra Pradesh is 15 per cent while that for Tamil Nadu it is 8 per cent and Karnataka a mere 7 per cent. It is of course disheartening to note that a large number of proposals are not taken to its logical conclusion. The precise reasons for this huge failure rate in project implementation needs to be researched into.

4.3 Investments in the MSME sector

4.3.1 Investment proposals at the MSME sector has hardly shown any growth and on an average it formed only about 5 per cent of what has been proposed for the country as a whole (Table 5). Kerala's share in total MSME proposals in the country has come down over time and it has registered sharp year-on-year fluctuations. Further a lion's share of these proposals is in the micro sector: in 2012-13 about 95 per cent of the total proposals are in the micro sector.

4.3.2 Given the low industrial investments, both proposals and actual, the number of working factories in the state has remained virtually constant at around 18000 or so (Figure 2)[10].

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[9] See Secretariat of Industrial Assistance (2014)

[10] These numbers on the number of factories are at variance with those reported for Kerala under the Annual Survey of Industries (ASI). According to this the number of factories (or industrial plants) in India increased from 4703 to 7031.

4.3.3 However the central government's investment in central public sector investments has risen from a stock of Rs 1074.44 crores in 1987 to Rs 31460.19 crores in 2013 and Kerala's share of the total went up from 1.58 to 2.06 per cent (Department of Public Enterprises, 2014, p.42). It is interesting to note that during the same period Tamil Nadu's share went up from 4.44 per cent to 7.17 per cent. It could, of course, be argued that these investments are more in response to political lobbying rather than for economic reasons.

V. Constraints to manufacturing investments

5.1 Several reasons have been adduced for this state of affairs. The ranking of these so-called constraints have varied over time. The constraints are land, labour, quality of bureaucracy and the attitude of civil society towards the negative externalities of industrial production such as air and water pollution, deleterious consequences on the water table etc. It is worthwhile to examine these constraints in some detail, as the sorting of these is a necessary condition for more entrepreneurship to flourish. This will also help us to understand as to why only entrepreneurship mostly based on services industries has flourished in the state.

5.2 At the top of the list is availability of land. Kerala's population density at 859 people per square kilometer (2011 census) is almost two and half times that of the all India average. Further, given the nature of cultivation, the opportunity cost of land in Kerala is, relatively speaking, very high. Both these factors combined increase the pressure on land to such an extant that there are severe shortages of land coupled with very high price if and when it is available. A manifestation of this pressure on land is the recent controversy on the 'Smart City Project' which has suffered a time overrun of nearly four years as the acquisition of land, its price and other conditions attached to its lease had become a major bone of contention between the party's involved. In fact the lack of availability of suitable land and its price has now become a major constraint for especially establishing large sized manufacturing firms. To overcome the problem of land availability, an earlier Industrial policy has recommended the creation of a land bank but hitherto this has remained as a mere proposal.

5.3 The second constraint, which in fact used to rank very high earlier, is labour. While Kerala labour is skilled and relatively speaking better educated, is known for being more conscious of their rights than their responsibilities. The result is that they can resort to strikes and other forms of unrest even for the simplest of issues. Historically speaking the labour has acquired a bad image of being termed as recalcitrant. Many analysts now dispute this proposition by pointing to the lower strikes and lockouts in the state compared to her neighbours although the interpretation of these numbers which are usually on total basis than on a density basis. Even in 2009, according to an Assocham study (Jaggi, 2010), the state continues to be the 5th top ranking state in terms of the number of mandays lost due to strikes and lockouts. However the density of industrial disputes (measured in terms of the number of strikes and lock outs per 1000 employed workers) in Kerala compared to the national average has tended to come down, although over the last three years the density has remained more or less constant (Figure 3).

5.4 Despite the fact that the militancy among the labourers have decreased over time, the bad image about their past behaviour continues to exert a negative image and a sort of psychological fear among prospective entrepreneurs. Successive state governments have sought to dispel this rather bad image about labour through massive public relations exercises. Nevertheless an aspect of labour that is still worrisome is the nature of casual labourers who are typically employed for loading and unloading operations. Despite the existence of legislations governing their employment, like the Kerala Head load Workers Act of 1978; there are several episodes of their behavior causing hardships of sorts to entrepreneurs. So the bad label on Kerala labour has stuck on and has not changed or improved with the passage of time. A still another aspect of labour is the issue of wage rates. Successive researchers have tried to show that the wage rates of organized factory workers in Kerala is not very high especially when compared to her southern neighbours like Tamil Nadu and Karnataka. Moreover as can be seen from Figure 4, wages rate and labour productivity (as measured by value added per worker), over the years, have moved in tandem with the zero-order correlation coefficient between the two working

out to almost + 0.89. This implies that increases in wage rates have been accompanied by increases in labour productivity[11].

5.5 However this hides an important dimension of labour productivity, namely that Kerala has the least labour productivity when compared with the more industrially advanced states in the country and indeed when compared with the all India average as well. See Table 6.

5.6 Moreover Kerala has also the highest absenteeism rates (Figure 5) among its labour force for almost all the years and this absenteeism is related to personal reasons like sickness etc. and not due to strikes, lockouts or suspension[12]. Perhaps this high rate of absenteeism is related to the high incidence of morbidity that Kerala suffers from[13]. Further another important criterion for entrepreneurs as far as wage costs is concerned is the share of wages in value added (Figure 6). This also is the highest for Kerala, with wage share working out to almost a quarter of value added as compared to just about 10 per cent or so for India as whole. This is in sharp contrast with the country as a whole where analysis of the most recent data (2011-12) for the organized manufacturing sector shows that that the share of profits in value added is as much as 46 per cent (Pandey and Shetty, 2014). In short we have a complex situation where while the wage rates in Kerala are lower, on both labour productivity and in the share of wages in value added Kerala does not compare herself favourably with the other states. All these refer to what is inside the factory. However, industrial ventures will also have to rely on the services of casual labourers especially for loading and unloading operations etc. The wages for these occupations are also typically high in Kerala when compared with other states.

5.7 Third, is the nature of bureaucracy in Kerala, which with its limited exposure to ways of doing business with industrialists is not used to doing things like granting various permissions on time. While the state claims to

[11] We did also compute the unit labour costs for Kerala and India during the period 1999-2000 through 2011-12. The unit labour costs for Kerala has more or less remained constant at about 3.93, while those for India has come down from 7.43 to 5.5 However, paradoxically Kerala's unit labour costs are only about 55 per cent of the all India average. This calls into question some doubts about the average wage rate for industrial occupations, as the wage rate for all other occupations including that for casual workers is significantly higher in Kerala than anywhere else.

[12] Absenteeism rates represent percentage of mandays lost due to absence to the corresponding total mandays scheduled to work. See Labour Bureau (various issues).

[13] The high incidence of morbidity in Kerala compared to India (25 per cent in Kerala compared to 10 per cent for India) has been pointed out by several researchers. See Panikkar and Soman, Kannan et al (1991) and Suryanarayana (2008)

be having introduced a single window clearance system, in actuality it appears to be a very large single window! Further, there are also very many instances of corrupt practices[14] and hence the common saying that even if you pay bribes in Kerala, the bribe is taken but the task remains unfulfilled. The bureaucracy with its limited experience is not very pro active and this also puts off potential entrepreneurs. So in short it becomes a vicious circle with limited contacts with entrepreneurs leading to limited experience which in turn leading to limited investments. One of the strategies envisaged in the recent Industrial and Commercial Policy 2011[15] is to 'create an effective 'Single Window Clearance' mechanism for speedy approval and statutory clearances to new enterprises'. But we do not have any empirical evidence that an effective clearance mechanism has been put in place. The best quantitative indicator about the effect of bureaucracy is the ease of doing business dataset compiled by the World Bank. Although this is usually at the national level, in 2009 the agency estimated at the sub national level across 17 cities in India that included Kochi from Kerala as well and in terms of starting a new business, Kochi had the 16th rank out of a possible 17. See Table 7.

5.8 The main factor that lowered Kerala's rank was the time taken to get the various permits to start a business.

5.9 The fourth factor that has a bearing on the level of entrepreneurship is a heightened sense of environmental consciousness among civil society members. The 'Plachimada issue' involving the MNC, Coca-Cola is a case in point. While in this specific case the evidence seems to have been overwhelmingly against the bottling plant in terms of its actions having a deleterious consequence on the water table, even here scientific opinion has been divided. There are many other less publicized incidents where local people have effectively managed to close down so called polluting factories[16] and more often than not these closures have been the result of violent outbursts. This environmental consciousness has also the consequence

[14] It must, however, be added that Kerala is perceived to be one of the least corrupt states in the country. However this perception has been dented by a number of high profile scandals involving civil servants and politicians that have been in the news recently.

[15] See http://www.kerala.gov.in/docs/policies/draftic_policy11.pdf (last accessed May 23, 2014)

[16] See Staff Reporter, 'Mob vandalizes clay company', The Hindu, November 17, 2008, http://www.hindu.com/2008/11/17/stories/2008111757710300.htm (last accessed May 23, 2014). More recently one more chemical company has met with the same fate. See Kerala Bureau, 'NGIL suspends operations after alleged proof of pollution found', The Hindu, October 13, 2013, http://www.thehindu.com/news/cities/Kochi/ngil-suspends-operations-after-alleged-proof-of-pollution-found/article5229492.ece (last accessed May 30, 2014)

of the local vigilante being an effective antidote to erring industrialists much more than the legal instruments instituted by the state.

5.10 Apart from these constraints the quantity and quality of physical infrastructure has also acted as an impediment. In order to improve this, the state government has an explicit policy on public-private partnership[17] and has been promoting a number of industrial parks on a public-private partnership mode. Hitherto the Kerala Industrial Infrastructure Corporation (KINFRA) has developed ten such industrial parks. But there is no secondary source information about the actual performance of these parks in jump starting entrepreneurship.

5.11 Of the various, electricity and the quality of roads stand out requiring improvement. Regarding electricity, the state has been, by and large, dependent on one source, namely hydro electric (almost 70 per cent). The state has a total installed capacity of 2657.24 MW, but the transmission and distribution loss is as much as 16 per cent. Given the rather excessive reliance on hydroelectric sources and the monsoons being erratic the state no longer enjoys a situation of having enough electricity generation to satisfy power hungry industries. The poor maintenance of the 23,000 KMs of road length under the Public Works Department (PWD) meant that much of it is not navigable for say easy movement of large container trucks and in addition the accident rate[18] with its unfortunate and near exponential increase had made the matters worse. Although successive governments have been attempting to address these two issues, the poor state of affairs on both electricity and roads continue although some remedial actions as far as quality of roads are underway. Finally one must also mention the obnoxious practice of political parties declaring a general strike or *harthal* as a way of protesting against national policies like raising prices of petrol[19]. A number of working days are lost and its suddenness affects adversely industries such as tourism, which is one of the major industries in Kerala.

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[17] This could be found here, http://kerala.gov.in/docs/policy_ppp.pdf (last accessed on June 28, 2014).

[18] According to Kerala Police, the number fatalities in road accidents increased from 2710 in 2000 to 4286 in 2012, but it has since reduced to 2526 in 2013. See http://www.keralapolice.org/newsite/pdfs/Road/2010/comparitive/death_in_road_accidents_2013.pdf (last accessed May 26, 2014). This reduction may be due to stricter enforcement of traffic rules.

[19] There are no official estimates of the number of general strikes. But according to an unofficial source, a whopping 363 harthals were called either for the entire state or in specific regions during the seven-year period 2005 through 2012. See Henderson, Tony, Pressenza, http://www.pressenza.com/2012/09/india-363-hartals-in-7-years-in-kerala/ (accessed on June 3, 2014). Given the fact that a significant number of mandays are lost due to these harthals, it is high time that the Labour Bureau starts documenting it.

VI. Future prospects- industrialization through the services route

6.1 Given this state of affairs the only industrial ventures that Kerala can have are those from the services sector, which does not require much land, labour, are compliant with the environmental standards, which the civil society imposes and for which various types of incentives are available from the state.

6.2 Three such areas are in retail trade, tourism and hotels and in Computer and Information Technology (IT) services. These are the emerging industries in Kerala and most of the new entrepreneurs too are found in these three industries. Of the three, tourism and retail trade has been around for some time excepting that a number of new ventures and entrepreneurs have emerged in this sector. Tourism among the two has received strong support from the state. The Kerala Tourism Development Corporation has been at the forefront in branding and selling tourism services not only in India but also abroad. Several new innovative products have emerged apart from the traditional ones: house boats and homestays being two such new products, which offered plenty of scope for new entrepreneurs. The arrival of package tourists from the West led to a number of tour operators emerging as well. Tourism is now one of the most dynamic sectors of the state: foreign exchange earnings from tourists have been growing at a compound annual rate of 22 per cent (Table 8), but it accounts only for about 5 per cent of the total foreign exchange earnings from tourism that India has been receiving. But for the global financial crisis induced negative growth rate in 2008-09, the growth rate would have been much higher. Nevertheless the table shows that despite a continuing marketing effort the state still has not reached its potential as far as foreign tourists are concerned. There are two ways of defining this potential. The first one is by setting targets for the relative size of foreign exchange earnings secured by the state from tourism. Given the different types of tourism products (beach, backwater, hill station) that the state possesses and given the liberalization of institutional impediments (such as the new visa on arrival policy), there is no reason why the state could not achieve at least 10 per cent of the tourist earnings, which the country as a whole receives. The second way of defining this potential is to compare the size of Kerala's tourism sector to another space that is similar to the state in terms of its physical features and size. There are two important issues here, which must first be settled, and these are the

appropriate indicator of size and the comparator space that must be selected. The size of the tourism sector can be measured either in terms of its earnings (preferably foreign exchange earnings as the quality of this data is better than total tourism earnings due to its better recording) or in terms of tourist arrivals (both domestic and foreign). The former measure of size is better as it takes into account the monetary value of tourist arrivals, although state-wise foreign exchange earnings from tourism are hard to come by and there a compromise may have to made in favour of physical tourist arrivals if and when monetary values of these arrivals are not available. Regarding the comparator space we consider two spaces: a country that may be compared with Kerala and a state. Regarding the country we have chosen Sri Lanka[20] as the country has very many physical features that are similar to that of Kerala and for the state for comparison we have chosen the neighbouring Tamil Nadu. Compared to Sri Lanka, the ratio of foreign exchange earnings from tourism in Kerala to that of Sri Lanka is unity implying that state has achieved its tourist potential, but however compared to Tamil Nadu, Kerala is much lower: ratio of Kerala's foreign tourist arrivals to that of Tamil Nadu is only 0.22 (in 2012)[21] which means that there is plenty of room for Kerala to catch up. Considering the fact that the state has spent considerable investments to shoring up its distinct brand image as 'God's own country', the policy makers must strive to improve its ranking by identifying the impediments which stand in the way of the state attracting foreign tourist arrivals.

6.3 An activity that is complementary to tourism is retail trade. In fact the sectoral category trade, hotels and restaurants is the single largest one in the Gross State Domestic Product (GSDP) of Kerala accounting for as much as 21 per cent of the total. With projects like the 'Grand Kerala Shopping Festival', which happens during December-January, has now become annual feature. Within retail trade two areas account for much of the visible growth in this area, namely, textile and gold jewelry shops. A number of new entrepreneurs have sprung up with chain stores in these two areas. In fact it may not be incorrect to say that Kerala-based entrepreneurs now occupy an important position in the gold jewelry trade in South India.

[20] The quantum of tourist arrivals to Sri Lanka is adversely affected by the long and bloody internal strife that the country has undergone. Therefore the monetary value of tourism may be much less than the actual tourism potential of the country.

[21] In terms of foreign tourist arrivals Kerala is ranked 8th in India compared to Tamil Nadu's 2nd rank. See Ministry of Tourism (2013), p. 93.

However there are constant complaints of this industry falling short on Value Added Tax (VAT) collections: VAT is the main source of revenue to the state. Textile shops of various hues have mushroomed even in smaller towns. Most of them deal with ready-made garments. The recent allowing of FDI in single brand retailing has led to the emergence of a number of shops dealing with well known foreign brands. All these kinds of shops are in the franchise mode and this has given another opportunity to Kerala-based entrepreneurs to express themselves.

6.4 Apart from all these the major emerging industry in Kerala is the ICT industry. In fact the industry has come to occupy a central place in the government's industrial promotional efforts. Six reasons or factors could be invoked for the emergence of this industry. The first one is of course the opportunities provided by the ICT industry itself, as it is one of the fastest growing industries in India. The growth of especially the outsourcing market with its 'double-digit' growth rates over a long period of time has given the industry plenty of room for new entrepreneurs to express themselves. Second, the traditional hubs of IT services production in India like Bangalore, Hyderabad, Chennai etc. have more or less reached a saturation point. Hence the industry has started migrating or expanding to second tier cities like Trivandrum and Cochin. Third, right through the early 1990s, the state had identified IT services as a potential growth area for Kerala and has invested heavily in the creation of two major clusters of IT service production, namely the Technopark at Trivandrum and little later, the Infopark at Cochin. These government created clusters are a natural response of the state to overcoming the six constraints that I discussed earlier. Everything is provided under controlled conditions that the parks are nothing but a government solution to government failures in not being able to provide the right type of environment for industries to flourish. The state has also come out with explicit policies for the development of this industry: hitherto three such policies have been enunciated in 1998, 2001 and 2007. Further a draft policy has been bought out in 2011 and a number of fiscal incentives are available, Apart from this the state has directly tried to promote entrepreneurship in IT by establishing Akshya centres, by promoting e-governance initiatives and by starting technology incubators in the Technopark, for instance. Fourth, is the increasing availability of engineers from Kerala-based engineering colleges. This coincided with

the liberalization of technical education in the state. Mani and Arun (2012) has shown that even though the number of places had increased from 3000 or so in 1991 to about 45, 000 in 2011, the outturn rates have been steadily falling. Nevertheless the system churns out about 12 000 engineers or so annually. Further even those who have failed to graduate could find employment in the lower end of the outsourcing industry such as call centres and data entry operations. This increased supply of engineers have also been another important contributing factor although questions have often been raised about the quality of these engineers which can act as a hurdle for the industry to go up the value chain towards knowledge-process outsourcing. Fifth, Kerala has one of the best communications infrastructures in the country. The overall teledensity of the state stood at 106 telephones per 100 people (as on March 31, 2012) while the national average stood at 78. The sixth and final reason is the lowering of barriers to entry in the IT industry with the faster diffusion of free and open source software. This has really given a boost to entrepreneurship in IT services as young engineers with good ideas could easily go about giving commercial expression to these ideas without worrying a great deal about even unknowingly violating any Intellectual Property Rights (IPRs). In fact the recent establishment by the state government of the International Centre for Free and Open Source Software (ICFOSS) at Trivandrum is likely to give a fillip to the emergence of a number of new ventures using free and open source software (FOSS) as promotion of entrepreneurship is one of the avowed objectives of this Centre. Finally the more recent Smart City project if and when it fructifies is also expected to jump start entrepreneurship of an unprecedented nature. But to promote the ICT industry, the state had to spend considerable sums of money for not only putting up the physical infrastructure but also offering fiscal incentives in the form of capital subsidy. This incentive induced industrialization strategy has welfare consequences. This is because to promote a foot loose industry such as the ICT one, the state has to resort to taxing her citizens and passing on the benefits to a group of industrialists in the hope that it will promote employment and through the incomes such generated will have multiplier effects. Theoretically speaking none can fault with this argument, but in actuality we have very little information on these multiplier effects even to the immediate local economy. Studies ought to be promoted on this aspect as the state government is extending this incentive induced way of promoting the IT services industry to second and third tier towns within the state.

6.5 It will also be instructive to analyse Kerala's record on IT services production. Production data is not easily forthcoming, but export data does and since exports account for very nearly 100 per cent of domestic production, it may be a good proxy. In terms of IT service exports from India, Kerala is ranked 8 out of the top 10 IT services producing states or union territories- in fact a slight improvement in its rank from 9 to 8 is noticeable. Its share in total IT exports from the country has virtually remained constant at about 1 per cent (Table 9)[22].

6.6 Despite its growing importance, the database on the IT sector in Kerala is very weak. This is all the more surprising as there are a number of institutions supporting its growth and government's ability to monitor the effectiveness of its own policy instruments is weakened. Hence there are no precise estimates of the number of entrepreneurs involved. A reasonable guess based on the number of firms in the two parks and including other firms, which are located outside the parks, one is talking about a figure of about 100 entrepreneurs. The background of these entrepreneurs is also diverse, but two broad groups exist. The first and smaller group is a bunch of experienced and older set who have had considerable years of experience either in India or abroad in the IT field. Some of the largest Kerala-based IT firms are founded by these entrepreneurs[23]. The second bunch is a group of younger engineers trained in the engineering colleges in Kerala. Numerically this category is the larger one of the two. Some of the members of the latter category have gone on to establishing very innovative IT companies which are worth watching[24]. Further a number of new initiatives by young college graduates are expected to emanate from two state sponsored initiatives: the 'Startup village 'at Cochin and the incubation unit at Technopark, Trivandrum. Returning entrepreneurs from the Silicon Valley has started a few companies and erstwhile employees of public sector enterprises such as Keltron have started still another set. IT services with its growing opportunities and relatively low effect of the constraints will be an important segment in the industrial landscape of the state.

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[22] However IT service exports from Kerala has registered a very high growth rate. Exports increased from 553.12 million dollars in 2008-09 to 925.93 million dollars in 2012-13. See Electronics and Computer Software Export Promotion Council (2014), p.13.

[23] Prominent examples of these are the founders of IT firms like IBS, SunTec and Nest Technologies.

[24] Companies like MobMe wireless, which emerged as a winner in the NASSCOM Emerge 50 Innovation 2011 or QBurst, are examples of this category.

6.7 Another related service sector industry that the state has immense potential is in terms of logistics. With the existing three international airports and the International Container Transhipment Terminal at Vallarpadom and with one more airport and the Vizhinjam International Seaport under way, the industry can have strong roots in the state.

6.8 There are three areas which are emerging as important industries in Kerala. These are Ayurveda (both manufacturing of Ayurveda drugs and distribution of Ayurveda services), real estate and running of professional colleges of various sorts but predominantly in engineering education. However all the three areas are replete with, a relatively speaking, larger proportion of fraudulent pretenders that very often their activities have brought a bad name to the rest in each of the three categories. Government's regulation of their conduct has also been very superficial and tardy and the guilty has often got away with lighter penalties.

6.9 Finally, although Kerala has also the potential to be industrial haven for at least small and medium type of enterprises, its ability to attract investments from rest of India and abroad even from non resident Keralites have been tardy. There is nothing much in the state's industrial policy to sort out the constraints that we discussed earlier. Instead the policy makers in the state has been resorting to massive public relations exercises to wipe out the 'bad image' that is stuck on to it. The emerging Kerala investors meet in September 2012 was a step in that direction. However, there are a few but growing number of success stories from Kerala where entrepreneurs have struggled against odds and have created a number of interesting companies. Case studies of these successful cases are more likely to offer an encouragement to the stimulation of entrepreneurship in the state.

VII. Conclusion

7.1 Industrial investments in Kerala's manufacturing sector have been very meager. In fact the situation is so acute since 2007 that the state has attracted virtually zero investments in the medium and large sectors since that year. Our analysis shows that four constraints are in play, which has its effect in dampening the flow of investments. These are land, labour, environmental consciousness of the civil society and the role of the bureaucracy. The industrial policy of the state has taken cognizance of one of these four constraints, namely the non-availability of land. To overcome

two practical suggestions are made. The first suggestion is to establish a land bank of sorts and the second one is to establish industrial parks. Of these two suggestions, the first one is yet to be implemented while the second one of establishing industrial parks have been implemented through the public private partnership mode. The state has to make concerted efforts to lessen the negative effects of the latter three constraints if it were to promote industrialization through the manufacturing route. Lessening the effect of these three constraints require strong political will which appears to be short in supply with both the coalitions: the ruling and the opposition as well. Given the existence of these constraints and given the fact that the political will to lessen their negative impact is found wanting, the most practical option for the state is focus on industrializing through the services sector route where the effect of these constraints are expected to be less severe. The four sectors where such investments can flourish are Computer and Information services, hotels and tourism, retail trade and logistics. In fact the state is indeed focusing on the former two. In the case of the computer software industry, considerable improvement in the provision of physical infrastructure by adopting a hub and spoke model of investments to the sector has shown some considerable increases in the production of software services both in the absolute and relative senses. Tourism and hotel is yet to reach its potential limit and in retail trade political compulsions have outweighed economic ones. Promotion of organised retail trade can in fact precipitate some local manufacturing in the MSME sector. Logistics is another emerging area where the state has immense potential especially with developments in shipping that is envisaged. In case of both software and tourism, the state ought to have specific targets for its relative growth. For instance, it must strive to double its relative size (to the country as a whole) every five years. Retail trade and logistics must find a place on the policy maker's table. Finally, the database on all service sector industries in general and the above four in particular must be developed so that better planning for their systematic growth becomes possible.

7.2 Given the level of investments that can be expected in the near future, the state's youth will have to continue migrating to other parts of the country and indeed abroad for gainful employment. For the state to industrialize through the manufacturing route will remain a distant dream, but through the services route are well within the reach of the state.

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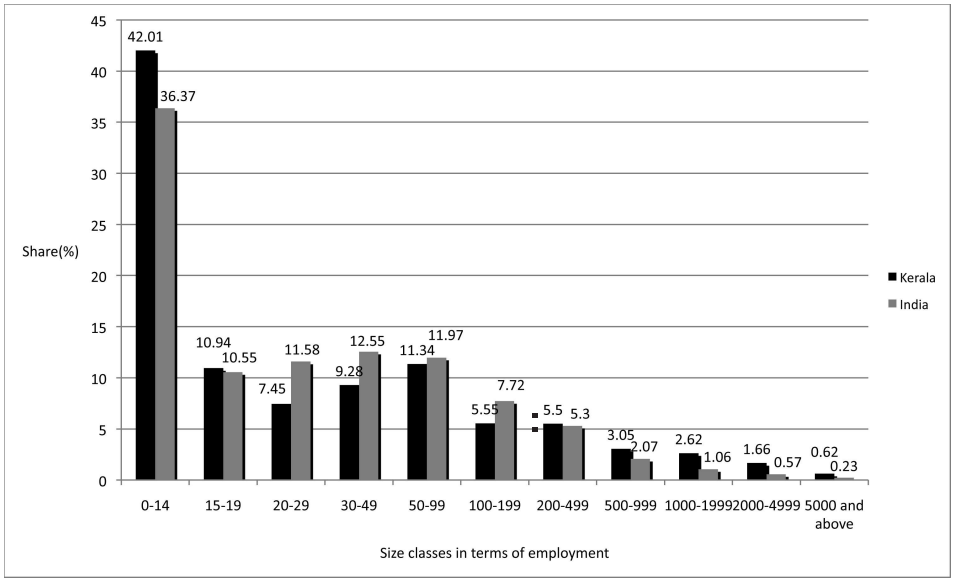
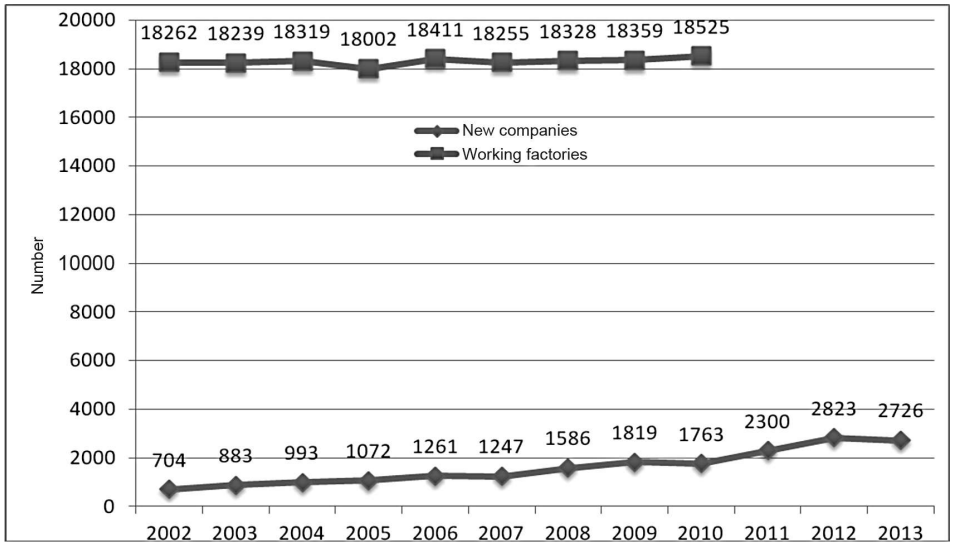
Figure 1: Distribution of factories in Kerala and in India according to size of employment, 2011-12



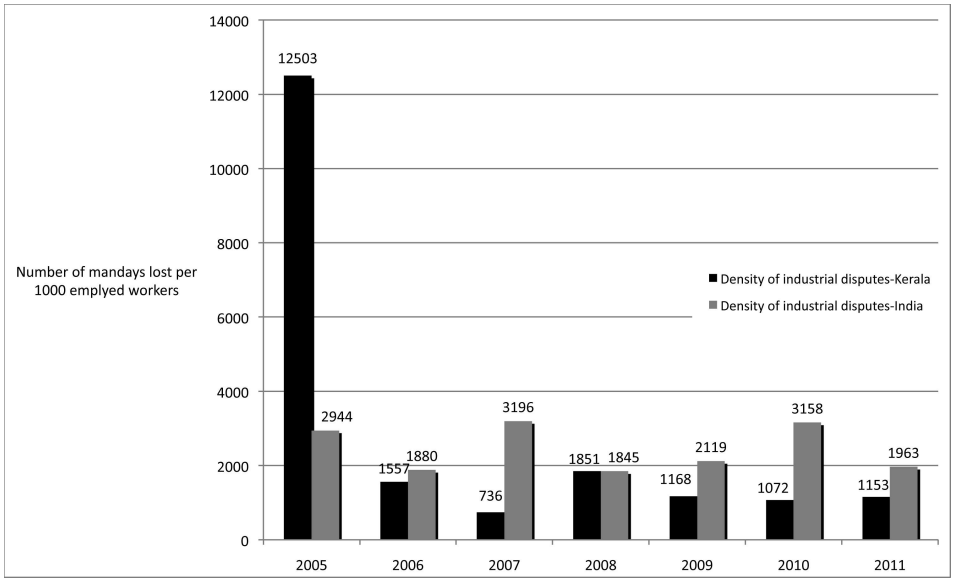
Source: Central Statistical Organization (various issues)

Figure 2: Number of working factories and new companies formed in Kerala, 2002-2013



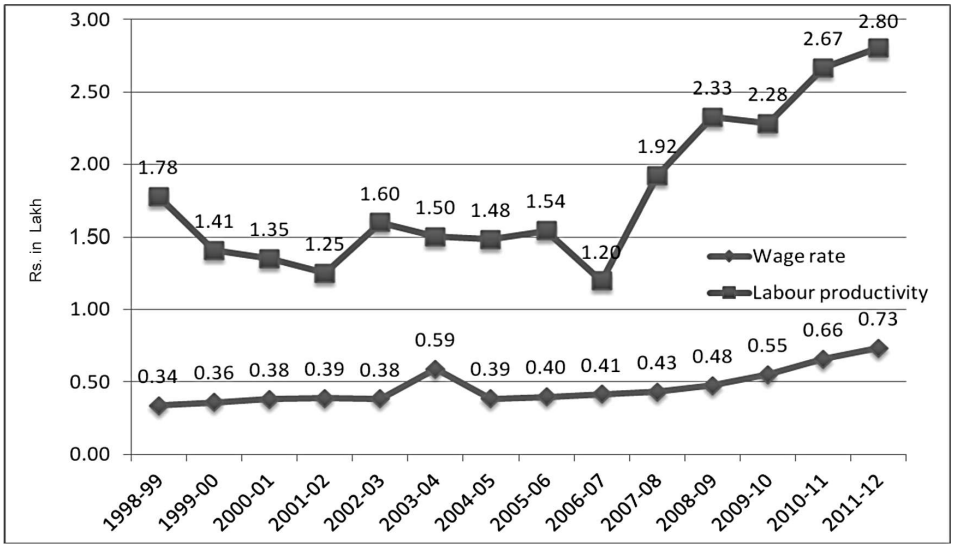
Source: State Planning Board (various issues)

Figure 3: Density of industrial disputes in Kerala compared to all India



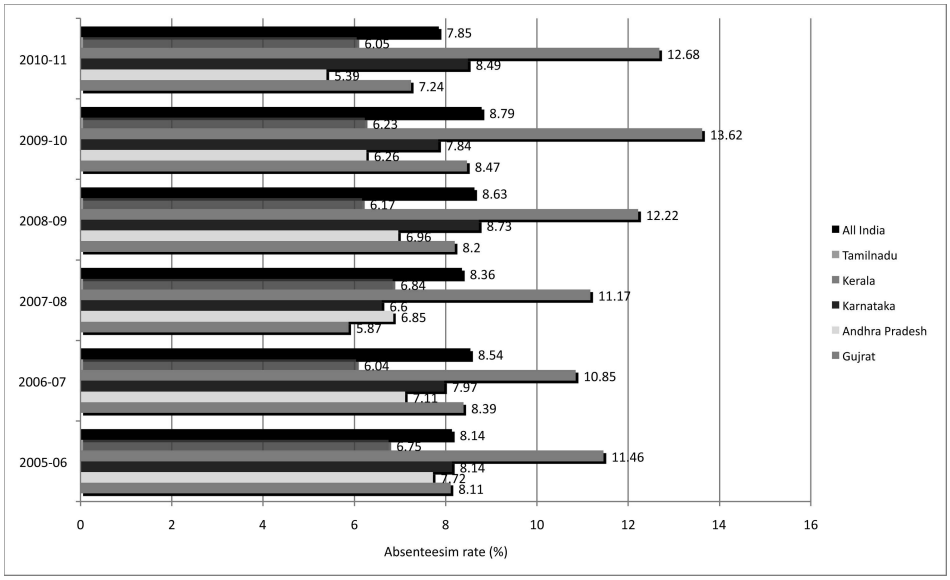
Source: Labour Bureau (2012) and Labour Bureau (2014)

Figure 4: Trends in average wage rate and labour productivity in Kerala's organized manufacturing sector



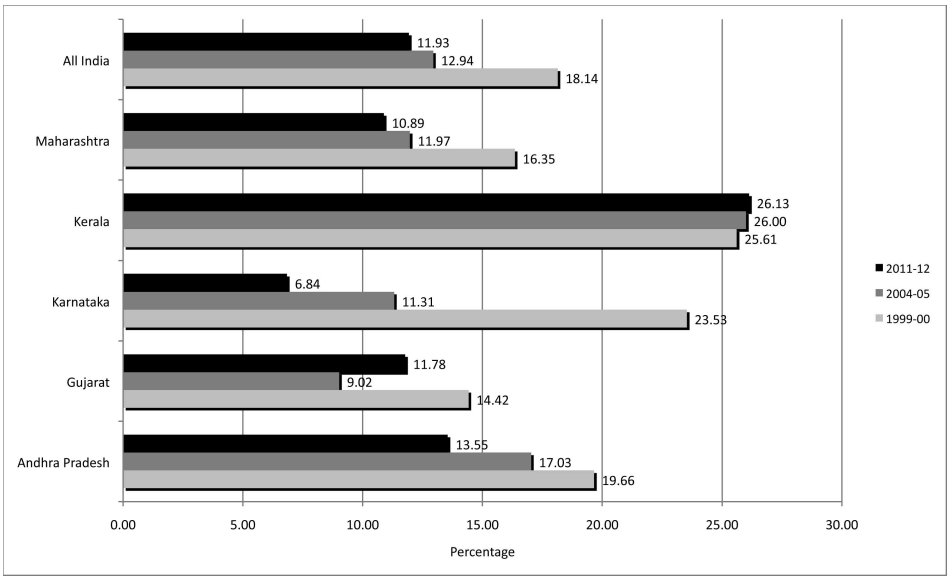
Source: Computed from Central Statistical Organization (various issues

Figure 5: Absenteeism rate in Kerala's manufacturing sector



Source: Labour Bureau (various issues)

Figure 6: Share of wages in value added : Kerala compared with other states



Source: Computed from Central Statistical Organization (various issues)

Table 1: Relative size of Kerala's manufacturing sector, 1991-92 and 2011-12 (Kerala's share in India)

	1991-92 (%)	2011-12 (%)
Number of factories	3.3	3.2
Number of workers	3.67	3.2
Fixed Capital	2.05	0.8
Value of Output	2.70	1.93
Value Added- Total manufacturing	2.08	1.68
(a) Registered manufacturing	3.02	1.1
(b) Unregistered manufacturing	1.14	3.01

Source: Central Statistical Organization (various issues)

Table 2: Organized manufacturing sector: Structure (Share in percent of Gross Value Added)

	1998-99	2011-12
Food products	19.62	18.91
Chemicals	27.01	16.18
Rubber and Plastics	6.79	13.73
Non-metallic minerals	-	6.33
Printing and publishing	-	4.70
Textiles	6.08	4.65
Coke and refined products	9.09	-
Radio, Television and Communication	5.62	-
Basic metals	4.23	
Others	21.57	35.49
Total	100	100

Source: Central Statistical Organization (various issues)

Table 4: Large enterprise sector projects implemented[1] across states, 1992-2013 (Investment figures in Rs Crores at current prices)

	1992-2006	2007	2008	2009	2010	2011	2012	2013
Kerala	1017	0	0	2	0	0	0	0
Gujarat	70588	7474	1334	2195	4565	2148	49616	15478
Maharashtra	29106	1421	2448	3499	1291	4671	7509	30266
Tamil Nadu	9638	1561	1365	1267	1374	235	524	2292
Karnataka	9009	126	750	524	1771	890	1672	4912
Andhra Pradesh	14553	1184	2148	1899	2185	2439	8411	8386
All India	**241756**	**19390**	**12465**	**14691**	**29735**	**12870**	**82156**	**78497**

Note: This is based on the number of Industrial Entrepreneur Memorandums (IEMs) actually implemented.

Source: Computed from Department of Industrial Policy and Performance (2014b)

Table 5: Investment proposals at Kerala's MSME Sector in comparison with All India and Tamil Nadu (in lakh numbers)

	Kerala	Tamil Nadu	India	Share of Kerala in India (%)
2007-08	0.11	0.27	1.73	6.40
2008-09	0.16	0.32	1.93	8.24
2009-10	0.12	0.42	2.14	5.61
2010-11	0.10	0.58	2.38	4.28
2011-12	0.10	0.70	2.83	3.54
2012-13	0.13	0.91	3.22	4.06
Average	**0.12**	**0.53**	**2.37**	**5.36**

Source: Development commissioner MSME (2014)

Table 6: Labour productivity in Kerala compared to other states (value added per worker in Rs Lakhs at current prices)

	1999-00	2004-05	2010-11
Andhra Pradesh	2.26 (0.62)	2.03 (0.73)	5.55 (0.48)
Gujarat	3.14 (0.45)	5.93 (0.25)	9.02 (0.30)
Karnataka	1.18 (1.19)	4.76 (0.31)	6.71 (0.40)
Kerala	1.41 (1.00)	1.48 (1.00)	2.67 (1.00)
Maharashtra	4.05 (0.35)	6.3 (0.23)	12.44 (0.21)
Tamil Nadu	1.67 (0.84)	2.06 (0.72)	4.52 (0.59)
All India	2.47 (0.57)	3.94 (0.38)	7.12 (0.38)

Note: Figures in parentheses indicate ratio of Kerala to other states and all India
Source: Computed from Central Statistical Organization (various issues)

Table 7: Ease of doing business across 17 cities in India, 2009 (Ranks out of 17)

Economy	Ease of doing Business Rank	Starting a Business	Dealing with construction permits	Registering property	Payin g taxes	Trading across Boarders	Enforcing contracts	Resolving Insolvency
Ludhiana	1	7	7	11	1	12	4	2
Hyderabad	2	4	4	9	13	13	1	1
Bhubaneswar	3	5	8	17	9	1	5	5
Gurgaon	4	9	2	1	7	17	14	6
Ahmedabad	5	14	4	2	11	3	16	4
New Delhi	6	1	4	7	7	14	12	6
Jaipur	7	3	13	3	2	14	7	14
Guwahati	8	13	12	14	6	7	2	12
Ranchi	9	15	9	6	4	8	11	13
Mumbai	10	12	17	5	4	3	17	3
Indore	11	8	13	10	10	11	10	9
Noida	12	6	9	12	2	16	7	16
Bengaluru	13	17	1	4	12	9	15	8
Patna	14	2	9	15	15	10	2	15
Chennai	15	10	3	16	17	2	7	10
Kochi	16	16	15	7	14	5	6	10
Kolkata	17	10	16	13	16	6	13	17

Source: World Bank (2009)

Table 8: Foreign exchange earnings from tourism in Kerala and in India (Rs in crores in current prices)

Year	Kerala	India	Share of Kerala (%)
2001	535	15083	3.55
2002	705.67	15064	4.68
2003	983.37	20729	4.74
2004	1266.77	27944	4.53
2005	1522.31	33123	4.60
2006	1988.4	39025	5.10
2007	2640.94	44360	5.95
2008	3066.52	51294	5.98
2009	2853.16	53700	5.31
2010	3797.37	64889	5.85
2011	4221.99	77591	5.44
2012	4571.69	94487	4.84
2013	5560.77	NA	NA

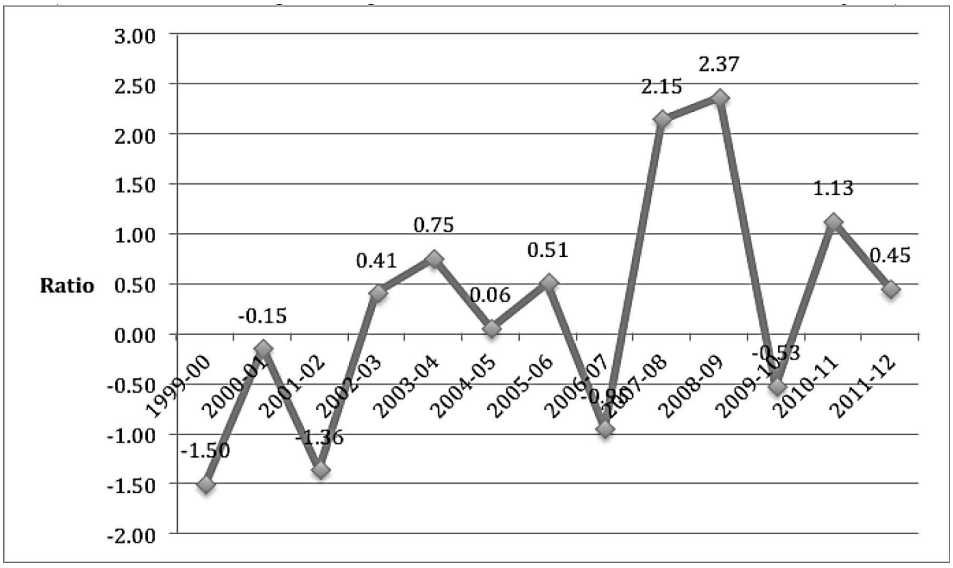
Source: Kerala Tourism (2014); Ministry of Tourism (2013)

Table 9: Distribution of IT exports from India across states (percentage shares) (Top 10 IT services exporting states)

	2008-09	2012-13
Karnataka	32.11	35.06
Maharashtra	20.41	19.48
Tamil Nadu	14.40	14.57
Andhra Pradesh	14.18	13.58
Haryana	6.36	6.91
Uttar Pradesh	4.96	5.73
West Bengal	2.41	2.77
Kerala	0.97	1.24
Delhi	2.24	1.04
Gujarat	0.57	0.62

Source: Electronics and Computer Software Export Promotion Council (2014)

Annexure 1: Relative growth performance of Kerala's manufacturing sector (based on ratio of growth of gross value added in Kerala to that of India at current prices)



Source: Central Statistical Organization (various issues)

Annexure 2: Growth performance and relative share of Gross Fixed Capital Formation in Kerala

Year	Rate of Growth (%)	Share (%)
1998-99	NA	1.850
1999-00	-28.90	2.036
2000-01	-49.83	1.411
2001-02	31.34	1.373
2002-03	-48.87	1.364
2003-04	-14.55	0.982
2004-05	43.03	1.318
2005-06	-0.91	0.780
2006-07	38.32	1.104
2007-08	-6.32	0.843
2008-09	40.61	1.117
2009-10	11.47	1.062
2010-11	-30.37	0.771
2011-12	2.14	0.650

Source: Central Statistical Organization (Various Issues)

Annexure 3: Proposed investments in Kerala and across selected states
(Based on IEMs filed, LOIs/DILs issued; Values are in Rs crores at current prices)

States	2008			2009			2010			2011			2012			2013		
	Pro	Sh	Avg	Pro	Sh	Avg	Pro	Sh	Avg	Pro	Sh	Avg	Pro	Sh	Avg	Pro	Sh	Avg
A.P	1,32,289	8.68	326.64	1,04,998	10.09	329.15	1,76,245	10.15	339.59	1,03,966	6.75	265.22	70,376	12.39	229.24	25,520	4.81	96.67
Gujarat	1,25,376	8.23	345.39	1,42,239	13.67	378.30	1,49,718	8.62	301.24	1,42,680	9.27	262.28	1,26,201	22.22	267.38	94,259	17.78	266.27
Karnat	1,42,284	9.34	677.54	92,054	8.85	514.27	1,40,289	8.08	521.52	94,147	6.11	433.86	47,967	8.45	283.83	10,050	1.90	91.36
Kerala	**269**	**0.02**	**16.81**	**171**	**0.02**	**21.38**	**99**	**0.01**	**12.38**	**3,984**	**0.26**	**332.00**	**124**	**0.02**	**20.67**	**14,624**	**2.69**	**3,566**
Mahar	92,287	6.06	128.71	68,073	6.54	114.60	1,76,259	10.15	232.23	1,33,730	8.69	137.16	70,181	12.36	131.67	53,402	10.07	118.15
Tamil	24,506	1.61	79.05	67,224	6.46	284.85	38,595	2.22	162.85	73,348	4.76	284.29	21,253	3.74	107.88	27,380	5.17	162.98
All India	**15,23,852**	**100**	**373.04**	**10,40,259**	**100**	**299.36**	**17,36,322**	**100**	**400.44**	**15,39,728**	**100**	**394.80**	**5,67,868**	**100**	**200.80**	**5,30,086**	**100**	**222.07**

Sh= Share in %age values, Avg= Average values
Source: Department of Industrial Policy and Performance (2014a)

Energy Consumption in the Manufacturing Sector in Odisha: Complexities for Sustainability Transition Due to Size Mix within the Sector

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Abstract

The transition of the economy of Odisha to a higher growth path since 2005-06 has been led by high growth in the industrial sector. Simultaneously, Odisha's substantial mineral resource endowments has led to the growth of metallurgical and non-metallic mineral based and other energy intensive manufacturing industries in the state. The present paper reveals that the penetration of energy efficient technologies and processes in this sector has been inadequate to offset the rising demand for energy due to growth in activity. Dominance by MSME firms is one of the barriers towards successful implementation of enhanced energy efficiency measures. Considering diffusion of energy efficient technologies in the MSME niche as experiment, this paper identifies a set of critical factors that are deterring the gradual up scaling and social embedding of the experiment using the contemporary strategic niche management framework.

1. Introduction

1.1 Transitions are systemic changes (major transformations) in the socio-technical dimensions that challenge, and, ultimately dislodge the incumbent regime and lead the economy and the society to another regime (Berkhout, et al, 2009; Elzen, *et al*, 2004). Transitions can happen in spaces concerning mobility, energy, production systems, etc. When the transition is marked by a considerable degree of sustainability gains, the process is called a sustainability transition (Berkhout, *et al*, 2009). Theories on transitions claim that for transitions to be effective, along with the evolution of technology solutions, the emergence of changes in the social, institutional, economic, behavioural and cultural rules is a necessary condition.

1.2 In recent years, the economy of the state of Odisha has been witnessing rapid growth. The state has long been characterized by persistent economic stagnancy, unacceptably high rates of poverty, massive fiscal deficits combined with significant dependence on

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central resources and absence of entitlement to forest resources among the tribal communities (Shah, *et al*, 2009). However, through the Industrial Policy Resolutions (2001 & 2007) and Orissa Industries Facilitation Act 2004, the Government of Odisha (GoO) aims to create an investment friendly scenario, attracting "*national and trans-border investors, especially in steel, aluminium, petrochemicals, power, IT & ITES, food processing industries and other sectors*" (Sahoo and Patra 2011). The observed economic growth in Odisha has been triggered mostly by flowing high degree of activity (investments, production) in sectors like mining, metallic and non-metallic industries, etc. Shah (2011) calls this phenomenon an "*economic dynamism*" which, according to the GoO (2010), is also manifested in a number of recent developments - "*increasing urbanization and associated buoyancy in the real estate markets, proliferation of specialized private institutions of higher education, and the emerging culture of consumerism penetrating through large and expanding service sector in the state's economy*. In the face of these developments, Shah (2011) raises a critical question - given the change in the tone of development in Odisha, "*whether the high rate of growth is environmentally sustainable, socially equitable, and, thus, politically tenable… It is here where a large body of academics, activists, and civil-society organisations are voicing their questions, resentment, and protests*."

1.3 In this article, we look at the factors determining the energy consumption of the manufacturing sector in Odisha through a decomposition analysis. We, then, critically examine the impact of energy efficiency in the overall energy consumption by this sector. We, then, deliberate on the possible reasons for a relatively slow penetration and upscaling of the energy efficient technologies in the state's manufacturing sector. Finally, following the literature on transitions, we deploy the strategic niche management framework to explore some of the possible policy responses for upscaling energy efficient technologies and practices so that the manufacturing sector in Odisha can realize a sustainability transition with respect to energy consumption.

2. Industrial Growth in Odisha: A Brief Overview

2.1 During the period 1990-91 to 2012-13, the state of Odisha, on an average, contributed to about 2.6% of the net national domestic product [2] (NDP) per annum (p.a.) (RBI 2013, 2011). The compound annual growth rate (CAGR) of approximately 5.47% p.a. for the net state domestic product (NSDP) of Odisha, calculated over 1990-91 to 2012-13, is comparable to the corresponding national figure of 6.45% p.a. In this context it can be mentioned that contribution of NSDP of Bihar and West Bengal, the neighbouring states of Odisha, to NDP remained 2.7% and 7% p.a. respectively during the same period (RBI 2013). The CAGRs of NSDP of these two states were 5.4% and 6.1% p.a. respectively. The state of the economy in Odisha, as reflected by the NSDP trend, however, has significantly improved since the turn of the 21st century. Traditional growth theories argue that industrial expansion is integral to the growth process of any economy (Rostow, 1960; Kuznets, 1966). The GoO, has initiated policies and strategies to achieve a high rate of industrial growth (Industrial Policy Resolutions (2001 & 2007). The results are evident in the increasing trend of the industrial output since the middle of the last decade, with an average annual growth rate of 10.20% p.a. during 2004-05 to 2010-11 (RBI 2011). However, the share of the industrial sector in the state NSDP has remained fairly constant (RBI 2011).

2.2 Odisha has a rich endowment of natural resources. Simultaneously, the state is rich in water and forest resources. This abundant supply of resources has helped the state to achieve an industrial base that has gained momentum in recent years. Industries have proliferated in places where there are adequate supplies of key ingredients and infrastructure. Consequently, given the resource base of the state, twelve industrially active zones have developed across the state, viz. Rourkella-Rajgangpur, Ib valley and Jharsuguda area, Hirakud, Talcher-Angul, Choudwar, Balasore, Chandikhol, Duburi, Paradeep, Khurda-Tapang, Joda-Barbil and Rayagada. The advantage gained through a rich mineral resource base has encouraged investment in energy intensive industries like iron and steel, thermal power, cement, ferro-alloys, paper and pulp, and fertilizers (Government of India 2007). Therefore, a large part of the industrial growth in Odisha has

[2] For the purpose of calculation, the Net Domestic Product at Factor Cost (at constant prices, 2004 - 05) and the Net State Domestic Product at Factor Cost (at constant prices, 2004 - 05) have been considered.

been contributed by the growth of manufacturing industries (Figure 2), especially those that are energy intensive. Given the focus of this article on energy consumption and sustainability transition, we therefore concentrate on the manufacturing industries in Odisha[3].

2.3 The growth in an economy, when fueled by the growth in the manufacturing sector, usually puts additional pressure on the demand for natural resources and contributes to climate change (Rock and Angel 2005). The standard argument also suggests that growth occurs in stages leading to an increase in the resource and pollution intensity of an economy (Rostow, 1960; Kuznets, 1966; Berkhout, *et al*, 2009). Similar pattern applies for Odisha as well. The state is home to 12 of the 17 categories of industries identified as "highly polluting" by the Central Pollution Control Board. About 65% of all industrial units in the state fall under the critically polluting red category identified by the Ministry of Environment and Forest, Government of India. In terms of CO_2 emissions, during 1980 - 2000, Orissa ranked ninth among all the states in the country with an average annual emission of 8539.78 Kilo Ton of CO_2 with a CAGR of 6.74%[4] p.a. (Ghoshal and Bhattacharya 2008). With the increased pace of industrialization in the state, the level of emission is expected to increase. Ghoshal & Bhattacharya (2008) also predicts that the average annual growth rate of CO_2 emission in the state is 8.76% p.a. The rapid industrialization and other growth led development processes has led to a growing research interest in the area of sustainable transitions - where the growth is engineered through an alternative development pathway marked with efficiency in resource use and low emission (Berkhout, *et al*, 2010). This can also be positioned within the concept of green growth. Therefore, whether an expanding industrial economy such as Odisha shows signs of sustainable development is largely dependent on the pattern of energy and resource use, resultant impacts on the local and global pollution etc. Equally important is the issue of societal benefits that the process delivers. Amidst this industrialization process, it is therefore, a crucial challenge as well as an opportunity for the state of Odisha to explore an alternative pathway of transition through "sustainable industrial development." The challenges and opportunities lie in designing innovative new-era policies and strategies that integrates the current concerns of energy use and related climate change, local pollution and other social issues. In this way Odisha can become

[4] The CAGR is calculated on the basis of the data for the period 1990 - 2000.

a responsible actor in the sustainable industrial development - a principle that is sweeping across the world.

3. Energy Consumption in Odisha: Some Issues

3.1 Since 2000-01, the power consumption in Odisha has increased at an average annual rate of 8.25% p.a [5]. (GoO 2011). Correspondingly, the power consumption by the industries has also witnessed a high growth rate of about 11% p.a. The industrial share in the total power consumption is about 48% and is rapidly increasing (GoO 2010). Moreover, the Odisha Climate Change Action Plan states that with abundant coal reserve in the state more emphasis will be given to coal based thermal power generation in the coming years. As a result, the present mix of more hydel power will change significantly to more coal based thermal power generation. In fact, the share of thermal power generation has gone up to 61% in 2013 as compared to 44% in 2011 while the share of hydel power generation has come down from 56% to 39% during the same period (Government of India 2014, 2013). Given the possible shift from renewable to fossil fuel in energy generation, the state emphasizes on enhanced energy efficiency to reduce the adverse climatic impact of increased energy consumption. The state policies also accord special importance to clean coal which can be achieved through a switch over from '*sub-critical to super-critical technology*' [6] (GoO 2010). Given this scenario, enhancing energy efficiency is also integral to enhancing the competitiveness of industries. Enhanced energy efficiency can be an important area for intervention in the case of Odisha since an energy intensity (measured as energy consumption per unit of output produced) study of a few industries across 18 states in the country reveals that the overall energy productivity of Odisha is lower than the all India average (Goldar 2010).

4. Decomposition Analysis of the Energy Consumption in the Manufacturing Sector of Odisha

4.0 As discussed earlier, energy efficiency is being emphasized in the policy documents to ensure a climate responsible industrialization process in Odisha. Decomposition of energy demand of the manufacturing sector gives important insights regarding the drivers of energy consumption and

[5] The data has been considered for the period 2000 - 01 to 2009 - 10.

[6] For GHG abatement potential of different types of thermal power plants please refer to Beér, 2007.

the role of energy efficiency. Achieving enhanced energy efficiency in itself is a sustainability goal. But whether it will simultaneously reduce total energy demand to achieve the climate goal in terms of absolute reduction of emission depends on other drivers as well. For the aggregate economy, IPAT and Kaya identity based decompositions (Kaya, 1990; Kaya & Yokobori, 1993) identify population, per capita GDP, energy intensity of GDP and emission intensity of energy use to be the main drivers of emission (Blanco, *et al*., 2014). Similarly, in the context of energy use by industries, activity level that refers to the production of primary product (takes into account both population and per capita production), energy intensity of activity and the structure of the industrial sector can be considered to be three important drivers. The methodology adopted here and the data used are described in section 4.1.

4.1 Methodology and Data

4.1.1 In this article we used Index Decomposition Analysis (IDA) (Ang & Zhang, 2000; Ang & Xu, 2013) to assess systematically the immediate sources of change in energy demand in the manufacturing industries in Odisha. As mentioned, this change is attributed to three sources: activity (growth in production), structure (relative contribution of energy intensive sectors in total industrial production vis-à-vis the contribution of energy non-intensive sectors) and energy intensity (ratio of energy demand to output). Given IDA, total energy consumption at period 't' can be expressed as :

$$E_t = \sum_i E_{i,t} = \sum_i Y_t \frac{Y_{i,t}}{Y_t} \frac{E_{i,t}}{Y_{i,t}} = \sum_i Y_t S_{i,t} I_{i,t} \qquad \text{.....Eq.1}$$

Where,

Et = total energy consumption by the manufacturing industries

Ei,t = energy consumption in industry i

Yt= total production by the manufacturing industries

Yi,t = production of industry i

S i,t = Yi, t/Yt= production share of industry i

It=Et/ Yt= energy intensity of the aggregate manufacturing industries

Ii.t = Ei,t/ Yi,t= energy intensity for industry i

The subscript 't' denotes the time period

In this study the subscript 'i' denotes energy intensive and energy non-intensive manufacturing industry groups.

Taking into consideration these three sources, the change in energy demand can be theoretically decomposed in the following manner:

Where,

$$E_T - E_0 = \Delta E_{TOT} = \Delta E_{OE} + \Delta E_{SE} + \Delta E_{IE} \quad \text{.....Eq.2}$$

ΔE_{TOT} = Magnitude of change in energy demand

ΔE_{OE} = Activity Effect, i.e. change in energy use due to the change the level of production/activity

ΔE_{SE} = Structural Effect, i.e. change in energy use due to change in relative contribution of energy intensive industries in total manufacturing.

ΔE_{IE} = Intensity Effect, i.e. change in energy use due to change in energy intensity of the production process

4.1.2 The decomposition methodology has evolved over the past decades to determine the expressions for different components of change in energy demand $(\Delta E_{OE}, \Delta E_{SE}, \Delta E_{IE})$. The method used in the late 1970's and early 1980's were mainly based on Laspeyres Index [7]. Later, the method evolved to the use of the Divisia Index[8]. The present study uses the Log-Mean Divisia Index (LMDI) (Ang & Choi, 1997) that gives perfect decomposition (results do not contain any residual term) [9], satisfies the factor reversal test and is consistent in aggregation.

In LMDI, the change in energy consumption is identified as:

$$\Delta E_{OE} = \sum_i w_i ln\left(\frac{Y_T}{Y_0}\right) \quad \text{.....Eq.3}$$

$$\Delta E_{SE} = \sum_i w_i ln\left(\frac{S_{iT}}{S_{i0}}\right) \quad \text{.....Eq.4}$$

$$\Delta E_{IE} = \sum_i w_i ln\left(\frac{I_{iT}}{I_{i0}}\right) \quad \text{.....Eq.5}$$

Where $w_i = \frac{E_{i,T} - E_{i,0}}{\ln E_{i,T} - \ln E_{i,0}}$

[7] See Jenne & Cattell (1983), Marlay (1994), Reitler, et al. (1987), Howarth, et al. (1991), Park (1992), Sun (1998), Ang, et al. (2002) [mentioned in (Ang, 2004)]

[8] A weighted sum of logarithmic growth rates, where the weights are the components' shares in total value, given in the form of a line integral. This is a theoretical construct to create index number for continuous data and is a close analogue in discrete time Tornqvist Index and Fisher Ideal Index (Ang, 2004).

[9] For proof of perfect decomposition see (Ang, 2012)

4.1.3 The present study decomposes the energy demand by the manufacturing sector in Odisha during 1998-99 to 2009-10. We have considered all 2 digit manufacturing industries (Section B) following the National Industrial Classification 2008. To be consistent with the coverage of industries over the study period, the concordance tables published by ASI are used. The industry codes considered are 10 -13, 16- 31. On the basis of relevant literature (Dasgupta 2005; Roy et. al., 1999; Mongia and Sathaye, 1998), Textile (13), Paper and Paper products (17), Chemicals and Chemical products (20), Non Metallic Minerals Products (23) and Basic Metal and Alloys (24) are considered to be the energy intensive industries. For the construction of the variables 'energy use (E)' and 'output (Y)', time series data on the monetary value of 'Fuel consumed[10] ' and 'Total Output [11] ' at current prices respectively are obtained from various volumes of Annual Survey of Industries, Summary Results for Factory Sector published by CSO (ASI, various volumes). Volumes of Index Number of Wholesale Prices (WPI) in India: 'A Time Series Presentation, as published by the Office of Economic Advisor, Ministry of Finance, Government of India' for various years are used to deflate the data. The price deflator used for Y is the WPI of manufactured products while the deflator used for E is the WPI of fuel, power, light and lubricant, coal, mineral oil, electricity. The relevant data is presented in Table 1.

4.2 The Trend of Energy Demand and the Role of Energy Intensity

4.2.1 The decomposition of energy demand by the manufacturing industries in Orissa shows that there has been a significant change in energy use since 2005-06. In Figure 3 the solid line represents the change in energy demand by the manufacturing industries in the state. Prior to 2005-06, the position of this line below the horizontal axis clearly implies that during 1998-99 to 2004-05 there was a decline in energy demand in the manufacturing

[10] In the ASI database, 'Fuel consumed' represents total purchase value of all items of fuels, lubricants, electricity, water etc. consumed by the factory during the accounting year including gasoline and other fuels for vehicles except those that directly enter into products as materials consumed. It excludes quantities acquired and consumed from allied concerns, their book value being taken as their purchase value and also the quantities consumed in production of machinery or other capital items for factory's use.

[11] Total output at constant price in the ASI database includes the ex-factory value of products and by-products manufactured during the accounting year and the receipt for industrial and non-industrial services rendered to others, value of semi-finished goods of last year sold in current year, value of electricity sold, and sale value of goods sold in the same conditions as purchased.

industries in Odisha. This was due to slow production growth in the sector (the arrowed line) and a relative shift of the production process towards energy non-intensive industries (the dashed line). However, it can be observed that there was a steady decline in energy intensity of the manufacturing process in Odisha since 2001-02 (the dotted line).

4.2.2 It is also interesting to observe that energy demand has been increasing in the manufacturing sector since 2005-06 and the solid line goes above the horizontal axis and increases steadily. This is not only due to the fact that the activity of the manufacturing sector has increased since then, but also the structural change shows relative increase in the share of energy intensive industries in the manufacturing process during the same period. The rising energy demand driven by higher activity level and growing emphasis on the energy intensive manufacturing industries, however, has been partly neutralized by falling energy intensity of the sector. Therefore, growth in energy demand in the manufacturing sector would have been much higher had there been no change in energy intensity. However, the increasing trend of energy demand shows that although energy intensity is playing a crucial role to neutralize a part of energy demand, it cannot guarantee the absolute decoupling of manufacturing growth from energy use and emission. This suggests that historical trend of energy efficiency cannot be considered to be sufficient to ensure energy and climate related sustainability transition of the manufacturing sector in the state. Along with this increasing trend in energy use, the fact that the carbon intensive fossil fuel coal will come up with a larger share in the energy generation in the state also implies that higher energy consumption will lead to higher emission in future while simultaneously hindering to the green growth of the economy. So to address sustainability, it may be necessary that Odisha goes for a much stronger energy efficient and low carbon technological progress. The historical trend of energy efficiency is far from being sufficient.

5. Dominance of MSME Firms - A Possible Barrier to Increasing Energy Efficiency in the Manufacturing Sector in Odisha

5.1 The decomposition analysis reveals that efficiency gains can offset only a part of the increasing energy demand in the manufacturing sector in Odisha. For achieving overall sustainability with respect to energy use (and associated emission), a faster penetration (and adoption) of energy

efficient technologies and measures is required. This leads us to an important question: what could be the barriers to penetration of such technology and practices? A possible answer is in the size-mix of the manufacturing sector.

5.2 The distribution of the units in the manufacturing sector in Odisha shows that the sector is dominated by Micro Small and Medium Enterprises (MSME)[12]. Approximately, 94% of the industrial units in the manufacturing sector of Odisha fall in the category of MSME firms (Government of India 2007), (OSPCB, 2014)[13].The concentration of the MSMEs is mostly in industries like mineral processing and crushers, food processing, refractories, bricks and tiles - most of which are part of the energy intensive industries in our analysis.

5.3 Past studies have revealed that for Indian MSME's, there are a set of important drivers that determine the diffusion of energy efficient technologies. Important among these are: (a) economic incentives, particularly reduction in costs, increase in profitability and/or expansion of markets, thereby gaining competitive advantage over the rivals; (b) internal impetus of the entrepreneurs and management - to do something new[14] and also to position the firm as an environmentally responsible economic entity; and, (c) regulatory norms (Tilley, 1999; Ghosh & Roy, 2011[15]). However, Williamson, et al (2006) suggests that because of pressures related to survival and supply chain, the MSME firms may not adopt environmentally responsible functions as a voluntary choice. Certain important drivers and barriers, in this context, are presented in Table 2.

5.4 Here an important question is: does the adoption of energy efficient technologies make adequate economic sense for the MSME firms? A study carried out by Ghosh and Roy (2011) finds that the payback period for most

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[12] The definition of Micro Small and Medium Enterprises in the manufacturing sector, according to the MSME Development Act, 2006, depends on the investment in plant and machinery (P&M). The limits of the investment are as follows: (a) Micro Enterprises: Investment in P&M ? Rs. 2.50 Million; (b) Small Enterprises: Rs. 2.5 Million < Investment ? Rs. 50.00 Million; (c) Rs. 50.00 Million < Investment in P&M ? Rs. 100.00 Million.

[13] In Odisha, the total number of industrial units surveyed by ASI in 2011-12 is 2678. According to OSPCB, there are 2755 manufacturing units. Out of this about 168 are large and 2587 units are medium to small.

[14] The internal impetus constitutes constant search for new technologies and an internal urge to re-engineer processes. This trait is mostly observed in case of MSME firms owned/managed by entrepreneurs with a high degree of professional outlook (Ghosh and Roy, 2011).

[15] This is a field study conducted among MSME firms in the eastern India. Many firms from Odisha feature in this study.

investments by the MSME firms in the energy efficient technologies vary in the range of 6 months to 3 years. The variability in the payback period depends on the type of technology or practices adopted and the scale of operation. In this regard, Ghosh and Roy (2011) observes: "*an optimal technology choice - involving initial cost, lifetime of the technology and periodic returns - is critical for firms to profit from such investments. It is therefore important to provide SMEs with a support system that helps them make an optimal choice with respect to technology for improving energy efficiency. Without such a support system in place, the probability of SMEs that generally lack expertise and knowledge, to arrive at the crucial decision to adopt energy efficient technology reduces*." It has also been found that the perception of the MSME units is that the initial capital requirement for energy efficiency projects is very high (Ghosh & Roy, 2011). When the capital base is low and the access to capital market is constrained, the perception can act as a major deterrent to the adoption of energy efficient technologies. Therefore, the presence of firms of different size classes in the manufacturing sector in Odisha, and the dominance of MSMEs in the sector, poses a challenge in upscaling energy efficient technologies and processes.

6. Policy Responses for Enhancing Energy Efficiency in the Manufacturing Sector: An SNM Approach

6.1 The size mix of units in the manufacturing sector in Odisha is found to be an important factor that inhibits sustainability transition with regard to energy demand. Strategic policies and plans are required to be in place to foster this sustainability transition. However, one needs to formulate the plans keeping in perspective the characteristic of the sector and associated complexities. In this section we discuss some possible policy responses - specifically with regard to the adoption of energy efficient technologies and processes by MSME firms. We resort to the strategic niche management framework in the literature on transitions for this discussion.

6.2 Researchers in sustainability transitions (Schot, et al., 1994; Rip and Kemp, 1998; Geels, 2002) proposed a multi-level perspective (MLP) incorporating the complex interactions and dynamics within and between landscape, regime and niches as explanatory factors for explaining systemic transformations. In this framework, a regime is a configuration of a set of established rules and routines that makes the society "blind to radical

variations" in technologies. Raven, et al. (2008) describes the socio-technical regime as "retention mechanisms in the minds of engineers like genes are in biological variation." On the other hand the socio-technical landscape encompasses the more slowly changing factors, like culture, behavior and values (Schot, et al., 1994; Raven, 2012). Innovations or technological breakthroughs are "socio-technical experiments" (Schot, et al., 1994; Kemp et al., 1998) - accounting for the uncertainty and the learning activities associated with such activities. A set of experiments (with a common purpose) forms a niche. The researchers also advocate the need to protect experiments and niches, especially at an early stage. The governance of the sustainability transition is seen as a process of articulating expectations, initiating and withdrawing protection(s), building of social networks, experimentation, learning and, finally, branching into new market niches and eventually mainstreaming markets (Raven, 2012). Hoogma, et al. (2002) mentions certain important components of strategic niche management (SNM) - articulation of vision and expectations, shaping social networks and alliances, second order learning and protection of the niche being important ones. The experiments originate in the niche, mature and challenges the existing regime. Experiments are "mature" and "upscaled" when they successfully destabilize the existing regime and landscape and give rise to a new set of values, routines and rules.

6.3 Following the framework of strategic niche management (Elzen, et al, 2004; Geels & Raven, 2006; Schot & Geels, 2008), we consider the adoption of 'energy efficient technologies and practices' as 'experiments' within the 'niche' MSME groups. The policy responses required to upscale the experiments in the niche are:

- **Articulating expectations among actors:** The term 'expectations' embody all information about the experiment(s) and niche. The information concerns costs, benefits and associated risks. Raven (2012) posits that effectively articulating expectations reduces uncertainties perceived by the actors and allows mobilization of resources through promising future benefits. Similar view is also expressed by many scholars working on the SNM framework [16]. Further, articulation is "powerful" when it is not only tangible and specific in nature but also targeted at the appropriate set of

[16] For an overview please see Raven (2012).

actors (van der Laak, Raven and Verbong 2007). In the incumbent regime in the manufacturing sector in Odisha, for many small firms, there is paucity of information with regard to the available technologies and processes for energy efficiency gains (Ghosh & Roy, 2011). Further, there may be a dominant perception among these firms that such technologies do not fit into their preferences and values and are, hence, regarded as an unprofitable venture. This is somewhat evident from the findings reported in Table 2.

Alleviating deficiencies with regard to information and knowledge is an integral part of the strategic policy response. At the national level, the Bureau of Energy Efficiency (BEE) initiated a collaborative platform[17] named Small and Medium Enterprises: Energy Efficiency Knowledge Sharing (SAMEEEKSHA). The platform facilitates pooling and sharing of knowledge and experiences of a range of actors on themes like energy efficiency, use of renewable energy and environmental protection. This platform works on technology development and technology dissemination, capacity building, policy dialogues, etc. - both at the unit and cluster levels. Such activities are aimed at helping the firms in the MSME space overcome information barriers and form expectations about costs, returns and risks. Successful cases have been reported from various parts of India and across different sectors (SAMEEEKSHA, 2014). However, given the vastness and dispersed nature of the MSME space in Odisha (and/or other states in the country), it may be difficult, albeit, impossible for a central organization to reach majority of the MSME firms. Such platforms and institutions may be initiated in Odisha to address the information and capacity related barriers faced by the MSME firms for undertaking and/or upscaling energy efficiency related projects. Creation and reconfiguration of institutions are required in Odisha so that the actors in the manufacturing sector are communicated about the appropriate technologies and the potential gains, along with costs and risks from adopting energy efficient technologies.

[17] This platform comprises of actors - both national and international. For more details, please refer to the website www.sameeeksha.org.

- **Forming robust and effective networks of actors:** The SNM literature argues that a robust network of actors play an important role in niche management. It irons out gaps and weak links in the value chain and contributes to maturing of technologies for sustainability gains. The networks are the vehicles of expectations and promises, articulators of renewed requirements and demand, sources of resources and enablers in respect of learning and dissemination of learning across (and between) actors and locations (Raven 2012). It is often argued that the incumbent regime networks may be insufficient as they imbibe the incumbent rules and routines and are more prone to tread the existing trajectory and desist from exploring the new ones (Raven, 2012; Rehman, et al., 2010). Hence the need for re-shaping of networks.

  Some of the barriers pointed out in Table 2 indicate that there may exist a critical gap in the actor network for facilitating MSME firms to access and adopt energy efficient technologies. An enabling actor network must not only comprise of technology partners [18] (for bridging the technology gap) but also financial partners for bridging the finance gap. Equally important is the role of a knowledge sharing platform for overcoming the cultural barriers.

  It is often argued that industry associations can initiate the process of creating networks and alliances (Moris, et al, 2001). Although there exists a number of industry associations for MSME firms in Odihsa (e.g. Odisha Small Scale Industries Association, Odisha Assembly of Small and Medium Enterprises, various other small associations at district levels), the vision and ability of these associations to build networks may be highly constrained (Das, 2008) [19]. Programmes targeted at enriching and enabling these institutions is critically important. Further, most often the networks created by industry associations of small enterprises fail to include several major actors - government, banks and other financial institutions, academia, etc. Inclusion of financial institutions is

[18] The technology partners may include research and development institutions, academia, industry associations and government departments who can evolve technology solutions specific to the need for the MSME firms.

[19] Das (2008) observes this feature just not for Odisha but for the entire India.

absolutely important as these institutions perceive inordinately high risk in lending to MSME firms (Moris, Basant, Das, Ramachandran, & Koshy, 2001), (Das, 2008), (Ghosh & Roy, 2011).

In Odisha, the GoO is playing a major role in building comprehensive network of actors. The Orissa MSME Development Policy, 2009, announced by the GoO, spells out enablers in building network of actors. With the policy focusing on MSME clusters, especially in the manufacturing sector, there is scope to create cluster specific networks. Further the policy also emphasizes on institutionalizing a 'credit monitoring group' - to "facilitate institutional credit to MSMEs," and, together launch 'Orissa MSME Venture Capital Scheme' for stimulating "promotion of technologies and innovations" (Government of Odisha, 2009). This clearly marks an attempt to include financial actors in the network to facilitate innovations. Although the strategies for creating and reshaping networks have been initiated, the performance of such strategies in facilitating the promotion of energy efficiency in small and medium firms is also dependent on the dynamics between actors within the network(s). This issue also needs to be addressed simultaneously.

- **Protecting experiments and niche:** Hoogma, et al. (2002) argues that the experiments that have promises for sustainability transitions may not be economically viable in the short run. Positive expectaions about future profits and/or social benefits may induce the investors to invest in these niche products and processes. This brings us to the idea of "protection". Protection can be in the form of financial instruments or regulatory instruments. However, researchers opine that protections should never completely hide an innovation from the market selection pressure nor should it continue indefinitely (Kemp, et al., 1998; Raven, 2012). Thus designing protection and deciding on the continuity of the protection is a critical element in the SNM approach.

6.4 While the discussions in the previous sections have revealed that energy efficiency projects may be profitable, most MSME firms will adopt

the same provided incentives are adequate. In the case of large industrial units, the Perform, Achieve and Trade (PAT) aims at incentivizing industries in selected sectors for gains in energy efficiency through a market based mechanism (Mathur 2010). In India (and, hence, Odisha), there is dearth of incentives for energy efficiency initiative by small firms. Policy reforms must, therefore, aim at addressing this critical issue. Reward and punishment systems may be introduced to incentivize the firms adopting better technologies while punishing firms for non-action. Tax holidays, subsidies, grants, etc. are some of the possible instruments for introducing such systems (Roy, et al, 2013). Equally important is devising a financing mechanism through special purpose vehicles promoted by the state government that facilitates both equity and debt finance for the energy efficiency projects implemented by the MSME firms. Lower requirements for margin contribution, reduced collateralization are some of the mechanisms that may be explored.

7. Conclusion

7.1 Starting from the middle of the last decade, the state of Odisha is registering a sharp growth in its manufacturing sector. However, an area of concern is the resource and emission intensities of the sector. The decomposition analysis performed on the basis of data on energy demand by the manufacturing sector in Odisha has revealed that the penetration of energy efficient technologies and processes in this sector was not sufficient to ensure an absolute decoupling of manufacturing growth and energy use. Greater penetration of energy efficiency, however, can be challenging given the fact that the manufacturing sectors in the state is dominated by MSME firms. Past research has found that the diffusion of new technology in the MSME sector has always been tardy. While planning for a sustainability transition in the manufacturing sector, the policymakers in Odisha must address this critical issue. Our analysis, considering diffusion of energy efficient technologies in the MSME niche as experiment, under the strategic niche management framework, has identified a set of critical factors that are deterring the gradual upscaling and social embedding of energy efficient technology and processes. However, future research may be directed at assessing the change in energy intensity in small and medium firms by size class and industry category. The findings will be most helpful in formulating size and sector specific strategies. To undertake such research availability of data by size class of firms, along with industry sectors will be most helpful.

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Table 1 : Output produced and energy consumed (in Rs. 1 Lakhs in Constant Price base year 2004-05)

Year	Total Output of manufacturing sector (Y_t)	Fuel consumed by manufacturing sector (E_t)	Total Output of energy intensive manufacturing industries ($Y_{\text{energy intensive, t}}$)	Total Output of energy non-intensive manufacturing industries ($Y_{\text{energy non-intensive, t}}$)	Fuel consumed by energy intensive manufacturing industries ($E_{\text{energy intensive ,t}}$)	Fuel consumed by energy no- intensive manufacturing industries ($E_{\text{energy non-intensive ,t}}$)
1998-99	13252.2	2784.47	10241.5	3010.7	2630.07	154.40
1999-00	13783.8	2258.20	10540.9	3242.9	2119.28	138.92
2000-01	15296.0	2273.63	11430.5	3865.6	2146.80	126.84
2001-02	15101.2	2559.11	10560.5	4540.7	2431.24	127.88
2002-03	16282.7	2459.69	12032.2	4250.5	2326.50	133.19
2003-04	19341.9	2766.21	14783.3	4558.6	2633.67	132.54
2004-05	23054.5	2784.95	18400.2	4654.3	2643.60	141.35
2005-06	26902.6	3467.59	21142.8	5759.8	3314.11	153.48
2006-07	33082.0	3147.07	27361.6	5720.4	3002.44	144.63
2007-08	41702.4	3786.40	35485.5	6216.8	3629.81	156.59
2008-09	56877.8	3972.41	48173.2	8704.6	3794.41	178.01
2009-10	52611.3	4499.38	46663.9	5947.3	4346.25	153.13

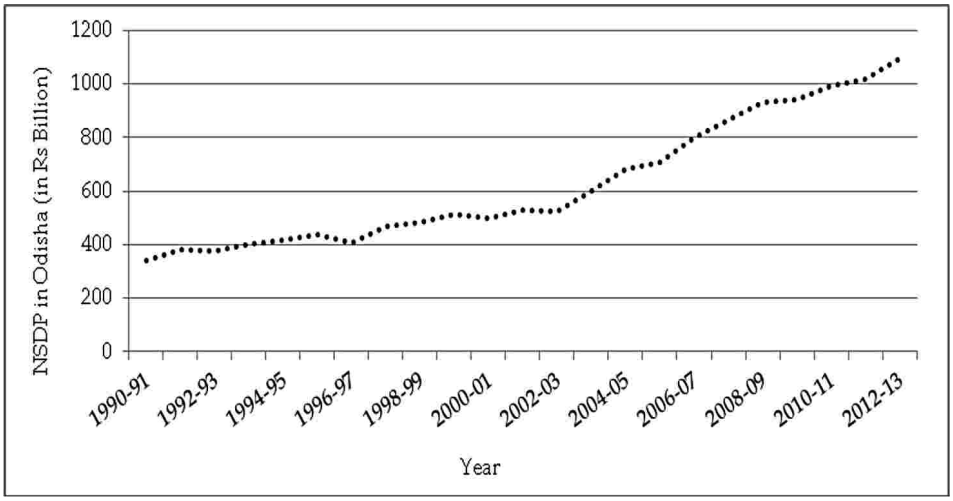
Source: Based on Annual Survey of Industries, Summery Results for Factory Sector, Central Statistical Organization, Ministry of Statistics and Programme Implementaiton & Index Number of Wholesale Prices (WPI) in India: A Time Series Presentation, as published by the Office of Economic Advisor, Ministry of Finance, Government of India

Table 2 : MSME Firms in India : Drivers and Barriers to adoption of technologies for energy efficiency gains[20]

Factors	Driver (+)/ Barrier (-)
Prospects of profit from investment in technologies for energy efficiency gains	+
Responsibility to environment	+
Prospect of attracting new customers, markets and increasing exports by assuming a "clean" image	+
Owner/ Key Manager's knowledge of technologies for achieving energy efficiency	-
Ease of access to new technologies	-
Absence of proper guidance on implementation of newtechnologies/ Lack of capacity	-
Insufficient knowledge abou possible benefits	-
Resistance to change by management and/or workers	-
Improper access to finance	-
Regulations concerning pollution	+
Absence of incentives	-

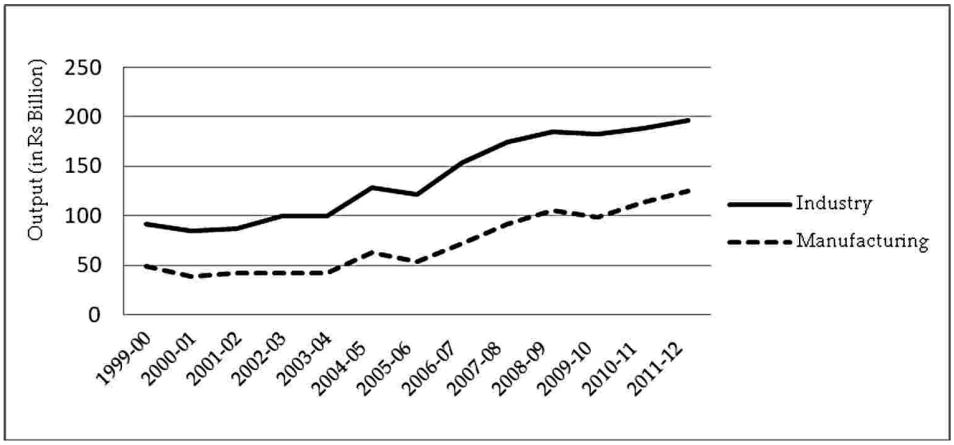
[20] Source : (Ghosh & Ray, 2011)

Figure 1: NSDP of Odisha at Factor Cost (at Constant Prices: 2004 - 05)



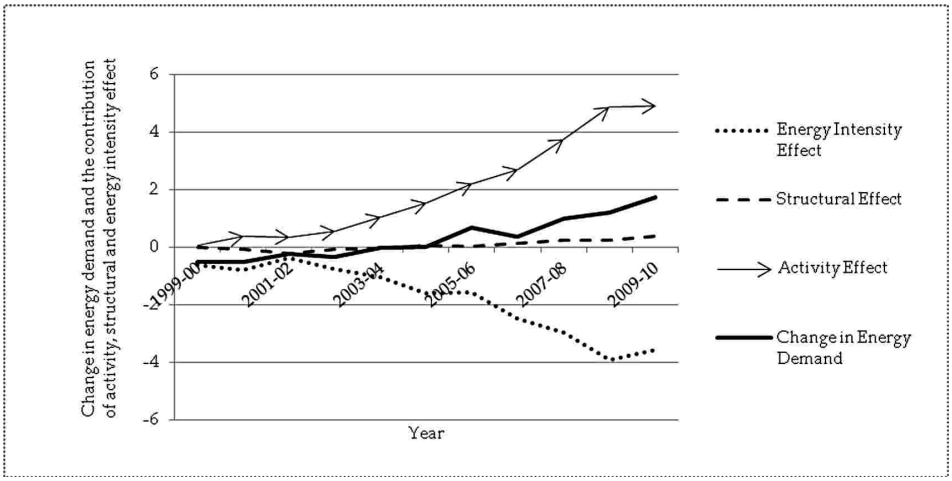
Source : (RBI 2013)

Figure 2: Trend of Industrial and Manufacturing Output of Odisha



Source : (RBI 2013)

Figure 3 : Results of the Decomposition Analysis : Energy Consumption in the Manufacturing Industries in Odisha



Source : Author's estimation

Industrial Development and Regional Disparities in Andhra Pradesh (Pre and Post Economic Reforms)

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Abstract

The objective of the present study is to analyse whether inter-regional disparities in industrial activity increased during the last two decades in Andhra Pradesh. Further, the study makes an attempt to focus on the pattern of disparities in the post-reform period in the three regions (Coastal Andhra (CA), Telangana, Rayalaseema). In all the three regions the District Domestic Product (DDP) from industry registered an increase in the post-reform period with the increase being the highest in Rayalaseema. However, we observe that the registered manufacturing accounted for a negative growth rate in Rayalaseema in the post-reform period as compared to the pre-reform period. The analyses of the structural ratios across the three regions reveal that the capital-output ratio performed better in Telangana in post-reform period when compared to the other two regions. Labour productivity increased in all the three regions in the post-reform period and the increase is the highest in Coastal Andhra.

Industrial base of Coastal Andhra is comparatively wide consisting of 8 out of 12 industries having location quotient more than one. Telangana comes next with 6 industry group having a higher than one location quotient. Rayalaseema has the narrowest industrial base with only 3 product groups having a location quotient greater than one. Further, Rayalaseema has the lowest specialization coefficient for almost all the product groups excepting manufacture of tobacco products and manufacture of non-metallic mineral products.

1. Introduction

1.1 Backward linkages created from autonomous industrialization lead to the growth of markets for the primary products of the region. A more obvious improvement from this process comes in the direction of infrastructure. As industrialization absorbs primarily local labour, it is likely to reduce disguised unemployment in agriculture and increase agricultural productivity. These and similar arguments urge that industrialization should be considered as an 'opportunity' for the development of the regional economy. Attempts to explain regional growth patterns analytically have always recognized both the potential contribution of international trade

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theory and its inadequacies. The implications of conventional trade theories applied to regional development are that there would be continual pressures for equalization of regional product prices and factor incomes. However, it has also been recognized that a substantial amount of time might be required for this theoretical prediction to work out (Chakravarty et al.2009).

1.2 According to dominant theory of modern economic development, industry is expected to play a major role in creating as well as mitigating disparities among different regions. Industry is seen as the main engine of growth (Kaldor, 1967) and industrial development is subject to cumulative causation to a larger degree than development of other sectors (Myrdal, 1957). Industrial development, and consequently overall economic development of different regions, according to the typical conventional theory of regional development, is expected to take a path that finally leads to a convergence (See Barro and Sala-i-Martin, 1992 and 1995). To begin with, industrial development takes place as a result of developed infrastructure, agglomeration and linkages, but subsequently, when diminishing returns set in-in the more industrialized regions-it shifts to less developed regions. Since diminishing returns set in agriculture much earlier, due to land being fixed in nature and because of limits to technological progress, it is industry with extension of increasing returns for a logically long period of time, that plays the leveling role once the process of its development starts in the poorer regions. The historical experience of development, as a result, has revealed what is called "inverted U-shaped" behaviour of disparities in the long period development (Williamson, 1965; Barro and Sala-I-Martin, 1990; Kuznets, 1955). In a way, this represents the spatial version of Kuznets Hypothesis on income inequality.

1.3 Quite contrary to the convergence hypothesis there is an equally strong outlook that puts forward increasing divergence because of technology and agglomeration externalities which make increasing returns possible over long periods. Different regions situated differently in terms of initial levels and capacities for development are thus subjected to cumulative causation. They not only grow differentially due to internal factors, but differences get reinforced through interaction among them through the mechanism of "back-wash effects" (Myrdal, 1957; Hirschman, 1958; Kaldor, 1967). Differences arise and get perpetuated often by what are called the 'core-periphery' and 'dependency' relationships that apply

both internationally and inter regionally (Baron, 1957). Technological change, new forms of organization and transaction costs are also seen by some, specially the post-Fordist scholars, as factors leading to widening of disparities (Piore and Sebel, 1984).

1.4 While Myrdal (1957) refers to the forces of convergence and of divergence as spread and backwash effects, Hirschman (1961) describes these broadly as trickling-down and polarization effects respectively. Scrutinizing regional economic literature, one comes across at least three different hypotheses in this regard and these differ on the emphasis given to the relative importance over time of the forces of convergence and of divergence. One of these is the self-perpetuation hypothesis propounded by Hughes (1961) and found empirically valid by Booth (1964) for the USA. According to this view, the forces of divergence dominate over those of convergence and as a result, inter-regional differences in the levels of economic development keep on widening over time. A completely opposite view is the convergence hypothesis propounded and found empirically valid by Hanna (1959) and substantiated these days also with the Solovian logic that the rate of economic growth is inversely related to the level of per capita income and hence given identical technologies, preferences and rates of population growth, cotemporaneous differences in per capita incomes between any two regions will be transitory. Considerable evidence to support the hypothesis empirically has been provided by Hanna (1959), Perloff et al (1960) and more recently by Sala-i- Martin (1996) .The third hypothesis, which is a combination of these two diametrically opposite views is the concentration cycle hypothesis propounded by Williamson (1965). The proponents of this view show that inter-regional economic differentials diverge initially to converge later on and thus trace out the famous Kuznetsian inverted U shaped curve over time in the process of national economic development. Considerable empirical evidence in support of such a view emerged as a result of a detailed international study of regional development experiences by Williamson (1965). A new and suitable point that is being given importance in this regard by many including Nair (1982) is that the pattern of regional change depends upon the indicator of development being considered, with different indicators demonstrating different patterns of regional change.

1.5 What then has been the experience in Andhra Pradesh? Have inter-regional disparities in industrial activity increased or declined especially since early 1990s when economic reforms were introduced and the state adopted the path of globalisation? There is a view that post- reform regional development is likely to be more evenly balanced" (Elizondo and Krugman, 1992), as a "free flow of goods, services and factors of production" would have strengthened spread affects thus reducing inter-regional disparities (Dholakia, 2009). A study using ASI data has, however, found that the new investments are spatially more concentrated in the post-reform than in the pre-reform period (Chakravorty and Lall, 2007). It is, therefore, interesting to study the pattern of disparities in the post-reform period when most of the interventionist measures have been removed in comparison with the pre-reform period when they were in place.

1.6 Broadly, the study seeks to answer the following questions:

- How is industry distributed across the different regions of AP? What changes have taken place in the share of industries in different regions over the years?
- What has been the performance of different regions in the growth of industry during the study period?
- How does the structure of industries - agro-based and non-agro based differ among regions? Have there been significant changes in recent years? What explains the structural variations in industry among regions?
- How do technical ratios like output-labour, capital-output and capital-labour differ among regions? Have there been changes in relative position of different regions in these ratios?
- How do the location quotients and specialization coefficients differ among regions?

1.7 Andhra Pradesh is divided into three regions on the basis of cultural, socio-economic and region specific resource base: Coastal Andhra (CA), Telangana (TEL) and Rayalaseema (RS) (CESS, 2008). In this paper, we primarily stick to this standard regional classification. We bring in the issue of the state as a whole mainly to contrast different regions in the context of AP.

1.8 This paper is organized in six sections. The next section deals with issues related to data. This is followed by a detailed discussion of industrial development as a whole, along with the service sector, in Telangana, Coastal Andhra and Rayalaseema. We bring out some contrasts between the development of the service sector and the performance of industry in different regions of AP. As registered manufacturing plays the most important role within the industrial sector, the fourth section is devoted to an analysis of the features of this sector in the three regions of AP. Section five looks at the performance of the agro-based and non-agro based sectors of the registered manufacturing sector. The overall features of the state will be used as a meaningful benchmark for all the three sections dealing with hard facts. The last section provides the conclusions.

2. Data and Methodology

2.1 In order to capture the regional performance of the industrial sector in AP we have to look mainly at two crucial variables relating to this sector, employment and output. The industrial sector comprises mining, manufacturing, electricity, gas and construction. The National Accounts Statistics (NAS) published by the Central Statistical Organization (CSO) provide time series data for gross state domestic product (GSDP) in terms of broad industrial classifications at the single digit level. From this source it is easy to get the industrial output figures at the state level.

2.2 The period for analysis chosen for SDP in this study is 1980-81 to 2010-11. For District Domestic Product (DDP), period of study is from 1993-94 to 2006-07, as this data is available from 1993-94 onwards. In this paper we make an attempt to understand the regional dimension of industrial development in AP in the perspective of the foremost changes in macroeconomic policy regime of the country. Consequently, we work with two periods: the initial phase of liberalization/pre-economic reform from 1980-81 to 1992-93 and the later phase of liberalization/post-economic reform from 1993-94 to 2010-11 with 1999-2000 as base: we expect to capture changes through relevant comparisons. Considering the significance of the manufacturing sector within the industrial sector in general and registered manufacturing in particular, we decided to narrow down our focus. Another vital reason behind this decision is the availability of a rich data set for the registered manufacturing sector provided by the Annual Survey of Industries (ASI) published by the CSO. Annual Survey of Industry

(ASI) provides fairly detailed information regarding output, employment, capital formation, wages etc for the factory sector of manufacturing every year. 2008-09 is the latest year for which data are available for the districts of Andhra Pradesh. The wholesale price index numbers with 1981-82 as base for the first period and with 1993-94 as base for the second period are used for deflating the net value added (NVA) and the emoluments. We have deflated the fixed capital figures by a composite index of electrical and non-electrical machinery.

2.3 A close look at the performance of NVA and employment of agro and non-agro based industries reveals which industries play a major role in a particular region. Location quotients and specialization coefficients help in identifying whether a particular industry group is concentrated in one region or not. This is arrived at by examining the pattern of NVA and employment created by different industry product groups in different regions for the latest year for which data are available.

2.4 An attempt is also made to find out the industrial base of the region by making use of the location quotients and specialization coefficients. The location coefficient is calculated by subtracting for each region the percentage employment share of the industry in question from the total regional employment share. It varies between zero and one. Coefficient of Specialization is calculated just like the coefficient of localization, except that regions become industries and industries become regions. When the value of this coefficient is zero, then the industrial structure of the region is exactly similarly diversified as that of the state as a whole. If it is one, then that region has one industry which is present in that region only. In between, values of coefficient show the degrees of specialization of regions in relation to the industrial structure of the state.

3. Industrial Development in Andhra Pradesh

3.1 This section aims at giving a broad sketch of the production performance of the industrial sector in AP. Here, we look at the performances during 1980-81 to 2010-11 of the manufacturing sector, both registered and unregistered, and of the service sector in some detail. This is sub-divided into two periods - i.e., 1980-81 to 1992-93 (pre-reform) and 1993-94 to 2010-11(post-reform).

3.2 Sectoral trend growth rates of SDP are given in Table 3.1. The growth rates are calculated by fitting the semi-log equations. It may be seen that |in AP, the growth rate of industry in SDP registered an increase of nearly 0.4 percentage points while that of the manufacturing sector declined by around 2.5 percentage points during post-economic reform period when compared to the pre-reform period. Within the manufacturing sector, the growth rate of both registered and unregistered sectors in the state domestic product decreased with the decline being the highest for the registered manufacturing again in the post-reform period. Thus, at the state level, the manufacturing sector which is the driving force of an economy has not performed well in the post-reform period.

3.3 What is the scenario at the district level? Since data are available at the district level only from 1993-94 onwards, the percentage shares of industry, manufacturing and service sectors in DDP are analyzed for two points of time: in the early 1990s (1993-94) and in the mid- 2000s (2006-07). Average annual growth rates are analyzed for two periods - 1993-94 to 1998-99 and 1999-2000 to 2006-07.

3.4 If we look at the state as a whole, there is an increase (13 percentage points) in the share of industry in SDP in 2006-07 over 1993-94, while the share of the manufacturing sector in SDP remained more or less the same in 2006-07 when compared to 1993-94 (Table 3.2). The increase in the share of industries in SDP in 2006-07 compared to 1993-94 can be attributed to the increase in the mining and construction activity in the state. Within the manufacturing sector, at the state level, share of registered sector increased while that of the unregistered sector in SDP declined in 2006-07 as compared to 1993-94 (Table 3.3). On the other hand, the share of services in SDP registered an increase of nearly 15 percentage points in mid-2000s over the early nineties.

3.5 Across the regions of the state, share of the manufacturing sector (registered and unregistered) in SDP declined in 2006-07 vis-à-vis 1993-94 in Telnagana and Rayalaseema (Table 3.3) and share of service sector in SDP increased in all the three regions (Table 3.2) in 2006-07 over 1993 -94 (Table 3.2).

3.6 We now take a look at the average annual growth rates of industry, manufacturing and services in total domestic product in regions and the state as a whole.

3.7 The average annual growth rates of industry and manufacturing in SDP increased in CA while it registered a negative growth rate in Rayalaseema in the post-economic reform period. The average annual growth rate of industry in SDP increased by more than double in Rayalaseema, while that of the manufacturing sector accounted for a negative growth rate (-2.0) in the same period. The increase in the growth rate of industry in SDP in this region during the post-economic reform period is because of the increase in the mining activity in Kadapa district especially during the period 2005-07 (Table 3.4). For the manufacturing sector, data clearly shows that except Rayalaseema, in the other two regions, average annual growth rates of registered manufacturing sector in DDP increased in the second period over the first period (Table 3.5).

3.8 Rayalaseema has seen the slowest transformation of the economy. Over a period of time, the contribution of industry, manufacturing and the services sector to the total domestic product registered a decline. Its growth rate, especially that of the manufacturing sector has been the lowest in fact it has been negative (-2.0).

4. The registered manufacturing sector

4.1 The analysis of the growth rates in the previous section shows that the structural transformation has not been in favor of the manufacturing sector at the state level. It is in this context, it becomes crucial to look at the performance of the registered manufacturing sector. The period chosen for analysis is 1980-81 to 2008-09. 2008-09 is the latest year for which the Annual Survey of Industries (ASI) data are available at the district level. 1980-81 to 1992-93 is taken as the initial phase of liberalization and 1993-94 to 2008-09 as the later phase of liberalization. Structural ratios like per worker productivity (O/L), capital output ratio (K/O) and capital intensity (K/L) are analyzed to look at the performance of the registered manufacturing sector.

4.2 Table 4.1 clearly shows the dominance of registered manufacturing in the total manufacturing output of the state, regions. Based on the percentage share of registered manufacturing at two points of time 1993-94 and 2008-09, we ranked the regions and the growth centres. While CA ranked third in total manufacturing in 1993-94, it moved to second position in 2008-09, Telangana moved from second to first position and Rayalaseema moved from first position in 1993-94 to third position in 2008-09 (Table 4.2).

4.3 A comparative investigation of the behavior of the critical structural ratios reveal that per-worker productivity/labour productivity (O/L) of the registered manufacturing sector remained constant at 0.1 during the pre-economic reform period and it increased in all the three regions and the state as whole during the post-reform period. The increase in labour productivity is the highest in Coastal Andhra (from 0.1 in pre-reform period to 0.7 in post-reform period) (Table 4.3).

4.4 The case of capital output ratio (K/O) reveals that it registered a decline in Telangana in the post-reform period as compared to the pre-reform period. On the basis of this evidence we can say that in Coastal Andhra and Rayalaseema more of capital has been used to produce a unit of output in the post-reform period compared to pre-reform period. The reason for this could be that capital innovations on balance served more to replace other factor inputs rather than the output (Table 4.3).

4.5 Does technological variation explain the above mentioned inter-regional differences in labour productivity of registered manufacturing sector? Taking capital intensity, measured in terms of capital per worker as the indicator of technology, we attempt to examine this question.

4.6 It is a well-known fact that different industries use different levels of technology in production. Simultaneously, it could also be reasonably assumed that a high technology industry would be so, irrespective of its location in one region or the other. Nevertheless, there could be differences from region to region due to, firstly, the factors within the same product growth that a region specializes in production, and secondly, perhaps because of the choice of technology - capital intensive vs. labour - that the entrepreneur may decide to adopt depending on the labour market situation. Thus regions with high capital intensity accounted for an increase in labour productivity in the post-reform period. Coastal Andhra is a case in point to illustrate the above explanation (Table 4.4).

5. Agro-based and Non-agro based industries

5.1 Since registered segment now comprises of a considerably large part of total manufacturing in the state (accounting for 71 per cent) and also a huge part of the unregistered sector is found to be linked with the registered sector, it would be significant at this juncture to go into some added

particulars as regards the product structure of this sector. This is taken care here in respect of two features of the product groups. In the first case, we try to broadly classify industries into two groups-agro-based and non agro-based, the former consisting of product group 15 to 25 and later 26 to 37, according to the National Industrial Classification (NIC) 1998. Subsequently, we have tried to identify major product groups (at 2-digit level) of different regions and growth centres in order to examine industrial diversification and specialization across the regions. We make use of the location quotients and coefficients of specialization/diversification to further sharpen our analysis.

5.2 Agro-based products have always dominated the Indian as well as the state's manufacturing industry in terms of employment, employing majority of workers working in the sector. Around 61 percent of the workers are employed in agro-based industries in 2008-09 at the state level. Though the shares of employment declined in 2008-09 when compared to 1982-83 in CA, Telangana and RS, we still observe that the major chunk of employment is created by agro-based industries. Rayalaseema witnessed a huge decline in the share of workers in 2008-09; it declined by almost half compared to 1982-83 in 2008-09 compared to 1982-83 (Table 5.1).

5.3 When we take a close look at the NVA of the agro-based industries |t the state level, we find that their share in gross value added in manufacturing has, however, declined to less than half in 2008-09 compared to 1982-83. Share of NVA of agro-based industries declined in all the three regions in 2008-09 compared to 1982-83 and the decline is highest in Rayalaseema where the share declined by nearly 18 percentage points (Table 5.1). In aggregate, we can conclude that agro-based industries contribute less to gross value added (25 percent) than to employment (61 percent) in 2008-09 compared to 1982-83 reflecting lower productivity.

5.4 In case of non agro-based industries, Rayalaseema stood first amongst the regions in the share of number of workers in 2008-09, while Rangareddy topped within the growth centres in the same year. Interestingly, Rayalaseema has the highest share of NVA in 2008-09 and it increased by almost two and a half times when compared to 1982-83 (Table 5.2).

5.5 Inter-Regional Differences in Structure and Specialization: Top 5 industries

5.5.1 Just like the case of the composition of manufacturing industry in terms of agro-based and non agro-based groups, industrial structure of regions differs in terms of product groups at more disaggregated (2-digit) level. We look here at the top five industry groups with regard to their contribution to employment in registered manufacturing in Andhra Pradesh to see to what degree the product groups featuring in this group differ from region to region. We also work out to see the degree of specialization or diversification of the manufacturing sector in the state, as represented by the percentage of employment asserted by the five top industries. We carried out this analysis for the year 2008-09.

5.5.2 The regions show diverse patterns in employment as far as the largest product group is concerned. At the state level, manufacture of food products and beverages (15), manufacture of tobacco (16) and manufacture of non-metallic mineral products account (26) account for a major share of employment. Out of these product groups, as high as 76 percent of employment comes from the manufacture of food products and beverages, followed by non-metallic and mineral products (around 63 percent). In CA, food products and beverages account for around 41 percent of employment. In Telangana, 42 percent of registered manufacturing sector employment is provided by the manufacture of tobacco products. Non-metallic mineral products contribute nearly 44 percent of employment in Rayalaseema. Industries with significant domination though with smaller proportion of total employment are non-metallic mineral products in CA (11 percent) and in Telangana (7.7 percent) (Table 5.3).

5.5.3 The above features advocate a high degree of specialization in the product structure of the three regions. The same is also revealed by the high proportion of total employment accounted for by the largest five industry groups. Among the three regions, Rayalaseema had over 75 percent of their registered manufacturing employment concentrated in top five groups - (i) manufacture of food products and beverages, (ii) manufacture of tobacco and tobacco products (iii) manufacture of basic metals (iv) manufacture of chemicals (v) manufacture of non-metallic mineral products. CA comes close to Rayalaseema with 67 percent and Telangana with 66 percent of the employment. As such no region shows diversified industrial employment

structure. Interestingly, the largest group which accounted for similar share in total employment in registered manufacturing in the state is food products.

5.6 Industrial Base and Specialization

5.6.1 Industrial base of a state has been identified in terms of the group of industries which claim a higher share in the region's industrial structure than in the industrial structure of the state as a whole and is measured by location quotients of individual industries. Location quotient is one for an industry if its share in the region is the same as in the state, is less than one if this share is lower and more than one if it is higher than in Andhra Pradesh. Industries having quotient value of one or higher are considered to constitute the industrial base of the state/region or growth centre.

5.6.2 At this juncture, it must be noted that the location quotients measure industrial base of a region only relative to the industrial structure of the state. Those industries which have a higher share in the region does than in the state's industrial structure constitute this base and these industries need not necessarily be the largest in the region. Location quotient, in fact, reflects the region's relative specialization vis-à-vis the industrial structure of the state and is acknowledged in terms of value of the quotients, and defines industrial base in a relative and not in absolute sense. In other words, it also means that more industrialized regions would have a wider industrial base in terms of having a larger number of industries with value of location quotients higher than one.

5.6.3 Industrial base of Coastal Andhra is comparatively wide consisting of 8 out of 12 industries having location quotient more than one. Telangana comes next with 6 industry group having a higher than one location quotient. Rayalaseema has the narrowest industrial base with only 3 product groups having a location quotient greater than one (Table 5.4).

5.6.4 Let us now see how similar or different the industrial structure of a region is vis-à-vis that of the state as a whole. To arrive at this, shares of different industries in the total industrial employment in a region are compared with the corresponding shares at the state level. We make use of coefficient of specialization to sum up the differences between the two. When the value of this coefficient is zero, then the industrial structure of the region is exactly similarly diversified as that of the state as a whole. If

it is one, then that region has one industry which is present in that region only. In between, values of coefficient show the degrees of specialization of regions in relation to the industrial structure of the state.

5.6.5 When we consider specialization coefficient, we observe that Rayalaseema has the lowest specialization coefficient for almost all the product groups excepting manufacture of tobacco products and manufacture of non-metallic mineral products. Telangana has the highest specialization coefficient of 0.32 for manufacture of rubber and plastic products followed by a specialization coefficient of 0.26 for manufacture of tobacco. Interestingly, CA has specialization coefficients of 0.16 and 0.12 only for two product groups - manufacture of food products and beverages and manufacture of tobacco products. It is surprising to note that basic metals have a specialization coefficient of only 0.04 (Table 5.5). This implies that no forward linkages are taking place in CA despite the presence of the large scale Iron and Steel industry in Visakhapatnam.

6. Conclusions

6.1 Amidst various findings, as mentioned above, regions have performed differently in terms of growth of manufacturing industries and changes in their structure. It is quite clear from the analysis that there are regional inequalities. Even after a decade of economic reforms, we find that industrial activity is concentrated and divergent in few product groups; industrial base is narrow, high degree of specialization takes place only in five product groups, i) manufacture of food products and beverages, (ii) manufacture of tobacco and tobacco products (iii) manufacture of basic metals (iv) manufacture of chemicals (v) manufacture of non-metallic mineral products. Within the regions, Rayalaseema has the narrowest industrial base and also the lowest specialisation coefficient. Telangana has the highest specialization coefficient for manufacture of rubber and plastic products followed by manufacture of tobacco. CA has higher specialization coefficients for manufacture of food products and beverages and manufacture of tobacco products. In Rayalaseema, it is observed that the registered manufacturing accounts for a negative growth rate in the post-reform period while the growth rate of industry registered the highest increase during this period. The increase in the growth rate of industry in this region is due to the increase in the mining activity in Kadapa district during recent years. The shares of industry, manufacturing and services in DDP are highest in

Telangana in 2006-07 compared to 1993-94. Among the three regions, Coastal Andhra registered an increase in the growth rate of manufacturing sector in the post-reform period as compared to the pre-reform period. As far as the structural ratios are concerned, Telangana performed better in post-reform period in capital-output ratio, while, Coastal Andhra performed better in terms of labour productivity and capital intensity.

6.2 Overall it can be concluded that the regional inequalities in industrial activities have increased in the post-reform period when compared to the pre-reform period. Within the regions while Telangana, Coastal Andhra and Rayalaseema have performed reasonably well in industrial activities while the manufacturing and the registered manufacturing sector fared well in Coastal Andhra. Rayalaseema witnessed poor performance in the registered manufacturing activity in the post-reform period. The increase in the growth rates of SDP from industry both in CA and Telangana can be attributed to the increase in the construction activities while it is due to the increase in mining activity in Rayalaseema.

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Table 3.1 : Trend Rate of Growth of State Domestic Product from Industries and Services in AP during 1980-81 - 2010-11 (percent per annum) (1999-2000 prices)

Sector	1980-81 to 1992-93	1993-94 to 2010-11
Industry	6.9*	7.3*
	(0.004)	(0.003)
Manufacturing	8.3*	5.8*
	(0.005)	(0.002)
Registered Manufacturing	9.3*	6.0*
	(0.005)	(0.003)
Unregistered Manufacturing	6.1*	5.4*
	(0.005)	(0.003)
Services	7.2*	7.8*
	(0.002)	(0.001)

Note: Figures in parentheses indicate standard errors; * indicates 5% level of significance.
Source: National Accounts Statistics.

Table 3.2 : Percentage Shares of Industry, Manufacturing and Services in Total Domestic Product in Regions and AP 1993-94 and 2006-07 (1999-2000 prices)

Regions	Percentage shares in DDP (1993-94)			Percentage shares in DDP (2006-07)		
	Industry	Manuf.	Services	Industry	Manuf.	Services
Coastal Andhra	17.9	12.6	44.3	23.1	12.0	47.7
Telangana	16.1	16.5	37.4	28.0	13.0	53.7
Rayalaseema	26.2	17.0	53.4	24.0	7.8	46.2
AP	18.3	14.2	25.4	31.3	14.1	40.4

Source: State Domestic Product and District Domestic Product, AP, Several Years

Table 3.3 : Percentage Shares of Registered and Unregistered Manufacturing Sectors in Total Domestic Product in Regions and AP in 1993-94 and 2006-07 (1999-2000 prices)

Region	1993-94			2006-07		
	Manuf.	Registered	Unregistered	Manuf.	Registered	Unregistered
Coastal Andhra	12.6	7.8	4.8	12.0	8.2	3.8
Telangana	16.5	11.5	4.9	13.0	10.7	2.4
Rayalaseema	17.0	7.7	9.3	7.8	2.3	5.5
AP	14.2	8.7	5.4	14.1	10.0	4.1

Source: State Domestic Product and District Domestic Product, AP, Several Years

Table 3.4: Average Annual Growth Rates of Industry, Manufacturing and Services in Total Domestic Product in Regions and AP during 1993-94 to 2000-01 and 2001-02 to 2006-07 (percent) (1999-2000 prices)

Regions/DDP	1993-94 to 2000-01			2001-02 to 2006-07		
	Industry	Manuf.	Services	Industry	Manuf.	Services
Coastal Andhra	6.4	5.9	7.3	11.9	11.0	8.0
Telangana	6.1	5.5	7.7	9.8	8.5	10.2
Rayalaseema	6.2	4.8	6.4	17.8	(-)2.0	7.2
AP	6.1	5.1	7.5	11.5	7.7	9.4

Source: State Domestic Product and District Domestic Product, AP, Several Years

Table 3.5: Average Annual Growth Rates of Registered Manufacturing Sector in Total Domestic Product in Regions and AP during 1993-94 to 2000-01 and 2001-02 to 2006-07 (percent) (1999-2000 prices)

Regions	1993-94 to 2000-01		2001-02 to 2006-07	
	Manuf.	Registered	Manuf.	Registered
Coastal Andhra	5.9	6.7	11.0	12.8
Telangana	5.5	5.4	8.5	8.7
Rayalaseema	4.8	3.6	(-)2.0	0.1
AP	5.1	4.5	7.7	9.0

Source: State Domestic Product and District Domestic Product, AP, Several Years

Table 4.1: Percentage Share of Registered Manufacturing in Regions, 1993-94 and 2008-09

Regions	Percentage share of registered manufacturing	
	1993-94	2008-09
Coastal Andhra	61.9	68.5
Rayalaseema	45.5	30.0
Telangana	70.2	82.0
Andhra Pradesh	61.2	71.1

Source: Calculated from District Domestic Product, Andhra Pradesh

Table 4.2: Rank Orders of Regions in Manufacturing in 2008-09

Regions	Total manufacturing		Registered manufacturing		Unregistered manufacturing	
	1993-94	2008-09	1993-94	2008-09	1993-94	2008-09
Coastal Andhra	3	2	2	2	3	2
Telangana	2	1	1	1	2	3
Rayalaseema	1	3	3	3	1	1

Source: Own calculations based on DDP, AP (2008-09)

Table 4.3: Capital-Output Ratio and Labour Productivity (O/L) for Different Regions of AP - 1980-81 through 2008-09

Regions	K/O		O/L	
	Period I 1980-81 to 1992-93	Period II 1993-94 to 2008-09	Period I 1980-81 to 1992-93	Period II 1993-94 to 2008-09
Coastal Andhra	3.0	4.0	0.1	0.7
Rayalaseema	3.2	3.3	0.1	0.6
Telangana	2.3	1.8	0.1	0.5
Andhra Pradesh	2.5	2.5	0.1	0.5

Source: Calculations based on ASI data, various issues

Table 4.4: Capital-Labour Ratios for Different Regions 1980-81 Through 2008-09

Regions	Capital / Labour	
	Period I 1980-81 to 1992-93	Period II 1993-94 to 2008-09
Coastal Andhra	0.4	2.3
Rayalaseema	0.3	1.8
Telangana	0.3	0.7
Andhra Pradesh	0.3	1.2

Source: ASI, AP, various issues

Table 5.1: Share of Non Agro-based industries in registered manufacturing sector (number of workers and NVA)

Regions	No of workers				NVA			
	1982-83	1993-94	2000-01	2008-09	1982-83	1993-94	2000-01	2008-09
CA	82.53	64.80	65.32	63.33	49.07	45.27	47.56	27.96
Telangana	72.45	69.32	69.42	63.55	30.45	34.32	27.40	24.65
Rayalaseema	74.15	56.85	50.80	35.38	68.93	44.17	22.37	16.11
AP	76.61	67.00	67.14	61.17	38.98	38.95	34.31	25.28

Table 5.2: Share of Non Agro-based industries in registered manufacturing sector (number of workers and NVA)

Regions	No of workers				NVA			
	1982-83	1993-94	2000-01	2008-09	1982-83	1993-94	2000-01	2008-09
CA	17.47	35.20	36.68	36.67	50.53	54.73	52.44	72.04
Telangana	27.55	30.68	30.56	36.45	69.55	65.68	72.60	75.36
Rayalaseema	25.85	43.15	49.20	64.62	31.07	55.83	72.63	83.89
AP	23.38	33.00	32.86	38.83	61.02	61.04	65.69	74.72

Table 5.3: Share of Top five industries in terms of workers in registered manufacturing (2008-09)

Regions/Industry	15	16	24	26	27	Total of five
CA	41.05	4.58	1.04	11.22	9.63	67.52
Telangana	11.40	42.38	2.04	7.69	2.39	65.90
Rayalaseema	23.06	1.65	3.57	43.91	3.98	76.17
AP	75.51	48.61	6.65	62.82	16.00	41.92

Source: Calculations based on ASI data, AP, 2008-09

Table 5.4: Location Quotient of different product groups in different regions (2008-09)

Regions/Industry	15	16	17	20	21	24	25	26	27	28	29	35
CA	1.63	0.28	1.38	1.72	1.45	0.30	1.28	0.54	1.81	0.60	1.33	1.75
Telangana	0.45	2.62	0.67	1.21	1.31	1.69	0.64	0.37	0.45	1.89	1.38	0.77
Rayalaseema	0.92	0.10	0.96	0.08	0.24	1.02	1.08	2.10	0.75	0.51	0.29	0.49

Source: Calculations based on ASI data, AP, 2008-09

Table 5.5: Coefficient of specialization of different product groups in different regions (2008-09)

Regions/Industry	15	16	17	20	21	24	25	26	27	28	29	31	35
CA	0.16	0.12	0.04	0.00	0.01	0.02	0.01	0.10	0.04	0.01	0.01	0.00	0.01
Telangana	0.14	0.26	0.04	0.00	0.01	0.02	0.32	0.13	0.03	0.02	0.02	0.01	0.00
Rayalaseema	0.02	0.15	0.00	0.00	0.01	0.00	0.02	0.23	0.01	0.01	0.01	0.01	0.00

Source: Calculations based on ASI data, AP, 2008-09

Appendix 1
Classification at 2-digit level (NIC 1998)

15 Manufacture of Food Products and Beverages
16 Manufacture of Tobacco Products
17 Manufacture of Textiles
18 Manufacture of Wearing Apparel Dressing and Dyeing of Fur
19 Tanning and Dressing of Leather Manufacture of Luggage, Handbags, Saddler, Harness and Footwear
20 Manufacture of Wood and Products of Wood and Cork, Except Furniture, Manufacture of Articles of Straw and Plating Materials
21 Manufacture of Paper and Paper Products
22 Publishing, Printing and Reproduction of Recorded Media
23 Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel
24 Manufacture of Chemicals and Products
25 Manufacture of Rubber and Plastic Products
26 Manufacture of Other Non-Metallic Mineral Products
27 Manufacture of Basic Metals
28 Manufacture of Fabricated Metal Products, Except Machinery and Equipments
29 Manufacture of Machinery and Equipments N.E.C
30 Manufacture of Office, Accounting and Computing Machinery
31 Manufacture of Electrical Machinery and Apparatus N.E.C.
32 Manufacture of Radio, Television and Communication Equipments and Apparatus
33 Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks
34 Manufacture of Motor Vehicles, Trailers and Semi-Trailers
35 Manufacture of Other Transport Equipment
36 Manufacture of Furniture; Manufacturing N.E.C.
37 Recycling

A Critical Look on the Structure of CENSUS Sector of ASI from 2000-01 data

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Abstract

Annual Survey of Industries (ASI) being the largest survey of registered manufacturing sector has assumed great importance right from its inception. Traditionally, to cover the sector in the most comprehensive way, the sample design of ASI has been so planned that it covers all the 'big' units on a census basis every year (called the census units) whereas a sample of suitable size is drawn from the remaining frame keeping in view the level of estimates (state, NIC digit etc.). Although the definition of the 'census' has undergone changes over time, the underlying spirit of capturing the large units remained the same. Last major change in the definition of census sector took place during 1998-99 and 1999-2000 when all the units having 200 or more workers were defined as census. From 2000-01 onwards the definition of census sector in ASI remained broadly the same with 100 or more workers being the main criteria. However, apart from these big units, there had always been units that were surveyed on a complete enumeration basis and formed a part of census sector.

In recent years volatility in ASI data has been a major point of debate among the stake holders. While some studies showed that volatility is inherent in this sector, questions have always been raised on the design effect in the estimates especially the behaviour of sample sector.

With that background, in this paper, an attempt has been made to look into the changes in the composition of the Census sector units over the last 11 years (from 2000-01 to 2010-11). For the purpose of the study, the Census sector has been further bifurcated into True Census units i.e. units with 100 or more employees and Pseudo Census units i.e. units with less than 100 employees, yet considered as census unit as defined in ASI. It shows the changes in its share and coverage of these 2 sub-sectors in all India and in major States as well as in major Industries for major characteristics and also the growth pattern of these sub-sectors vis-à-vis the growth of the Census sector as a whole, sample sector and the overall GVA growth of the industry or state. The paper shows that the contribution of the Pseudo Census units in the overall GVA has not been much for most of the industries and state and also at all India level for most of the years. The growth of this sector has been very erratic in most cases, implying thereby a high degree of volatility existing in this sub-sector.

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1. Introduction

1.1 Annual Survey of Industries (ASI) is the principal source of industrial statistics on the registered manufacturing sector of the economy and a main component for estimating state domestic product. ASI covers all factories registered under Sections 2(m)(i) and 2(m)(ii) of the Factories Act, 1948. The survey also covers bidi and cigar manufacturing establishments registered under the Bidi and Cigar Workers (Conditions of Employment) Act 1966. All captive electricity undertakings engaged in generation, transmission and distribution of electricity and not registered with the Central Electricity Authority (CEA) are also covered under ASI. The survey has so far been conducted annually under the statutory provisions of the Collection of Statistics (COS) Act, 1953 and the rules framed there-under in 1959 except in the State of Jammu & Kashmir where it is conducted under the J&K Collection of Statistics Act, 1961 and rules framed there under in 1964. However, from ASI 2010-11 onwards, the survey has been conducted annually under the statutory provisions of the Collection of Statistics (COS) Act, 2008 and the rules framed there-under in 2011.

1.2 Apart from this statutory backing, another unique feature of ASI is that the entire data collected for ASI are record-based, in the sense that they are taken from audited balance sheet, Profit and Loss Account etc. of the unit. These features, coupled with a large sample size (about 60,000 factories are surveyed every year) make ASI a very rich data source for analysing the growth and structural changes taking place in the registered manufacturing sector in general and industry specific behaviour of firms in particular. The sampling design followed in ASI is such that the entire frame of units is first divided into two sectors, viz., Census and Sample following a more or less similar definition of the sectors over the years based on a threshold number of workers. While the census sector units are surveyed every year, a sizable number of units of the sample sector are also surveyed every year following a circular systematic sampling with a specific sampling fraction (which varies over year).

1.3 Apart from the units having 100 or more workers, units having single books of account within states are termed as Joint return, are also a part of the Census sector. Some of the strata (State x NIC 4-digit of the remaining units), having less than 4 units, where sampling is not possible as per the present sampling design, are also included in this sector. This study critically

analyses the changes in structure and magnitudes of these parts separately for different parameters from ASI data during 2000-01 to 2010-11.

1.4 The organisation of the study is as follows: Section 1 is the introduction. Section 2 gives a brief account of the data preparation and the concepts used. Section 3 presents the analysis and Section 4 offers some concluding remarks.

2. Data preparation

2.1 The definition of Census sector remained same from 2000-2001, as the units having 100 or more workers and units with "Joint Returns". In some less industrial States/UTs, like, Manipur, Meghalaya, Nagaland, Tripura, Sikkim and Andaman & Nicobar Islands, all the units were taken under Census sector. The concept of "Joint Returns" was introduced in ASI 1998-99 and continued with more or less same manner with some regional variations. Over the years the definition stabilized to the units under same NIC 4-digit within State/UT under single ownership and having single Books of Account etc. As such Census & Sample sector are defined as follows:

Census Sector:

a) All industrial units belonging to the six less industrially developed states/UT's viz. Manipur, Meghalaya, Nagaland, Sikkim, Tripura and Andaman & Nicobar Islands.

b) For the rest of the twenty-six states/UT's., (i) units having 100 or more workers, and (ii) all factories covered under Joint Returns.

c) Strata (State by 4-digit of NIC) having less than or equal to four units after selecting the Census Sector units as defined above are also selected as census sector.

Sample Sector:

The remaining units in the frame are coming under Sample sector.

In the present study, with an objective to probe further into the census sector, Census Sector has been divided into the following categories (sub-sectors):

i) Census 100 - Single units with reported no. of Employees $\geq$ 100

ii) Joint returns(JR) 100 - Joint return units with reported no. of Employees $\geqslant$ 100

iii) Other Joint returns(JR) - Joint return units with reported no. of Employees < 100

iv) Other Census - Single units with reported no. of Employees < 100

Then i) & ii) were clubbed together as "True Census" and iii) & iv) as "Pseudo Census".

Sample Sector was also divided in two ways as:

i) Complete Enumeration - Sample Units with multiplier = 1.00, i.e., where all units in the stratum were selected & surveyed

ii) Other Units - Sample Units with multiplier > 1.00, i.e., where some units in the stratum were selected & surveyed

2.2 Till 2003-04, some strata having less than or equal to four units, were considered under Sample Sector. As can be seen from the Table 1, from ASI 2004-05 onwards, these units were considered in Census Sector. Number of units surveyed in Other Census and Complete Enumeration are comparable over the years. Hence, for this study, Complete Enumeration Units under Sample Sector were counted under Other Census in Census Sector.

2.3 Table-2 shows that contributions in GVA of Other JR (Joint Returns) in all the years were quite small, and hence now the Census Sector is broadly categorized as:

i) True Census - Single & Joint return units with reported no. of Employees $\geqslant$ 100

ii) Pseudo Census - Single & Joint return units with reported no. of Employees < 100

Thus, the Pseudo census units include

(i) all units in a stratum having less than 4 units

(ii) all joint return units having less than 100 employees and the

units reported as joint returns but initially not selected as joint return units

(iii) all the units selected as joint returns but surveyed as single units.

(iv) all units having less than 100 employees reported but having more than equal to 100 workers during preparation of frame.

2.4 During the period under study, on an average 3,350 units were initially selected every year with more than or equal to 100 workers, but reported less than 100 employees. Number of such units was highest (5,390) in 2000-01 and lowest (1,779) in 2004-05. On the other hand, on an average, 2,080 units each year reported more than equal to 100 employees, initially selected in sample sector. Over the period, joint return units increased more than 57%, but each year, number of joint returns reported was less than that in the frame. As per ASI 2010-11 data, Chhattisgarh (63%), Jharkhand (49%), Delhi (37%), Odisha (31%), Karnataka (26%) and Daman & Diu (25%) are the states where 25% or more contribution in GVA came from Joint return units. However, while canvassing the units, composition of these units changed in many cases from the composition given in the ASI frame. In 2010-11, 1,811 units were reported as single return while they were declared as joint returns units as per frame and 849 units reported as joint returns while they were selected as single units in the frame. These figures justify the study of this sector in a greater detail.

2.5 NIC-1998 was followed in ASI 2000-01 to ASI 2003-04, then NIC-2004 was followed from ASI 2004-05 to ASI 2007-08 and from ASI 2008-09, NIC-2008 has been introduced. In this study, NIC-2004 has been used and accordingly, NIC-98 codes for ASI 2000-01 to ASI 2003-04 and NIC-2008 codes for ASI 2008-09 to ASI 2010-11 have been modified with NIC-2004 codes for uniformity. As such, where ever direct concordance of NIC at 2-digit levels was not possible, unit-level records were checked to decide on such modifications.

2.6 Among six less industrial states, Sikkim was surveyed from ASI 2009-10. Excluding Sikkim, GVA contribution of other five states ranges from 0.06% in ASI 2002-03 to 0.16% in ASI 2010-11.Sikkim has GVA contribution of 0.25% in ASI 2009-10 and 0.35% in ASI 2010-11 in India. Small U.T.s like Chandigarh and Puducherry also had GVA contribution of less than 1% in all these years. These eight states/u.t.s were clubbed together in this study as "Other States".

2.7 Similarly, as in ASI reports, NIC-2004 2-digit 01 & 38 onwards were clubbed together as "Other Industries".

2.8 The characteristics studied in this paper are Estimated Number of Units, Number of Employees, Fixed Capital, Total Emoluments, Total Outputs and Gross Value Added. Data were prepared in constant prices with base 2000-01. Implicit price deflator for Gross Fixed Capital Formation (2004-05 prices) was used for deflating the Fixed Capital figures. WPI for Manufactured Products (1993-94 series & 2004-05 series) was used for deflating Total Outputs and Gross Value Added figures and CPI for Industrial Workers was used for adjusting Total Emoluments figures. Price deflators used for adjusting different characteristics under study are given in Annexure-II. Year-wise growth rates and percentage shares of all the characteristics under study are given in Annexure-I for States and 2-digit level of NIC2004 at constant prices (2000-01).

3. Data Analysis

3.1 Table T1 and Table T2 in Annexure-I gives overall growth rate of ASI 2010-11 over 2000-01 of major characteristics from ASI 2000-01 to ASI 2010-11 for major State/U.T.s and NIC at 2-digit level respectively at 2000-01 constant prices. It shows, during this period, at all India level, growth of gross value added (GVA) was 203.07%, total output was 230.49%, fixed capital was 147.49%, whereas growth of employees and total emoluments were 58.93% and 92.86% respectively.

3.2 In terms of GVA, among the major Indian states, Uttarakhand, Jammu & Kashmir, Himachal Pradesh, Odisha and Andhra Pradesh registered the highest growth in that order. However, in terms of % share of the states in all India manufacturing GVA, Maharashtra, Gujarat, Tamil Nadu, Karnataka and Andhra Pradesh ranked as top five states and together they shared 57.96% of GVA at all India level.

3.3 Similarly, at NIC 2-digit level, Recycling (37), Other industries, Other mining and quarrying (14), Coke, petroleum and nuclear fuel (23) and Fabricated metal products (28) had the highest overall growth of GVA in that order. Chemicals and chemical products (24), Basic metals (27), Coke, petroleum and nuclear fuel (23), Food products and beverages (15) and Textiles (17) remained the top five industries in terms of their average

share in the overall GVA of the manufacturing sector with a cumulative GVA share of 55.77%.

3.4 It shows that overall growth of "True Census" is much similar to that at all India level. It is higher for number of Units, Total output & GVA and lower for Fixed Capital, number of Employees & Total emoluments. But impact of "Pseudo Census" seems to be quite marginal as the difference between Census sector and "True Census" is quite small other than in number of Units.

3.5 Year-wise fluctuation in GVA and other characteristics cannot be measured through the overall growth rate of these characteristics. So, the following States and Industries were selected depending on the overall growth rate, coefficient of variation of year wise growth rates and their percentage share at all India level for major characteristics.

States : Uttarakhand, Jharkhand, Gujarat & Odisha and

Industries : Chemicals and chemical products, Basic metals, Coke, petroleum and nuclear fuel & Food products

3.6 These states and industries have been studied in further details and the findings are presented in the remaining part of the Section under Sub-sections A and B. Sub-section A presents the state-wise analysis, while the industry-wise analysis are presented in Sub-section B.

(A) State-wise Analysis

3.7 Results of four states viz. Uttarakhand, Jharkhand, Gujarat and Odisha are presented in this Sub-section.

Uttarakhand:

3.8 This state shows a phenomenal growth in GVA (1,624%), Total output (1,319%) and Fixed Capital (1,081%) during the period 2000-01 to 2010-11, whereas overall growth in Employment and number of units has remained 568%, and 229% respectively during the same period. It is seen from the Table 4 that almost for all the characteristics under study, year-wise growth suffered the most in 2001-02 and in 2009-10, while 2008-09 showed very high growth in Total emoluments, GVA and Total output.

3.9 In Uttarakhand, Chemicals and chemical products (NIC 24) had an average 17% share of GVA in the state. Machinery and equipment n.e.c. (NIC 29) had 14% share, but during 2000-01 to 2002-03 its percentage share was less than 1%. From 2004-05 it had a major increase in share of GVA. Food products (NIC 15) was more or less having consistent share of GVA with an average of 11%. These three industries provided an average 42% share of state GVA. Percentage share in GVA for Wood and wood product (NIC 20) showed sharp decline in 2004-05 to 0.30% from 28.9% in 2003-04. Steady decline in share of GVA was also seen in Paper and paper products (NIC 21).

3.10 In food industries, on an average 83% share of GVA came from Census sector units and Sample sector units contributed only 17%. Out of this 83% share, 73% came from True Census units. But in 2002-03, percentage share of True census units were only 41%. So, the variation observed in the growth rate in Food industry can be attributed to both Census and Sample sector units.

3.11 In Chemical industries, 78% share of GVA came from Census sector units and 73% share from True census units. In 2006-07 Census sector share showed a decline to 59% and True census units contributed 53%. Census sector provided highest share of 97.77% in 2002-03 and Sample sector had highest share of 46% in 2009-10.

3.12 In machinery and equipment industry, percentage share of GVA wason an average, 90% from Census sector except in 2008-09, when it fell abruptly to 11%. Share of true census units also showed variations ranging from 21% to 94% due to changes in number of employees resulting in changes in different sectors (census and sample) over the period. For all other industries taken together, Census and True census units had a steady share of 82% and 73% respectively, except in 2008-09, when both were reduced to 40% and 38% respectively.

3.13 Year-wise GVA growth in the state was quite fluctuating as can be seen from the Table 6 and also, year-wise growth rate observed in top three industries was not in the same line with the growth in the state as a whole. But, in most cases, growth in True census units was close to that in Census sector. Except in machinery & equipment industry, Census sector growth was conforming to that of the industry at state level as a whole. Interestingly,

in many cases, the growth rate observed in Pseudo Census units have been extremely erratic and widely varying with the growth rates observed in Census, True census and even sample units both in magnitude and also in direction. This clearly points out to a possible disturbance in the overall estimate by these units.

Jharkhand

3.14 For the state of Jharkhand, growth observed in GVA (193%), Total output (230%) and Fixed capital (146%) have been less than that observed for all India, while Employment growth (8.42%) and Total Emolument growth (9.94%) were lowest among all states during the period 2000-01 to 2010-11. It is seen from the Table 7 that year-wise growth suffered severely in 2001-02, 2006-07 and 2008-09 for most of the characteristics. Fluctuation in year-wise growth figures was also very high for most of the characteristics in this state during this period. It is also seen from the Table 7 that year-wise growth of GVA suffered in two consecutive years twice, once in 2005-06 & 2006-07 and then again in 2008-09 & 2009-10.

3.15 Jamshedpur is well known for its Steel & Motor vehicle industries. In Jharkhand, both these industries taken together had an average share of 79% of the total GVA, with 71% contribution coming from Basic metals (NIC 27) alone. As seen from the Table 8 that percentage share of these industries also varied significantly over the period and in 2009-10, Basic metals had only 50% share in state GVA.

3.16 In Basic metal industry, on an average 97% share of GVA came from Census sector of which 96% came from True census units. Although the Pseudo Census and Sample sector units exhibited wide fluctuation in year-wise growth, given their almost negligible contribution in terms of % share of GVA, the fluctuation in this industry is mainly due to the True census units.

3.17 Similarly, Motor vehicles (34) industry, 89% share of GVA came from Census sector of which 88% came from True census units. But, in all other industries taken together, behaviour of all the categories of units was different and none of them was conforming to the year-wise GVA growth rates at the state level.

3.18 Interestingly, year-wise growth rates observed of Basic metals were quite opposite to that observed for Motor vehicles in some years during the period under study. For other years also, growth rates were quite different for these industries.

3.19 For the state of Jharkhand, Census sector contributed on an average 91.5% of the state GVA, where as share of true census units were 88%. Even though, year-wise growth rate observed in all sectors were erratic and widely varying, growth rates of Census sector and True census units were very close to that of the state as a whole, implying that the Census sector, or more specifically the True Census sector is the main driver of the GVA growth in the state and fluctuation in state GVA growth rates is mainly attributed to the volatility in growth rate in this sector only.

Gujarat

3.20 Gujarat is the second most industrialized state in India after Maharashtra. It's percentage share in the country's GVA was, on an average, 14% during the period 2000-01 to 2010-11. In the state, growth of GVA (212%), Total output (313%), Total Emolument (114%) and Employment (72%) were more than that of all India growth rates while growth rates observed for Fixed capital (132%) and number of Unit (51%) were lower the corresponding all India figures. It is seen from the Table 10 that GVA in the state grew steadily till 2005-06 and during the next five years it showed negative growth in alternate years. However, after 2000-01, Employment growth has remained quite stable during the period of study with nearly 10% share on an average in India, which is less than only 3 states viz. Tamil Nadu, Maharashtra and Andhra Pradesh.

3.21 In Gujarat, Chemicals and chemical products (NIC 24) had an average share of 34% while Coke, petroleum and nuclear fuel (NIC 23) had 23% share of GVA. Next highest share in GVA was from Textiles (NIC 17) with an average share of 7%. Among the remaining industries, basic metals, food products, machinery and equipment and other non-metallic mineral products industries had more than 1% shares in total GVA of the state. Year-wise percentage share of Coke & petroleum industry has increased was more or less steadily from 4.02% in 2000-01 to 29.46% in 2010-11, while that of Chemical and Textiles industries decreased steadily during this period from 51.45% in 2000-01 to 26.78% in 2010-11. However, the share of other industries remained more or less same over the period.

3.22 In both Coke & petroleum and Chemical industries, GVA share of Sample sector and Pseudo census units were very small but in Textile industry, share of both these sectors were more. In these three industries, year-wise growth rates of GVA of True census units were more or less same as that of Census sector as a whole and other than Textile industry, they were conforming to the GVA growth of the state. However, negative growth of Sample sector and Pseudo census units changed the magnitude of growth of GVA in some years for Textile industry.

3.23 In all other industries in Gujarat, True census units contributed on an average 68% share of GVA. But with 30.63% share, Sample sector units might also have affected growth in some years during the period.

3.24 However, at state level, year-wise growth rate in GVA was similar to that of True census units and Census sector units as a whole. Although, there have been erratic year-wise growth rates observed for Pseudo census units, they seem to have little impact in the overall growth rate of GVA at the state level, due to their negligible share in the overall GVA of the state. Both Sample sector and Pseudo census units had much effect in industry wise growth, but had less impact at state level.

Odisha

3.25 This state registered phenomenally high growth of GVA (356%), Total output (356%) and Fixed Capital (553%) during the period 2000-01 to 2010-11. Growth of Total Emolument (158%) and Employment (120%) were also much higher than all India level. Only growth in number of Units (52%) was lower than the all India average. Odisha had an average share of only 2.24% in country's GVA. It is seen from the Table 13 that growth of GVA was suffered only in 2001-02 (-10.97%), in 2005-06 (2.28%) and in 2009-10 (-8.52%). However, Fixed Capital grew significantly from 2005-06, registering a positive growth in all the subsequent years with a minimum of 17.65% growth in 2008-09 and a maximum growth of 61.72% in 2009-10.

3.26 For the state of Odisha, Basic metals (NIC 27) had the highest 73% share of GVA followed by 8% share from Other non-metallic mineral products (NIC 26). Among the remaining industries, chemicals and food products had more than 4% shares in total GVA of the state. For these two major industries, on an average, 96% share in Basic metals and 85% share

in Other non-metallic mineral products, came from True census units, whereas share of Pseudo census units was negligible at an average 0.28% and 2.05% respectively. But for all other industries together, average share of Pseudo census was more than 7% out of 77.5% average share of Census sector.

3.27 Although, year-wise growth rate of GVA has been found to be significantly varying for Basic metal industry, the variation in growth rate of Pseudo census and Sample sector units also have been extremely fluctuating.

3.28 Quite expectedly, Basic metal industry having major contribution in the overall GVA of the state, has remained the main driver of the GVA growth for the state - its growth resembled the overall growth at the state level, both in magnitude and direction for most of the years.

3.29 Overall for the state, an average of 92% share in GVA came from Census sector and 90% from True census units, Sample sector contributed remaining 8%. So, year-wise growths in GVA were similar to that of True census units and Census sector at state level. Although, there were erratic year-wise growths in both Sample sector and Pseudo census units, they had little impact in GVA growth at the state level.

(B) Industry-wise Analysis

3.30 Results of four industries viz. Chemical and Chemical Products (24), Basic Metals (27), Coke, Petroleum and Nuclear Fuel (23) and Food Products (15) are presented in this Sub-section.

Chemicals and chemical products (24)

3.31 Among the manufacturing industries, this industry had the highest share in overall manufacturing GVA (on an average of 16%) during the period under study, although its percentage share gradually declined from 21% in 2000-01 to 14% in 2010-11. Growth of GVA (102%), Total output (102%), Fixed capital (31%) and Total Emolument (75%) of this industry were much lower compared to those at all India level. However, the industry's share in Fixed capital (11%) in 2010-11 was second highest in India, next only to Basic metal industry.

3.32 It is seen from the Table 16 that GVA growth was negative only in 2000-01 and thereafter, in all subsequent years it registered a positive growth rate albeit in different magnitude. Interestingly, in the year 2001-02, all the characteristics under study showed a negative growth. Apart from the year 2001-02, Total output and Total emoluments registered a negative growth only in 2009-10.

3.33 For the Chemical industry, Gujarat and Maharashtra are the two major states having (average) 29% and 14% contribution to the total GVA respectively at all India level. It is seen from the Table 17 that share of both these states declined over the years. It was mainly due to increase in the shares of Himachal Pradesh, Uttarakhand and Andhra Pradesh.

3.34 In Gujarat, on an average 84% share of GVA for this industry came from True census units and contribution of Pseudo census units was negligible. In Maharashtra, True census units' average share was 72% with only 1% share from Pseudo census units. At all India level, on an average, 73% share came from True census units while Pseudo census units contributed only 2.6%.

3.35 It may be observed from the Table 18 that except for a few years (like 2004-05, 2010-11 for Gujarat, 2008-09 and 2010-11 for Maharashtra), direction and magnitude of growth of Census and True census units resembled the overall growth of the industry at state or all India level, as the case may be.

3.36 As can be seen from the Table 18, year-wise growth of GVA for Pseudo census units have been extremely erratic in many cases; although owing to their insignificant share in the overall industry level GVA, the impact of such high degree of fluctuation has not been that profound. Census and True census units also showed some irregularity in their growth pattern over the years, but in a much lesser degree.

Basic metals (27)

3.37 This industry has the second highest share in GVA, (on an average 14%) during the period 2000-01 to 2010-11 next only to Chemical and Chemical products. This percentage share fluctuated between 9% to 18% in the middle years, and then declined to 12% in 2010-11. Growth of GVA (265%) , Total output (355%), Fixed capital (206%) and Employment (80%)

of this industry were much higher compared to those at all India level, whereas, Growth in Total Emolument (90%) and in number of Units (60%) were close to the figures of all India. Moreover, share in Fixed capital (22%) in 2010-11 was highest among all states in India.

3.38 It is seen from the Table 19 that GVA growth was negative in 2000-01, 2005-06 and 2008-09. In these years, growth in Total Output was also marginal compared to remaining years.

3.39 Jharkhand, Chhattisgarh and Odisha are the major states with an average GVA share of 18%, 14% and 12% respectively. Other three states having more than 7% average share of GVA were Maharashtra, Andhra Pradesh and Karnataka.

3.40 In Jharkhand, on an average 96% share of GVA came from True census units and contribution of Pseudo census units was only 1%. In Chattisgarh, on an average 97% and in Odisha on an average 95.5% share of GVA came from True census units and contribution of Pseudo census units in these two states were negligible. As a whole, at all India level, an average 87% share came from True census units while Pseudo census units contributed only1% and Sample sector had remaining 12%.

3.41 It may be seen from the Table 21 that year-wise growth rates of GVA observed for the Census and True Census units were mostly similar in direction and magnitude in most of cases except perhaps for Odisha in 2007-08 and in 2008-09, where growth in Sample sector and Pseudo Census sector had changed the direction and/or magnitude of GVA growth of the industry in the state.

3.42 At the overall industry level, year-wise growth of GVA has remained quite fluctuating for almost all the sub-sectors with the growth pattern of the Pseudo Sector units being most erratic.

Coke, petroleum and nuclear fuel (23)

3.43 This industry has the third highest share in GVA with an average share of 10.5% during the period 2000-01 to 2010-11. During this period, the percentage share of this industry gradually increased from 4.9% in 2000-01 to 13.1% in 2005-06 and then declined to 10.6% in 2010-11. Growth of GVA (559%), Total output (467%), Fixed capital (236%) were highest among the major industries in India and growth in Total Emolument

(91%) and in Employment (68%) were close to the corresponding all India figures.

3.44 It is seen from the Table 22 that year-wise GVA growth was quite high till 2007-08 and then it registered a negative growth in 2009-10. Year-wise growth of Total Output always remained positive during the period. Employment growth increased steadily till 2005-06 and then oscillated between 21.04% in 2006-07 and -6.74% 2010-11. Fixed capital showed very high growth in 2001-02 and in 2009-10 and remained in under 15% in all other years.

3.45 For this industry, Maharashtra and Gujarat are the two major states with an average GVA share of 43% and 31% respectively during the period 2000-01 to 2010-11 of the shares of GVA in India. It is seen from the Table 23 that difference in share of GVA between these two states was less than 5 percentage points for the years 2001-02 to 2005-06 and 2010-11. However, for the same industry, share of Fixed capital has been widely different for these two states of Gujarat (47% share) and Maharashtra (10% share).

3.46 In both the states, share of GVA of Pseudo census units were negligible while on an average only 1.9% and 1.6% contribution came from Sample sector in Gujarat and Maharashtra respectively. As a whole, at all India level, an average 95.6% share came from True census units while Pseudo census units accounted for only 1% and remaining 3.4% came from Sample sector units.

3.47 It may be observed from the Table 24 that in most cases direction and magnitude of growth of Census and True census units resembled the overall growth of the industry at state or all India level, as the case may be. However, in 2001-02, high growth rate in Gujarat (318.51%) has probably affected the overall industry growth.

3.48 Although the year-wise growth of GVA for Pseudo census units has been most erratic, there have been wide fluctuations in the growth registered by the Census, True Census and Sample units also, albeit in lesser degree.

Food products (15)

3.49 This industry has the fourth highest share in GVA with an average share of 8.4% during the period 2000-01 to 2010-11. During this period,

percentage GVA share of this industry has fluctuated from 7.1% to 10.7%. Growth of GVA (125%), Total output (158%), Fixed capital (131%), Total Emolument (49%) and Employment (23%) were much lower than the corresponding all India level growth rates.

3.50 It is seen from the Table 25 that year-wise GVA growth rates showed fair amount of divergence during the period of study, having registered relatively higher growth rates in the years 2005-06,2006-07 and 2010-11. However, from 2004-05, all the selected characteristics exhibited positive growth except for GVA in 2007-08.

3.51 Maharashtra, Uttar Pradesh and Andhra Pradesh had higher share of GVA for this industry at all India level with an average GVA share of 17%, 12% and 10% respectively in India. Food and food products industry was present in all the states and in 13 states, it had more than 1% share of total GVA of the country. Percentage share of Uttar Pradesh and Andhra Pradesh were more or less same over the years, but, in Maharashtra, share of GVA declined during the period.

3.52 In all three states, contribution of Pseudo census units share of GVA was quite small with an average share of only 1.78%, 1.24% and 1.26% in Maharashtra, Uttar Pradesh and Andhra Pradesh respectively. But share of Sample sector in Maharashtra, Uttar Pradesh and Andhra Pradesh were on an average 27%, 24% and 50% respectively. As a whole, in India, average 63.5% share came from True census units while Pseudo census units contribute 4.25% and remaining 32.25% came from Sample sector units.

3.53 Unlike in other industries discussed above, for this industry, in the GVA growth at the state-level and all India level a confounded effect of all the subsectors is noticed. Census and True Census units have not been the only driver of the GVA growth for this industry, owing to a sizable chunk of sample sector units.

3.54 Year-wise growths of GVA for all the sectors were fairly erratic and widely varying during the period. As expected, Pseudo census units were shown more erratic growth than Sample sector units, mainly due to their overall contribution in the industry and both had quite impact on the state or industry growth.

4. Conclusion

4.1 Results presented in the previous section reveals that growth rates observed for Pseudo census units were mostly erratic showing a very high degree of fluctuation in year-on-year growth rates with growth figures varying widely both in magnitude and direction and showed different directions than True census and Sample sector units, even in major states and industries. In terms of fluctuation and variability, the growth rate of Sample sector has also been very significant, next only to the Pseudo census units. This is probably because of the fact that as per average worker size, with an average of 33 Employees and 25 Workers over the period, The Pseudo sector units are similar to Sample sector (on an average 32 Employees and 24 Worker) units. As the number of Pseudo census units is much less in comparison to the total number of Sample Sector units selected for survey, fluctuation in this sub-sector is generally much higher than that observed in the Sample sector units. In comparison to these categories of units, True Census units showed much more consistent growth rates, especially at the overall state or industry level. With some exceptions, in most of the cases, these True census units have remained the main driver of GVA growth at the industry or state level. It is the True census units that determined the direction and magnitude of the growth because of their high percentage of GVA share in any industry and/or state. However, as is evident from the results in the preceding section, there has been considerable fluctuation in the growth rate of these units also.

4.2 As per the new sampling design adopted from 2012-13, apart from the units traditionally defined as census units (like all the units belonging to the six less industrially developed states/ UT's, Joint Return units and units with 100 or more employees), all the units belonging to the strata (District × 4-digit of NIC-08) having less than or equal to 4 units are also to be considered as Census Sector units. This major deviation in stratum formation (State X NIC 4 digit to District X NIC 4digit) is expected to give rise to a much higher number of Pseudo census units. A study on ASI frame of 2010-11 revealed that as per this stratification criterion, 6,363 strata would have to be completely enumerated with 22,416 units and would be a part of the Pseudo census units. The behavior of these units and their impact in both central and state data may be studied in greater detail as a significant increase in number of Pseudo Census units may bring more

instability in the estimates. Over the period under study, average number of employees per unit declined from 430.85 in 2000-01 to 416.21 in 2010-11 for True census units. But in over all Census sector, both employee/unit and workers/unit figures showed an increase of more or less 30 persons/unit over the period. However, both ratios remained more or less same in Sample sector. Also, as the new sampling design is aimed at generating District level estimates from ASI data, suitable methodology should be devised to apportion the contribution of the Joint Return units across the districts as the definition of Joint Return units has not been changed.

Table 1: Number of Units surveyed under defined categories for ASI 2000-2001 to ASI 2010-2011

Categories	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
In ASI Year	**43,320**	**44,611**	**44,595**	**59,656**	**52,961**	**60,980**	**70,725**	**60,856**	**58,391**	**61,114**	**61,573**
Census Sector	18,034	18,184	14,808	14,823	21,097	25,808	31,080	35,536	24,275	23,813	25,613
Other Census	6,617	6,930	2,787	2,579	6,482	10,747	15,471	19,300	7,368	6,786	7,179
Other JR	1,002	1,006	1,217	1,132	1,648	1,553	1,525	1,330	1,290	1,271	1,339
JR 100	2,618	2,830	3,214	3,285	4,179	4,300	4,546	4,870	4,991	4,922	5,271
Census 100	7,797	7,418	7,590	7,827	8,788	9,208	9,538	10,036	10,626	10,834	11,824
Sample Sector	25,286	26,427	29,787	44,833	31,864	35,172	39,645	25,320	34,116	37,301	35,960
Complete * Enumeration	3,019	2,077	5,537	9,684							
Other Units	22,267	24,350	24,250	35,149	31,864	35,172	39,645	25,320	34,116	37,301	35,960
Other Census & Complete Enumeration	9,636	9,007	8,324	12,263	6,482	10,747	15,471	19,300	7,368	6,786	7,179

*Complete Enumeration is clubbed with Other Census and considered as Census Sector in rest of the paper for comparability.

Table 2: Percentage contribution of Gross Value Added (GVA) for the redefined categories for ASI 2000-2001 to ASI 2010-2011.

Categories	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
In ASI Year	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Census Sector	75.03	74.29	76.49	80.47	78.30	79.00	77.21	78.87	74.50	73.01	75.33
Other Census	2.59	3.31	3.51	5.72	1.44	2.11	2.20	2.80	1.90	1.33	1.37
Other JR	0.25	0.19	0.24	0.21	0.25	0.58	0.26	0.17	0.13	0.23	0.27
JR 100	14.69	15.59	16.11	14.56	17.34	16.27	15.61	17.28	15.76	13.71	13.52
Census 100	57.49	55.20	56.63	59.98	59.28	60.04	59.15	58.61	56.71	57.74	60.18
Sample Sector	24.97	25.72	23.51	19.53	21.70	21.00	22.79	21.13	25.50	26.99	24.67
Pseudo Census	2.84	3.50	3.75	5.93	1.69	2.69	2.46	2.97	2.03	1.56	1.63
True Census	72.18	70.78	72.74	74.54	76.62	76.31	74.76	75.90	72.47	71.44	73.69

Table 3: Overall growth of estimated major characteristics by defined categories of ASI 2010-11 over ASI 2000-01 at constant prices.

Categories	No. of Units	No. of Employees	Total Emoluments	Fixed Capital	Total Output	GVA
All India	**61.24**	**58.93**	**92.86**	**147.49**	**230.49**	**203.07**
Census Sector	35.23	53.56	79.05	144.59	236.45	204.30
Pseudo Census	-3.68	-27.41	19.37	102.22	47.87	74.15
True Census	64.18	58.60	81.14	146.50	246.82	209.43
Sample Sector	65.42	66.86	132.50	159.27	218.17	199.38

Table 4: Year wise growth rate of selected characteristics for Uttarakhand.

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-6.18	2.44	-5.04	10.75	19.68	27.78	28.17	29.38	22.92	4.56
No. of Employees	-5.22	1.48	0.18	24.54	37.35	33.71	36.32	77.28	3.95	20.71
Total Emoluments	-21.38	-0.31	0.26	10.22	16.29	35.60	28.60	199.10	-42.36	18.76
Fixed Capital	0.94	1.74	1.62	22.47	40.97	114.48	29.97	57.52	42.23	4.91
Total Output	4.83	12.78	13.65	30.78	51.01	31.31	45.99	136.21	-6.42	26.22
GVA	**-9.73**	**49.12**	**5.35**	**20.03**	**68.07**	**36.91**	**59.05**	**207.57**	**-35.66**	**39.82**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 5: Year wise % share of GVA for major industries in Uttarakhand

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
food products and beverages	17.06	16.24	12.85	12.62	10.26	7.98	5.12	8.61	3.93	7.49	20.31
chemicals and chemical products	7.03	8.27	8.88	11.77	13.54	24.80	36.19	23.12	15.84	21.41	16.29
machinery and equipment n.e.c.	0.67	0.63	0.80	1.85	36.31	21.74	16.29	14.47	38.45	12.01	10.04
All other industries	75.23	74.87	77.47	73.75	39.89	45.49	42.40	53.80	41.78	59.10	53.36

Table 6: Year wise growth rate of GVA for major industries by defined categories in Uttarakhand.

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Food & Food Products (15)										
Industry total	-14.10	18.05	3.46	-2.45	30.67	-12.09	167.53	40.35	22.53	279.33
Census Sector	3.26	13.46	3.08	-14.26	62.14	-17.20	213.21	16.76	29.99	292.07
Pseudo Census	-53.32	822.46	-60.13	-61.11	86.97	-12.15	-5.95	-47.38	-19.01	5,680.71
True Census	12.11	-39.25	65.62	-3.10	59.78	-17.77	239.38	18.89	30.71	243.16
Sample Sector	-54.94	42.91	5.04	47.10	-46.35	25.72	-55.04	840.80	-8.89	202.76
Chemicals & Chemical Products (24)										
Industry total	6.13	60.12	39.76	38.07	207.78	99.79	1.59	110.71	-13.02	6.38
Census Sector	-10.00	111.31	39.42	16.49	203.05	46.04	44.08	67.29	-29.54	53.51
Pseudo Census	1,216.0	577.81	-70.90	153.00	-11.21	315.36	8.47	535.09	-98.15	383.40
True Census	-14.52	84.82	62.37	11.40	221.22	39.72	46.56	43.16	-13.84	51.90
Sample Sector	117.46	-86.18	54.05	891.45	229.77	329.30	-60.13	338.60	20.06	-49.00
Machinery and equipment n.e.c.(29)										
Industry total	-15.61	89.79	144.03	2256.30	0.62	2.60	41.29	717.37	-79.91	16.95
Census Sector	-15.61	89.79	144.03	2254.79	0.64	1.64	40.70	-5.50	61.12	21.28

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Table 6: Year wise growth rate of GVA for major industries by defined categories in Uttarakhand.

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Pseudo Census	-61.64	317.54	91.51	24.92	53.78	9.05	-7.96	-46.81	-2.48	160.95
True Census		-100.00		10385.8	-1.67	1.14	44.27	-3.57	62.76	19.12
Sample Sector					-30.23	2193.33	101.16	52126.1	-98.06	-29.29
All other Industries										
Industry total	-10.16	54.30	0.29	-35.08	91.64	27.62	101.83	138.86	-9.00	26.23
Census Sector	-7.57	54.85	2.24	-44.88	81.05	36.83	70.88	32.19	70.45	33.98
Pseudo Census	55.07	-4.55	68.66	-46.57	111.56	106.43	89.20	-44.81	-110.40	-1379.85
True Census	-10.20	59.16	-0.64	-44.76	78.88	30.97	68.44	43.69	80.82	29.31
Sample Sector	-49.76	39.11	-60.24	750.53	146.66	-7.54	276.50	412.02	-61.53	3.55
State GVA	**-9.73**	**49.12**	**5.35**	**20.03**	**68.07**	**36.91**	**59.05**	**207.57**	**-35.66**	**39.82**
Census Sector	-6.35	52.70	6.92	9.80	61.82	25.53	65.01	32.37	35.19	57.85
Pseudo Census	10.88	149.63	-12.27	-28.70	71.53	83.61	52.57	35.14	-97.12	4269.03
True Census	-7.40	45.60	9.33	13.68	61.20	21.63	66.28	32.11	47.80	50.03
Sample Sector	-38.20	3.41	-24.20	291.78	114.62	100.80	38.14	942.24	-73.40	-8.99

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 7: Year wise growth rate of selected characteristics for Jharkhand.

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-4.67	-0.91	2.12	11.06	-1.06	0.50	1.06	14.30	10.08	23.23
No. of Employees	-9.84	0.06	-7.65	5.54	-2.77	-1.03	4.02	7.18	-13.55	32.98
Total Emoluments	-6.41	5.60	7.90	-21.30	9.56	-1.70	28.12	-0.25	-20.33	24.13
Fixed Capital	-3.11	-3.43	-1.63	-7.53	12.02	4.16	3.23	27.35	7.94	74.37
Total Output	-4.01	28.04	6.28	27.16	8.16	6.46	22.97	-7.73	11.11	36.99
GVA	**-10.97**	**72.39**	**10.48**	**78.72**	**-23.65**	**-16.29**	**72.22**	**-30.70**	**2.54**	**23.69**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 8: Year wise % share of GVA for major industries in Jharkhand.

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Basic metals	82.97	64.69	76.37	72.62	68.22	75.35	67.08	79.77	72.22	50.48	70.73
Motor vehicles, trailers etc.	2.83	11.01	5.62	11.36	18.05	5.31	10.37	5.35	3.29	11.20	6.31
All other industries	14.20	24.30	18.01	16.02	13.73	19.35	22.55	14.88	24.49	38.32	22.96

Table 9: Year wise growth rate of GVA for major industries by defined categories in Jharkhand

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Basic metals(27)										
Industry total	-30.59	103.51	5.07	67.89	-15.67	-25.48	104.80	-37.26	-28.33	73.30
Census Sector	-28.73	100.72	5.54	68.77	-16.75	-24.85	103.33	-38.70	-28.51	55.01
Pseudo Census	58.14	-96.37	3,472.00	-72.82	-54.58	861.68	1,483.97	-99.01	3,164.06	-102.76
True Census	-29.11	102.62	4.95	69.60	-16.71	-25.31	94.22	-35.46	-31.15	61.18
Sample Sector	-89.15	680.11	-20.47	5.75	105.36	-54.03	215.43	32.49	-24.14	457.48
Motor vehicles, trailers etc. (34)										
Industry total	246.67	-11.98	123.18	184.05	-77.54	63.58	-11.14	-57.44	249.35	-30.35
Census Sector	241.39	15.64	129.35	200.28	-80.94	88.33	-8.75	-63.26	261.39	-30.69
Pseudo Census	7.79	-17.3	20	-68.39	-16.36	287.68	202.62	-51.2	-90.13	4306.41
True Census	253.43	16.15	130.58	201.84	-80.98	87.79	-9.92	-63.48	270.12	-33.56
Sample Sector	258.82	-72.64	65.96	-24.2	95.03	-59.33	-66.12	302.65	181.3	-27.85
All other Industries										
Industry total	52.36	27.79	-1.75	53.15	7.6	-2.41	13.63	14.06	60.42	-25.87
Census Sector	75.94	13.02	9.69	32.45	24.06	-6.31	3	-21.67	83.02	-39.32
Pseudo Census	-9.92	101.88	20.01	-79.28	81.59	-29.66	26.93	-65.86	1396.87	-82.6
True Census	122.08	-6.36	4.84	92.55	20.73	-4.27	1.47	-18.13	39.17	-23.79
Sample Sector	-41.22	203.16	-52.36	264.18	-53.44	36.04	86	148.66	33.6	-4.01
State GVA	**-10.97**	**72.39**	**10.48**	**78.72**	**-23.65**	**-16.29**	**72.22**	**-30.70**	**2.54**	**23.69**
Census Sector	-10.38	73.06	12.82	77.61	-23.98	-16.23	71.1	-37.96	-1.61	17.32
Pseudo Census	-4.17	73.27	29.35	-78.68	67.06	-3.99	410.78	-92.25	1397.15	-83.59
True Census	-10.69	73.05	11.94	87.18	-24.61	-16.41	65.07	-34.97	-10.77	28.40
Sample Sector	-19.8	61.09	-31.6	111.51	-15.41	-17.72	97.61	112.36	26.43	52.25

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 10: Year wise growth rate of selected characteristics for Gujarat

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-0.99	-5.52	-2.92	6.32	3.32	1.94	5.44	-1.62	4.80	36.63
No. of Employees	-5.21	0.60	1.71	10.87	9.76	10.86	6.26	7.66	2.99	11.74
Total Emoluments	-1.97	2.49	5.95	11.67	8.34	13.86	12.23	8.23	6.39	13.09
Fixed Capital	16.85	-7.54	-0.74	-5.69	32.51	4.48	5.07	10.61	33.01	7.25
Total Output	13.22	20.65	7.39	18.35	15.31	14.50	14.82	6.77	23.74	18.76
GVA	5.03	23.36	12.22	13.74	26.22	-0.62	18.51	-6.38	41.67	-4.22

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 11: Year wise % share of GVA for major industries in Gujarat form ASI 2000-01 to ASI 2010-11

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Coke, petroleum and nuclear fuel	4.02	16.00	24.37	24.96	26.66	32.19	25.93	24.73	25.32	22.76	29.46
Chemicals and chemical products	51.45	41.88	37.10	39.16	34.07	31.80	30.82	28.53	28.62	27.21	26.78
Textiles	10.74	9.46	7.21	6.81	6.25	6.46	6.02	6.11	5.51	4.91	6.06
All other industries	33.79	32.66	31.32	29.07	33.03	29.55	37.23	40.63	40.55	45.11	37.70

Table 12: Year wise growth rate of GVA for major industries by defined categories in Gujarat.

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Coke, petroleum and nuclear fuel(23)										
Industry total	318.51	87.92	14.90	21.50	52.40	-19.93	12.99	-4.12	27.35	23.97
Census Sector	296.99	98.06	15.38	15.43	60.33	-20.39	11.93	-3.12	25.92	23.03
Pseudo Census	-102.09	10150.0	121.57	-100.00		143.50	-233.98	-204.1	-97.05	-5920.0
True Census	293.29	97.56	15.11	16.00	60.29	-20.44	12.12	-3.31	26.05	23.17
Sample Sector	4606.51	-82.45	-76.02	5554.98	-95.37	280.03	157.25	-63.15	248.64	76.90
Chemicals and chemical products (24)										
Industry total	-14.52	9.28	18.47	-1.05	17.81	-3.68	9.69	-6.08	34.70	-5.74
Census Sector	-11.36	17.42	16.32	2.65	18.24	-5.28	9.15	-6.56	25.31	1.13
Pseudo Census	137.92	79.29	-26.29	-38.98	-28.25	183.23	-9.32	-84.32	-4.53	372.99
True Census	-11.70	17.05	16.72	2.89	18.40	-5.68	9.26	-6.14	25.33	0.88
Sample Sector	-25.18	-23.32	31.64	-21.05	14.79	7.94	13.16	-3.13	90.32	-32.55
Textiles(17)										
Industry total	-7.49	-5.95	6.06	4.24	30.56	-7.41	20.41	-15.70	26.45	18.19
Census Sector	-2.51	25.75	9.52	0.56	11.16	3.04	14.66	-5.31	27.60	12.09
Pseudo Census	-74.26	-39.90	264.31	-46.59	75.11	16.42	-26.97	-40.27	38.99	19.77
True Census	0.90	26.55	8.05	1.48	10.51	2.82	15.43	-4.90	27.52	12.03
Sample Sector	-13.12	-46.14	-4.17	16.66	87.12	-25.50	34.19	-36.96	22.89	37.68
All other Industries										
Industry total	1.52	18.27	4.16	29.22	12.95	25.21	29.35	-6.58	57.61	-19.96
Census Sector	-13.28	29.04	9.00	32.84	9.19	36.18	31.79	-16.31	59.11	-14.20
Pseudo Census	-22.04	140.23	34.12	-77.98	111.69	99.55	18.33	-72.25	122.40	-57.11
True Census	-13.04	26.35	7.85	39.17	8.26	35.06	32.14	-15.00	58.62	-13.74
Categories	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**
Sample Sector	36.75	2.02	-5.10	21.29	21.98	1.62	22.33	23.63	54.45	-32.43
State GVA	**5.03**	**23.36**	**12.22**	**13.74**	**26.22**	**-0.62**	**18.51**	**-6.38**	**41.67**	**-4.22**
Census Sector	5.54	37.68	13.76	13.59	28.12	-0.72	17.70	-9.08	37.04	1.87
Pseudo Census	-17.89	117.94	29.95	-72.60	69.26	99.35	4.62	-68.77	84.28	-42.50
True Census	5.84	36.88	13.51	15.17	27.94	-1.30	17.85	-8.46	36.87	2.08
Sample Sector	3.64	-16.46	5.16	14.47	16.90	-0.03	22.86	7.43	61.78	-26.58

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 13: Year wise growth rate of selected characteristics for Odisha

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	2.64	-1.76	-0.06	4.23	6.46	2.36	-4.41	5.93	6.32	23.59
No. of Employees	-10.11	2.19	5.75	16.61	-0.82	12.45	13.74	15.31	6.72	24.32
Total Emoluments	-2.50	-0.87	7.94	7.44	6.61	13.76	37.51	20.14	-13.35	32.71
Fixed Capital	-0.57	-11.99	44.69	-7.54	42.12	18.84	39.50	17.65	61.72	24.38
Total Output	-0.44	7.85	17.80	18.49	17.27	23.95	25.06	36.41	-7.62	32.75
GVA	-10.97	19.67	21.97	57.45	2.28	30.70	38.37	16.58	-8.52	13.02

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 14: Year wise percentage share of GVA for major industries in Odisha

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Basic metals	65.69	56.45	69.72	74.74	84.43	80.60	86.15	78.93	74.91	61.39	73.12
Other non-metallic mineral products	8.60	6.08	6.73	5.69	4.56	5.89	5.37	5.39	8.69	22.06	5.65
All other industries	25.71	37.46	23.55	19.57	11.01	13.51	8.48	15.68	16.40	16.54	21.23

Table 15: Year wise growth rate of GVA for major industries by defined categories in Odisha

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Basic metals(27)										
Industry total	-23.49	47.8	30.75	77.86	-2.36	39.7	26.77	10.63	-25.02	34.6
Census Sector	-25.35	50.74	28.1	82.01	-3.3	40.61	10.63	23.74	-25.8	33.85
Pseudo Census	211.49	-209.98	-391.12	-89.63	2989.5	-53.29	311.5	-120.31	-208.94	-39.95
True Census	-25.53	51.55	27.15	82.89	-4.18	41.5	9.7	25.42	-26.15	34.06
Sample Sector	138.12	-31.78	189.72	-31.91	64.21	1.56	959.06	-68.48	-6.47	48.6
Other non-metallic mineral products(26)										
Industry total	-36.99	32.37	3.08	26.13	32.16	19.21	38.77	88.12	132.23	-71.04
Categories	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**
Census Sector	-42.3	35.03	8.19	24.07	26.37	22.97	35.61	0.56	372.03	-74.35
Pseudo Census	26.71	-8.06	63.87	-87.4	79.65	183.82	-57.13	-74.47	110.42	128.71
True Census	-44.31	37.88	5.74	31.68	26.03	21.47	37.63	1.07	372.47	-74.51
Sample Sector	82.18	13.53	-40.21	57.71	101.95	-9.12	70.9	797.04	-85.42	26.24
All other Industries										
Industry total	29.72	-24.79	1.37	-11.42	25.52	-17.98	155.89	21.94	-7.73	45.03
Census Sector	45.76	-29.59	6.78	-23.95	19.92	-9.01	159.42	18.62	2.26	34.68
Pseudo Census	31.81	18.78	34.04	-64.53	13.92	61.62	6.2	-51.82	158.32	-49.3
True Census	47.26	-34.28	2	-14.62	20.49	-15.38	185.83	23.14	-1.66	40.22
Sample Sector	-19.67	2.1	-19.48	52.66	39.78	-37.58	144.64	33.15	-37.78	96.22
State GVA	**-10.97**	**19.67**	**21.97**	**57.45**	**2.28**	**30.7**	**38.37**	**16.58**	**-8.52**	**13.02**
Census Sector	-11.95	21.94	22.54	60.2	-0.07	34.69	21.9	21.7	-3.26	9.25
Pseudo Census	35.26	4.44	59.48	-69.06	113.92	10.97	62.04	-86.96	445.94	-45
True Census	-13.09	22.6	21.36	65.62	-0.96	35.09	21.35	23.71	-4.14	9.86
Sample Sector	1.34	-4.95	14.02	16.28	50.67	-23.88	436.41	-11.54	-48.23	66.19

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 16: Year wise growth rate of selected characteristics for Chemicals and chemical products

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-0.86	-1.72	-1.63	5.09	2.31	0.64	1.01	7.67	0.03	33.56
No. of Employees	-4.77	-0.81	-1.94	6.01	5.16	6.26	1.81	9.10	4.45	9.80
Total Emoluments	-1.73	1.75	2.51	6.89	7.65	8.71	4.16	20.17	-3.10	12.43
Fixed Capital	-0.14	-10.65	-0.59	-8.24	26.09	4.34	-0.47	19.97	-0.18	2.76
Total Output	-5.01	4.02	4.15	10.25	11.82	7.89	4.40	22.78	-2.16	17.97
GVA	-4.53	7.97	2.00	8.48	12.14	6.65	6.93	17.85	11.02	6.00

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 17: Year wise percentage share of GVA for major states in Chemicals and chemical products

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Gujarat	31.49	28.20	28.54	33.14	30.23	31.76	28.69	29.43	23.45	28.45	25.30
Maharashtra	23.69	22.19	20.45	21.49	19.98	21.41	17.52	18.65	18.91	18.67	19.03
All other states	44.82	49.61	51.01	45.36	49.79	46.83	53.79	51.92	57.64	52.87	55.66

Table 18: Year wise growth rate of GVA for major states by defined categories in Chemicals and chemical products

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Gujarat										
Industry total	-14.52	9.28	18.47	-1.05	17.81	-3.68	9.69	-6.08	34.70	-5.74
Census Sector	-11.36	17.42	16.32	2.65	18.24	-5.28	9.15	-6.56	25.31	1.13
Pseudo Census	137.92	79.29	-26.29	-38.98	-28.25	183.23	-9.32	-84.32	-4.53	372.99
True Census	-11.70	17.05	16.72	2.89	18.40	-5.68	9.26	-6.14	25.33	0.88
Sample Sector	-25.18	-23.32	31.64	-21.05	14.79	7.94	13.16	-3.13	90.32	-32.55
Maharashtra										
Industry total	-10.55	-0.51	7.21	0.83	20.15	-12.71	13.85	19.46	9.64	8.05
Census Sector	-20.72	-3.89	10.43	1.03	19.12	-16.85	22.68	-3.53	14.39	29.73
Pseudo Census	-26.49	14.72	238.43	-45.59	-10.82	-16.78	65.27	-51.38	8.89	147.04
True Census	-20.66	-4.08	7.58	2.86	19.74	-16.85	22.02	-2.52	14.45	28.56
Sample Sector	43.98	9.44	-1.16	0.27	23.18	-1.03	-7.09	91.39	2.16	-30.23
All other States										
Industry total	5.67	11.03	-9.31	19.06	5.48	22.51	3.21	30.84	1.83	11.60
Census Sector	10.46	13.12	0.18	6.31	5.17	19.57	14.39	25.58	-2.84	11.80
Pseudo Census	11.44	46.50	79.69	-77.25	158.31	-14.00	41.25	-22.49	-15.54	-1.93
True Census	10.39	10.86	-6.93	20.73	0.19	22.39	12.81	29.13	-2.28	12.33
Sample Sector	-4.27	6.03	-33.56	68.21	6.24	29.59	-21.67	47.92	14.74	11.11
Industry GVA	**-4.53**	**7.97**	**2.00**	**8.48**	**12.14**	**6.65**	**6.93**	**17.85**	**11.02**	**6.00**
Census Sector	-5.01	10.63	7.38	3.97	12.39	3.05	14.02	10.11	7.49	11.41
Pseudo Census	10.76	46.12	81.09	-73.05	112.78	-10.15	39.82	-27.78	-13.92	13.61
True Census	-5.48	9.37	3.91	10.30	10.38	3.56	13.15	11.68	8.07	11.37
Sample Sector	-3.12	0.38	-15.03	26.47	11.32	18.59	-13.47	47.24	21.02	-7.64

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 19: Year wise growth rate of selected characteristics for Basic metals

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-4.38	-2.06	-1.27	3.27	7.30	7.84	-0.17	11.23	3.06	26.10
No. of Employees	-3.78	-1.41	0.87	7.02	11.48	19.45	5.32	10.97	-0.45	13.11
Total Emoluments	-4.75	6.38	8.55	-3.62	9.50	16.24	23.53	9.38	-16.54	24.93
Fixed Capital	-3.34	6.87	10.83	0.48	19.97	10.18	13.79	17.34	28.62	17.11
Total Output	0.54	24.89	22.78	44.86	1.83	30.03	13.53	9.61	2.36	20.65
GVA	**-7.17**	**41.46**	**30.11**	**56.56**	**-13.05**	**35.34**	**30.28**	**-19.78**	**4.20**	**6.37**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 20: Year wise percentage share of GVA for major states in Basic metals

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Jharkhand	22.94	17.15	24.67	19.92	21.37	20.72	11.41	17.94	14.03	9.65	15.72
Chattisgarh	12.14	14.45	14.09	15.36	14.87	13.78	16.01	13.78	17.32	13.51	12.41
Odisha	11.07	9.13	9.54	9.59	10.89	12.23	12.62	12.28	16.94	12.19	15.42
All other states	53.85	59.27	51.70	55.13	52.87	53.27	59.96	56.00	51.71	64.65	56.45

Table 21: Year wise growth rate of GVA for major states by defined categories in Basic metals

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Jharkhand										
Industry total	-30.59	103.51	5.07	67.89	-15.67	-25.48	104.80	-37.26	-28.33	73.30
Census Sector	-28.73	100.72	5.54	68.77	-16.75	-24.85	103.33	-38.70	-28.51	55.01
Pseudo Census	58.14	-96.37	3472.00	-72.82	-54.58	861.68	1483.97	-99.01	3164.06	-102.76
True Census	-29.11	102.62	4.95	69.60	-16.71	-25.31	94.22	-35.46	-31.15	61.18
Sample Sector	-89.15	680.11	-20.47	5.75	105.36	-54.03	215.43	32.49	-24.14	457.48
Odisha										
Industry total	-23.49	47.80	30.75	77.86	-2.36	39.70	26.77	10.63	-25.02	34.60
Census Sector	-25.35	50.74	28.10	82.01	-3.30	40.61	10.63	23.74	-25.80	33.85
Pseudo Census	211.49	-209.98	-391.12	-89.63	2989.5	-53.29	311.50	-120.31	-208.94	-39.95
True Census	-25.53	51.55	27.15	82.89	-4.18	41.50	9.70	25.42	-26.15	34.06
Sample Sector	138.12	-31.78	189.72	-31.91	64.21	1.56	959.06	-68.48	-6.47	48.60
Chattisgarh										
Industry total	10.49	37.88	41.87	51.62	-19.44	57.21	12.12	0.84	-18.71	-2.33
Census Sector	10.44	38.10	39.52	53.61	-19.28	53.98	13.30	1.06	-20.35	-4.70
Pseudo Census	32.07	-24.28	73.20	-2.65	217.66	33.00	18.22	-72.95	-75.06	107.26
True Census	10.36	38.39	39.43	53.79	-19.77	54.15	13.26	1.61	-20.24	-4.77
Sample Sector	14.64	19.35	273.82	-21.51	-31.13	329.58	-23.39	-9.28	62.92	55.56
All other States										
Industry total	2.18	23.40	38.73	50.14	-12.39	52.34	21.69	-25.93	30.27	-7.13
Census Sector	-2.20	24.69	43.01	45.86	-9.59	47.35	31.91	-36.54	29.75	-2.95
Pseudo Census	18.22	-24.05	79.64	35.63	31.35	115.50	17.60	-37.05	-44.77	106.67
True Census	-2.54	25.66	42.57	46.01	-10.17	45.95	32.34	-36.53	31.75	-4.19
Sample Sector	25.58	18.03	19.92	72.61	-24.82	78.88	-23.15	54.00	31.87	-19.87
Industry GVA	**-7.17**	**41.46**	**30.11**	**56.56**	**-13.05**	**35.34**	**30.28**	**-19.78**	**4.20**	**6.37**
Census Sector	-9.84	44.23	30.79	55.84	-12.11	31.32	34.77	-24.41	0.19	8.41
Pseudo Census	25.04	-38.18	125.44	13.27	51.51	97.82	89.50	-65.67	-6.55	23.36
True Census	-10.18	45.36	30.23	56.27	-12.58	30.47	33.71	-23.29	0.27	8.24
Sample Sector	18.38	21.24	24.18	63.16	-21.25	74.52	-2.60	27.17	28.40	-3.24

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 22: Year wise growth rate of selected characteristics for Coke, petroleum and nuclear fuel

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-3.49	7.12	-3.16	7.84	4.75	-6.94	9.22	-10.72	24.02	21.94
No. of Employees	1.07	1.95	5.91	7.29	7.31	5.60	21.04	3.40	8.50	-6.74
Total Emoluments	-6.31	-2.57	4.38	4.64	5.73	15.93	8.15	16.96	7.17	15.30
Fixed Capital	62.15	6.88	1.43	-6.53	13.53	-1.40	1.37	0.06	78.91	0.73
Total Output	29.93	38.24	14.52	24.63	21.69	20.55	11.07	3.72	9.77	19.17
GVA	**26.53**	**88.84**	**23.64**	**14.10**	**35.05**	**12.59**	**19.35**	**1.21**	**-9.98**	**18.23**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 23: Year wise percentage share of GVA for major states in Coke, petroleum and nuclear fuel

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Maharashtra	52.98	36.49	35.78	36.02	33.27	43.35	53.52	48.44	53.18	44.10	40.27
Gujarat	10.56	34.93	34.76	32.31	34.40	38.82	27.61	26.14	24.76	35.03	36.73
All other states	36.46	28.58	29.46	31.67	32.32	17.82	18.87	25.42	22.06	20.87	23.00

Table 24: Year wise growth rate of GVA for major states by defined categories in Coke, petroleum and nuclear fuel

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Maharashtra										
Industry total	-12.85	85.15	24.49	5.39	75.96	39.00	8.03	11.11	-25.35	7.95
Census Sector	-8.32	83.08	27.43	2.50	79.18	39.06	7.52	12.13	-27.65	11.88
Pseudo Census	252.26	-96.03	131.49	-52.57	215.50	20.27	-12.77	-62.41	-109.35	-663.33
True Census	-9.33	85.77	27.40	2.53	79.14	39.07	7.53	12.15	-27.64	11.87
SampleSector	-85.33	292.76	-113.16	-1300.8	-48.27	30.68	80.90	-74.75	838.86	-105.68
Gujarat										
Industry total	318.51	87.92	14.90	21.50	52.40	-19.93	12.99	-4.12	27.35	23.97
Census Sector	296.99	98.06	15.38	15.43	60.33	-20.39	11.93	-3.12	25.92	23.03
Pseudo Census	-102.09	10150.0	121.57	-100.00		143.50	-233.98	-204.06	-97.05	-5920.0
True Census	293.29	97.56	15.11	16.00	60.29	-20.44	12.12	-3.31	26.05	23.17
SampleSector	4606.51	-82.45	-76.02	5554.98	-95.37	280.03	157.25	-63.15	248.64	76.90
All other States										
Industry total	-0.83	94.67	32.92	16.45	-25.54	19.21	60.77	-12.18	-14.82	30.32
Census Sector	-10.44	112.48	38.71	16.62	-35.92	26.13	70.52	-17.63	-16.41	50.02
Pseudo Census	63.39	103.02	124.69	-94.41	296.49	-19.57	129.78	-98.64	6400.00	-79.96
True Census	-13.07	113.12	33.24	28.54	-37.47	27.49	69.41	-15.58	-19.03	54.29
Categories	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**
SampleSector	143.43	-3.70	-37.68	11.87	268.02	-14.87	-10.30	63.42	-3.74	-89.21
IndustryGVA	**26.53**	**88.84**	**23.64**	**14.10**	**35.05**	**12.59**	**19.35**	**1.21**	**-9.98**	**18.23**
Census Sector	24.84	96.00	26.30	11.08	35.48	13.22	19.52	0.85	-11.81	23.12
Pseudo Census	104.92	59.07	124.57	-94.42	300.86	-14.19	98.11	-93.18	1218.42	-87.75
True Census	23.76	96.83	24.51	14.54	35.05	13.35	19.24	1.41	-12.31	23.79
SampleSector	55.90	-10.79	-57.76	289.90	23.89	-5.33	13.55	14.21	48.25	-73.73

Note: 01-02 means growth of 2001-02 over 2000-01 and so on

Table 25: Year wise growth rate of selected characteristics for Food products

Characteristics	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
No. of Units	-2.10	1.41	0.10	6.39	1.43	0.13	1.79	3.28	0.97	30.29
No. of Employees	-1.94	0.13	-0.86	3.54	3.63	6.09	1.96	3.01	2.77	3.20
Total Emoluments	-2.26	0.25	-3.59	3.38	8.74	7.54	10.03	6.13	3.06	8.49
Fixed Capital	2.87	8.49	-5.25	2.75	5.82	20.21	13.12	10.32	17.10	14.60
Total Output	0.95	14.93	-4.51	6.60	9.22	17.76	13.26	12.88	7.88	23.21
GVA	**2.88**	**-1.06**	**-6.73**	**5.81**	**22.11**	**35.72**	**-2.47**	**9.53**	**7.11**	**18.10**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table 26: Year wise percentage share of GVA for major states in Food products

ASI Years	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Maharashtra	21.32	19.98	19.82	17.26	15.59	16.64	17.23	16.18	13.00	15.51	14.65
Uttar Pradesh	13.37	11.38	10.96	11.73	13.94	13.72	12.14	10.77	9.63	8.86	12.62
Andhra Pradesh	8.27	11.58	11.02	9.81	13.82	11.91	10.62	8.17	9.21	10.63	9.72
All other states	57.04	57.07	58.20	61.20	56.65	57.73	60.00	64.88	68.15	64.99	63.01

Table 27: Year wise growth rate of GVA for major states by defined categories in Food products

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Maharashtra										
Industry total	-3.61	-1.83	-18.77	-4.45	30.33	40.57	-8.44	-11.96	27.78	11.49
Census Sector	6.95	-14.68	-28.39	7.18	28.63	62.65	-16.07	-20.84	39.19	33.14
Pseudo Census	154.31	-64.62	238.66	-78.72	541.81	-8.29	81.05	-79.06	-86.97	1282.13
True Census	5.38	-13.41	-31.19	11.59	23.60	66.26	-18.79	-17.19	41.19	31.31
Sample Sector	-32.87	54.93	4.62	-23.80	34.31	-8.92	22.11	12.45	5.68	-43.72
Categories	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**
Uttar Pradesh										
Industry total	-12.44	-4.74	-0.16	25.71	20.21	20.10	-13.48	-2.06	-1.45	68.23
Census Sector	-21.50	3.76	3.80	27.12	24.34	-2.35	-6.08	0.40	-6.93	10.46
Pseudo Census	-71.48	190.82	103.97	-82.05	-16.48	183.44	203.61	-34.07	-53.22	64.52
True Census	-20.55	2.48	1.85	31.37	24.55	-3.01	-8.26	1.59	-5.90	9.86
Sample Sector	28.91	-28.36	-16.08	18.66	-1.80	171.73	-31.44	-10.26	18.96	236.31
Andhra Pradesh										
Industry total	44.05	-5.80	-16.99	49.11	5.21	21.07	-25.02	23.55	23.58	8.03
Census Sector	5.93	-9.10	2.37	24.11	26.85	-14.45	-5.10	47.48	17.17	-23.69
Pseudo Census	-7.42	26.24	54.72	-63.48	-7.83	149.27	14.82	-16.13	61.34	77.12
True Census	6.25	-9.82	0.86	27.97	27.29	-15.94	-5.64	49.57	16.36	-26.27
Sample Sector	110.04	-2.92	-32.80	80.24	-13.36	65.66	-37.94	-0.17	32.96	48.97
All other States										
Industry total	2.94	0.91	-1.93	-2.06	24.43	41.05	5.47	15.06	2.15	14.50
Census Sector	-1.48	2.79	-0.62	-8.40	31.17	30.75	-9.27	41.11	1.43	15.33
Pseudo Census	-8.90	32.05	19.59	-65.61	72.16	30.87	25.14	224.30	-82.06	61.66
True Census	-0.74	0.10	-3.07	0.14	29.07	30.74	-11.63	23.36	22.70	13.60
Sample Sector	14.24	-3.23	-4.99	13.47	11.12	65.10	32.70	-17.86	3.73	12.73
Industry GVA	**2.88**	**-1.06**	**-6.73**	**5.80**	**22.11**	**35.72**	**-2.47**	**9.53**	**7.11**	**18.10**
Census Sector	-2.15	-2.13	-5.53	1.56	29.14	26.09	-10.02	23.80	6.50	14.34
Pseudo Census	-5.54	24.07	30.06	-67.45	90.40	28.33	36.80	151.21	-80.20	73.92
True Census	-1.94	-3.68	-8.24	9.01	27.16	25.98	-12.32	14.03	21.15	12.69
Sample Sector	16.41	1.36	-9.36	15.45	8.05	58.72	11.86	-12.25	8.43	26.08

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

ANNEXURE-I

Table T1: Overall growth rate of estimated major characteristics of ASI 2010-11 over ASI 2000-01 for major State/U.T.s at 2000-01 constant prices.

State/U.T.s	No. of Unit	No. of Employees	Total Emoluments	Fixed Capital	Total Output	GVA
Jammu & Kashmir	123.31	138.13	155.83	528.52	828.13	905.87
Himachal Pradesh	335.90	297.27	488.03	522.34	626.11	773.67
Punjab	78.93	71.22	86.71	145.70	178.10	190.28
Uttarakhand	268.15	568.32	273.59	1,080.62	1,319.45	1,623.59
Haryana	34.15	81.55	122.37	126.77	215.65	176.02
Delhi	12.06	1.41	46.59	24.28	123.07	80.02
Rajasthan	59.86	85.98	115.63	127.38	219.30	121.22
Uttar Pradesh	42.77	49.83	91.44	32.47	195.16	171.09
Bihar	82.74	68.85	45.45	111.30	225.53	253.87
Assam	94.77	48.08	89.40	19.17	217.50	212.78
West Bengal	35.15	11.55	17.27	111.63	244.59	131.41
Jharkhand	66.93	8.42	14.23	145.74	230.32	193.17
Orissa	52.31	119.85	158.27	552.82	355.80	356.16
Chattisgarh	84.94	85.27	81.84	223.92	308.91	235.00
Madhya Pradesh	30.77	22.69	40.86	102.56	106.80	79.11
Gujarat	51.04	72.25	114.30	132.18	312.97	212.33
Daman & Diu	52.16	180.93	340.16	120.12	262.14	190.04
Dadra & N Haveli	61.53	171.09	260.45	116.80	249.55	153.45
Maharashtra	50.54	44.79	76.61	111.98	178.14	192.83
Andhra Pradesh	87.37	43.42	105.60	274.12	266.86	305.03
Karnataka	52.95	64.87	126.13	154.03	304.94	213.90
Goa	11.26	70.96	168.89	37.69	163.14	148.53
Kerala	42.53	21.70	35.19	37.59	101.23	57.28
Tamil Nadu	78.87	71.03	119.20	143.28	198.70	176.19
Other States	51.04	93.34	157.29	149.06	192.53	223.26
All India	**61.24**	**58.93**	**92.86**	**147.49**	**230.49**	**203.07**
Census sector	35.23	53.56	79.05	144.59	236.45	204.30
Pseudo Census	-3.68	-27.41	19.37	102.22	47.87	74.15
True Census	64.18	58.60	81.14	146.50	246.82	209.43
Sample sector	65.42	66.86	132.50	159.27	218.17	199.38

Note: Overall growth rate means growth of 2010-11 over 2000-01.

Table T2: Overall growth rate of estimated major characteristics of ASI 2010-11 over ASI2000-01 for major Industries at NIC 2004 2-digit level at 2000-01 constant prices

NIC 2004 2-digit level		No. of Unit	No. of Employees	Total Emoluments	Fixed Capital	Total Output	GVA
14	other mining and quarrying	45.31	179.11	250.71	2348.31	794.72	774.38
15	food products and beverages	48.5	23.41	49.1	131.45	158.14	124.97
16	tobacco products	29.51	-14.65	-3.69	4.82	46.22	43.62
17	textiles	58.95	30.74	31.33	59.22	112.66	97.62
18	wearing apparel	85.92	93.26	166.82	105.03	110.34	112.7
19	tanning and dressing of leather	70.49	111.27	139.21	81.40	106.02	148.32
20	wood and wood products	10.82	5.51	-39.38	82.94	84.31	-25.36
21	paper and paper products	78.69	38.57	56.57	83.40	108.66	61.56
22	publishing, printing	46.26	49.03	81.48	168.48	123.15	157.52
23	coke, petroleum and nuclear fuel	55.18	68.03	91.03	236.18	466.64	558.99
24	chemicals and chemical products	50.7	39.78	74.84	31.15	102.51	102.31
25	rubber and plastic products	74.45	102.86	139.31	127.65	258.22	272.15
26	other non-metallic mineral products	95.94	108.45	115.1	131.99	193.18	180.74
27	basic metals	59.45	79.47	90.09	205.81	354.45	264.59
28	fabricated metal products	69.53	121.24	160.19	357.16	353.11	376.32
29	machinery and equipment n.e.c.	58.92	93.27	153.78	220.14	326.29	285.04
30	office, accounting and computing machine	-4.02	18.9	23.39	124.28	128.26	125
31	electrical machinery and apparatus n.e.c	63.08	97.7	103.12	140.78	313.28	232.85
32	radio, television etc.	40.63	42.34	94.25	36.20	152.49	153.02
33	medical, precision and optical instrument	18.4	28.19	111.71	56.99	151.65	164.74
34	motor vehicles, trailers and semi-trailers	91.47	177.43	182.54	150.46	369.23	307.64
35	other transport equip.	32.15	47.47	74	167.52	229.44	312.57
36	furniture; manufacturing n.e.c.	85.66	123.3	179.76	180.67	430.01	189.14
37	recycling	717.65	697.61	701.39	1471.67	2752	2827.29
OO	other industries	70.21	87.36	265.48	1522.37	470.14	949.29
XX	**all industries**	**61.24**	**58.93**	**92.86**	**147.49**	**230.49**	**203.07**

Note: Overall growth rate means growth of 2010-11 over 2000-01.

Table T3: Year-wise growth of Gross Value Added for major Industries at NIC 2004 2-digit level at 2000-01 constant prices for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	468.83	61.55	-0.89	48.90	103.37	-60.30	77.02	-19.09	70.87	-67.37
15	food products and beverages	2.88	-1.06	-6.73	5.81	22.11	35.72	-2.47	9.53	7.11	18.10
16	tobacco products	-5.68	19.81	-4.94	-2.14	4.17	7.78	-5.11	38.64	-21.41	17.70
17	Textiles	-14.78	8.94	0.26	4.64	18.89	19.46	-5.18	-5.24	25.66	26.52
18	wearing apparel	-11.39	16.37	-8.81	25.33	15.24	22.30	4.96	10.55	-1.35	11.88
19	tanning and dressing of leather	10.87	-7.91	4.33	-4.96	36.76	10.00	15.31	15.26	30.73	-6.15
20	wood and wood products	-3.06	10.63	13.45	-73.82	72.11	-28.50	55.79	-12.10	48.57	-6.42
21	paper and paper products	-21.29	16.10	-7.34	-2.48	18.46	5.65	19.68	6.61	-13.12	41.03
22	publishing, printing	-7.53	21.53	2.59	-6.11	43.63	3.71	18.73	-20.77	23.31	37.69
23	coke, petroleum and nuclear fuel	26.53	88.84	23.64	14.10	35.05	12.59	19.35	1.21	-9.98	18.23
24	chemicals and chemical products	-4.53	7.97	2.00	8.48	12.14	6.65	6.93	17.85	11.02	6.00
25	rubber and plastic products	16.72	3.10	2.57	5.62	-3.91	5.03	35.06	41.12	16.15	27.76
26	other non-metallic mineral products	2.20	-5.85	1.86	32.71	2.45	49.80	37.85	7.39	9.08	-12.91
27	basic metals	-7.17	41.46	30.11	56.56	-13.05	35.34	30.28	-19.78	4.20	6.37
28	fabricated metal products	-3.51	5.68	9.89	10.51	43.25	41.67	20.02	-6.17	27.44	32.08
29	machinery and equipment n.e.c.	-0.25	-8.66	11.04	28.88	25.55	18.79	21.40	37.99	5.25	12.28
30	office, accounting and computing machine	16.70	24.35	28.43	-26.89	87.97	-27.12	-6.21	-14.78	28.75	17.13
31	electrical machinery and apparatus n.e.c	7.90	2.89	-0.52	10.95	50.19	37.21	8.87	-1.71	14.86	7.23
32	radio, television etc.	0.56	23.85	-7.99	-5.19	21.36	-7.76	32.03	54.95	1.90	-0.20
33	medical, precision and optical instrument	21.90	-7.50	18.27	8.68	12.25	8.50	36.47	-15.79	14.56	13.90
34	motor vehicles, trailers and semi-trailers	6.41	17.13	38.01	29.25	28.83	-5.86	5.75	-11.74	51.54	6.89
35	other transport equip.	35.73	12.47	10.89	15.61	16.97	25.82	-21.42	24.50	23.12	18.93
36	furniture; manufacturing n.e.c.	37.20	-18.83	13.70	29.33	6.78	26.26	9.36	-23.39	46.79	6.50
37	Recycling	59.86	22.96	176.78	47.85	-43.74	78.92	105.07	134.84	-76.33	217.17
OO	other industries	44.38	3.06	29.48	13.55	13.40	41.51	31.18	22.18	61.61	15.39
XX	**all industries**	**0.88**	**14.00**	**9.37**	**17.61**	**15.01**	**19.42**	**14.64**	**4.17**	**11.57**	**11.96**

Note: Overall growth rate means growth of 2010-11 over 2000-01.

Table T4: Percentage contribution of Gross Value Added at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	0.02	0.02	0.02	0.03	0.05	0.02	0.02	0.02	0.03	0.01
15	food products and beverages	10.74	9.32	7.95	7.15	7.60	8.63	7.34	7.72	7.41	7.82
16	tobacco products	2.23	2.34	2.03	1.69	1.53	1.38	1.15	1.52	1.07	1.13
17	textiles	8.11	7.75	7.11	6.32	6.54	6.54	5.41	4.92	5.54	6.26
18	wearing apparel	1.79	1.83	1.52	1.62	1.63	1.67	1.53	1.62	1.43	1.43
19	tanning and dressing of leather	0.85	0.69	0.66	0.53	0.63	0.58	0.59	0.65	0.76	0.64
20	wood and wood products	0.72	0.70	0.72	0.16	0.24	0.14	0.20	0.17	0.22	0.18
21	paper and paper products	2.01	2.04	1.73	1.44	1.48	1.31	1.37	1.40	1.09	1.37
22	publishing, printing	1.42	1.51	1.42	1.13	1.42	1.23	1.27	0.97	1.07	1.32
23	coke, petroleum and nuclear fuel	6.15	10.18	11.51	11.17	13.11	12.37	12.87	12.51	10.09	10.66
24	chemicals and chemical products	19.93	18.88	17.61	16.24	15.84	14.14	13.19	14.93	14.85	14.06
25	rubber and plastic products	3.83	3.47	3.25	2.92	2.44	2.15	2.53	3.42	3.56	4.07
26	other non-metallic mineral products	5.63	4.65	4.33	4.88	4.35	5.46	6.56	6.77	6.61	5.14
27	basic metals	9.42	11.69	13.91	18.52	14.00	15.87	18.03	13.89	12.97	12.32
28	fabricated metal products	2.55	2.37	2.38	2.23	2.78	3.30	3.46	3.11	3.56	4.19
29	machinery and equipment n.e.c.	5.60	4.49	4.55	4.99	5.45	5.42	5.74	7.60	7.17	7.19
30	office, accounting and computing machine	0.61	0.66	0.78	0.48	0.79	0.48	0.40	0.32	0.37	0.39
31	electrical machinery and apparatus n.e.c	3.71	3.35	3.04	2.87	3.75	4.31	4.09	3.86	3.97	3.81
32	radio, television etc.	2.14	2.33	1.96	1.58	1.67	1.29	1.48	2.20	2.01	1.79
33	medical, precision and optical instrument	1.08	0.88	0.95	0.88	0.86	0.78	0.93	0.75	0.77	0.78
34	motor vehicles, trailers and semi-trailers	4.63	4.76	6.00	6.60	7.39	5.83	5.38	4.55	6.19	5.91
35	other transport equip.	2.92	2.89	2.93	2.88	2.93	3.08	2.11	2.52	2.79	2.96
36	furniture; manufacturing n.e.c.	1.68	1.20	1.25	1.37	1.27	1.34	1.28	0.94	1.24	1.18
37	recycling	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.02
OO	other industries	2.22	2.00	2.37	2.29	2.26	2.68	3.06	3.59	5.20	5.36
XX	**all industries**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table T5: Year-wise growth of estimated Fixed Capital for major Industries at NIC 2004 2-digit level at 2000-01 constant prices for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	832.77	67.50	65.34	-15.08	183.72	-67.85	29.06	11.02	314.48	-79.40
15	food products and beverages	2.87	8.49	-5.25	2.75	5.82	20.21	13.12	10.32	17.10	14.60
16	tobacco products	-7.13	12.73	1.43	-13.05	1.64	17.63	0.01	1.12	21.32	-22.60
17	textiles	-13.79	-0.26	-0.84	3.02	16.42	39.04	-7.15	4.27	9.63	5.50
18	wearing apparel	-14.09	9.00	2.81	16.80	27.17	15.20	1.13	17.15	-5.89	11.62
19	tanning and dressing of leather	-7.68	-3.18	-3.24	-0.04	20.88	9.12	20.86	23.48	15.37	-7.62
20	wood and wood products	-2.87	15.15	6.74	-54.35	11.89	41.01	0.07	30.84	12.20	44.83
21	paper and paper products	-5.16	23.31	-18.07	-4.30	10.82	11.15	19.19	12.98	17.81	2.35
22	publishing, printing	-9.42	10.05	0.05	0.64	48.67	15.81	10.83	24.86	-6.16	19.64
23	coke, petroleum and nuclear fuel	62.15	6.88	1.43	-6.53	13.53	-1.40	1.37	0.06	78.91	0.73
24	chemicals and chemical products	-0.14	-10.65	-0.59	-8.24	26.09	4.34	-0.47	19.97	-0.18	2.76
25	rubber and plastic products	13.05	-0.21	-0.96	18.68	-19.41	14.47	9.92	25.95	22.68	9.58
26	other non-metallic mineral products	16.71	-13.35	1.79	4.60	2.89	3.81	29.62	18.08	8.01	22.02
27	basic metals	-3.34	6.87	10.83	0.48	19.97	10.18	13.79	17.34	28.62	17.11
28	fabricated metal products	4.24	6.32	-4.30	-1.47	32.76	41.94	38.82	3.29	8.63	49.04
29	machinery and equipment n.e.c.	3.01	8.46	-7.62	10.48	22.04	3.32	22.96	28.91	9.43	28.35
30	office, accounting and computing machine	13.19	64.81	25.50	-4.13	-5.10	-1.36	-6.19	-8.23	-10.54	38.62
31	electrical machinery and apparatus n.e.c	5.65	8.58	-20.56	-11.46	24.98	9.80	24.33	21.06	27.12	13.66
32	radio, television etc.	-14.73	21.75	27.72	-18.39	19.71	-12.36	11.40	3.86	31.17	-20.95
33	medical, precision and optical instrument	8.16	-1.76	6.30	6.18	-13.50	4.63	34.79	-10.90	-5.34	27.22
34	motor vehicles, trailers and semi-trailers	-11.54	-14.13	-1.28	13.72	3.80	10.07	42.52	38.64	13.31	14.81
35	other transport equip.	2.13	3.82	1.50	9.92	11.62	19.59	-0.56	23.57	24.35	10.86
36	furniture; manufacturing n.e.c.	111.06	-35.20	3.75	2.30	24.63	2.06	0.72	38.46	-6.74	16.87
37	recycling	206.11	102.27	8.08	1.16	68.69	122.26	141.88	-71.24	22.45	-27.30
OO	other industries	62.38	20.87	20.84	37.12	-0.68	28.74	55.85	30.72	57.75	21.40
XX	**all industries**	**4.57**	**0.66**	**1.41**	**0.68**	**14.23**	**11.80**	**12.41**	**16.59**	**22.13**	**12.66**

Note: Overall growth rate means growth of 2010-11 over 2000-01.

Table T6: Percentage contribution of estimated Fixed Capital at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0.05	0.01
15	food products and beverages	7.85	8.46	7.90	8.07	7.47	8.03	8.09	7.65	7.34	7.46
16	tobacco products	0.34	0.38	0.38	0.33	0.29	0.31	0.27	0.24	0.24	0.16
17	textiles	9.10	9.02	8.82	9.02	9.20	11.44	9.45	8.45	7.58	7.10
18	wearing apparel	0.72	0.78	0.79	0.92	1.02	1.05	0.95	0.95	0.73	0.73
19	tanning and dressing of leather	0.47	0.45	0.43	0.43	0.45	0.44	0.48	0.50	0.48	0.39
20	wood and wood products	0.35	0.40	0.42	0.19	0.19	0.24	0.21	0.24	0.22	0.28
21	paper and paper products	2.69	3.30	2.66	2.53	2.46	2.44	2.59	2.51	2.42	2.20
22	publishing, printing	0.79	0.86	0.85	0.85	1.11	1.15	1.13	1.21	0.93	0.99
23	coke, petroleum and nuclear fuel	10.93	11.61	11.61	10.78	10.71	9.45	8.52	7.31	10.71	9.58
24	chemicals and chemical products	20.32	18.03	17.68	16.11	17.78	16.60	14.70	15.12	12.36	11.27
25	rubber and plastic products	3.44	3.41	3.33	3.93	2.77	2.84	2.78	3.00	3.01	2.93
26	other non-metallic mineral products	8.09	6.97	6.99	7.27	6.54	6.08	7.01	7.10	6.28	6.80
27	basic metals	16.22	17.22	18.82	18.79	19.73	19.44	19.68	19.81	20.86	21.68
28	fabricated metal products	1.49	1.57	1.48	1.45	1.69	2.14	2.64	2.34	2.08	2.76
29	machinery and equipment n.e.c.	2.85	3.07	2.80	3.07	3.28	3.03	3.32	3.67	3.29	3.75
30	office, accounting and computing machine	0.31	0.51	0.64	0.61	0.50	0.44	0.37	0.29	0.21	0.26
31	electrical machinery and apparatus n.e.c	2.20	2.38	1.86	1.64	1.79	1.76	1.95	2.02	2.10	2.12
32	radio, television etc.	1.52	1.84	2.32	1.88	1.97	1.55	1.53	1.36	1.47	1.03
33	medical, precision and optical instrument	0.46	0.45	0.47	0.49	0.37	0.35	0.42	0.32	0.25	0.28
34	motor vehicles, trailers and semi-trailers	5.09	4.34	4.22	4.77	4.34	4.27	5.41	6.44	5.97	6.09
35	other transport equip.	1.38	1.43	1.43	1.56	1.53	1.63	1.44	1.53	1.56	1.53
36	furniture; manufacturing n.e.c.	0.97	0.63	0.64	0.65	0.71	0.65	0.58	0.69	0.53	0.55
37	recycling	0.00	0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.01	0.01
OO	other industries	2.38	2.86	3.41	4.64	4.03	4.64	6.44	7.22	9.33	10.05
XX	**all industries**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table T7: Year-wise growth of estimated Total Output for major Industries at NIC 2004 2-digit level at 2000-01 constant prices for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	555.17	73.13	-1.14	101.10	74.12	-52.20	112.45	-61.05	221.06	-82.06
15	food products and beverages	0.95	14.93	-4.51	6.60	9.22	17.76	13.26	12.88	7.88	23.21
16	tobacco products	-18.80	20.95	-6.55	-3.86	6.02	5.47	-7.74	31.80	7.39	13.49
17	textiles	-11.42	4.20	4.76	7.66	13.03	23.65	-5.58	4.96	14.08	29.29
18	wearing apparel	-13.95	26.09	-13.62	29.88	14.28	6.27	4.20	11.27	10.68	10.88
19	tanning and dressing of leather	3.50	-3.67	4.50	1.46	21.40	6.26	32.03	-2.80	21.27	-2.94
20	wood and wood products	21.12	-7.30	17.50	-52.22	14.70	10.27	19.77	11.26	22.20	41.98
21	paper and paper products	-9.98	14.61	-3.70	4.02	7.06	5.20	23.73	7.89	5.51	27.27
22	publishing, printing	-2.92	6.12	-1.90	10.28	27.45	9.78	11.57	0.16	2.29	25.19
23	coke, petroleum and nuclear fuel	29.93	38.24	14.52	24.63	21.69	20.55	11.07	3.72	9.77	19.17
24	chemicals and chemical products	-5.01	4.02	4.15	10.25	11.82	7.89	4.40	22.78	-2.16	17.97
25	rubber and plastic products	13.22	7.72	8.36	18.94	-1.42	18.98	13.31	18.98	23.98	16.24
26	other non-metallic mineral products	2.56	3.34	5.44	20.18	4.74	26.85	23.04	19.85	2.92	8.27
27	basic metals	0.54	24.89	22.78	44.86	1.83	30.03	13.53	9.61	2.36	20.65
28	fabricated metal products	-3.30	13.67	14.51	20.11	28.12	34.05	27.57	-5.07	7.22	34.40
29	machinery and equipment n.e.c.	1.72	5.89	4.82	35.63	27.93	12.08	22.41	22.80	2.36	26.19
30	office, accounting and computing machine	14.55	-5.98	21.23	-9.89	33.24	13.94	4.42	-8.26	17.10	13.92
31	electrical machinery and apparatus n.e.c	8.27	8.91	-0.16	15.34	53.46	37.05	0.89	9.79	7.92	21.05
32	radio, television etc.	-11.09	50.49	-5.44	2.63	7.53	0.91	14.58	32.63	19.06	-0.97
33	medical, precision and optical instrument	26.45	-1.26	12.49	3.63	4.64	17.52	26.38	-25.11	10.78	34.10
34	motor vehicles, trailers and semi-trailers	-0.81	31.91	15.89	92.19	-17.83	10.41	10.66	0.92	31.53	20.83
35	other transport equip.	13.72	8.52	7.57	27.97	11.17	14.97	-12.30	19.55	17.13	23.56
36	furniture; manufacturing n.e.c.	66.17	-12.07	27.03	23.59	35.68	13.63	8.65	10.56	131.13	-46.02
37	recycling	130.78	-38.04	153.92	-15.20	15.64	106.14	-33.41	210.88	17.37	59.93
OO	other industries	-4.23	5.22	34.77	13.19	23.84	43.50	2.52	17.03	22.38	42.16
XX	**all industries**	**1.97**	**14.45**	**7.76**	**22.26**	**11.40**	**19.45**	**9.99**	**11.06**	**11.59**	**18.50**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on

Table T8: Percentage contribution of estimated Total Output at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.00
15	food products and beverages	15.74	15.81	14.01	12.21	11.97	11.80	12.16	12.35	11.94	12.42
16	tobacco products	1.02	1.08	0.94	0.74	0.70	0.62	0.52	0.62	0.59	0.57
17	textiles	8.52	7.76	7.54	6.64	6.74	6.98	5.99	5.66	5.79	6.31
18	wearing apparel	1.51	1.67	1.34	1.42	1.46	1.30	1.23	1.23	1.22	1.14
19	tanning and dressing of leather	1.09	0.92	0.89	0.74	0.80	0.71	0.86	0.75	0.82	0.67
20	wood and wood products	0.73	0.59	0.64	0.25	0.26	0.24	0.26	0.26	0.28	0.34
21	paper and paper products	1.78	1.78	1.60	1.36	1.30	1.15	1.29	1.26	1.19	1.27
22	publishing, printing	1.02	0.94	0.86	0.77	0.89	0.81	0.83	0.74	0.68	0.72
23	coke, petroleum and nuclear fuel	10.80	13.04	13.86	14.13	15.44	15.58	15.73	14.69	14.45	14.53
24	chemicals and chemical products	15.92	14.47	13.98	12.61	12.66	11.43	10.85	12.00	10.52	10.47
25	rubber and plastic products	3.39	3.19	3.21	3.12	2.76	2.75	2.83	3.04	3.37	3.31
26	other non-metallic mineral products	3.54	3.20	3.13	3.08	2.89	3.07	3.44	3.71	3.42	3.13
27	basic metals	9.94	10.84	12.35	14.64	13.38	14.56	15.03	14.84	13.61	13.86
28	fabricated metal products	2.24	2.22	2.36	2.32	2.67	3.00	3.47	2.97	2.85	3.24
29	machinery and equipment n.e.c.	4.32	4.00	3.89	4.32	4.96	4.65	5.18	5.72	5.25	5.59
30	office, accounting and computing machine	0.57	0.47	0.53	0.39	0.47	0.45	0.42	0.35	0.37	0.35
31	electrical machinery and apparatus n.e.c	3.10	2.95	2.73	2.58	3.55	4.08	3.74	3.70	3.57	3.65
32	radio, television etc.	1.91	2.51	2.21	1.85	1.79	1.51	1.57	1.88	2.00	1.67
33	medical, precision and optical instrument	0.75	0.65	0.68	0.58	0.54	0.53	0.61	0.41	0.41	0.46
34	motor vehicles, trailers and semi-trailers	4.40	5.07	5.46	8.58	6.33	5.85	5.88	5.35	6.30	6.42
35	other transport equip.	2.66	2.52	2.51	2.63	2.63	2.53	2.01	2.17	2.28	2.37
36	furniture; manufacturing n.e.c.	2.11	1.62	1.91	1.93	2.35	2.24	2.21	2.20	4.55	2.07
37	recycling	0.02	0.01	0.03	0.02	0.02	0.03	0.02	0.06	0.06	0.08
OO	other industries	2.90	2.67	3.34	3.09	3.44	4.13	3.85	4.05	4.45	5.33
XX	**all industries**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table T9: Year-wise growth of estimated Total Emoluments for major Industries at NIC 2004 2-digit level at 2000-01 constant prices for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	245.82	1.94	25.71	53.08	5.46	-43.07	34.00	-47.61	39.32	-11.96
15	food products and beverages	-2.26	0.25	-3.59	3.38	8.74	7.54	10.03	6.13	3.06	8.49
16	tobacco products	-7.88	2.78	-1.88	0.48	-2.08	-2.50	-5.23	7.33	-4.25	10.97
17	textiles	-10.78	1.39	-0.30	4.75	6.14	12.00	1.47	2.84	0.76	11.24
18	wearing apparel	-1.38	13.52	7.77	26.94	23.46	12.11	9.14	10.21	-5.07	10.24
19	tanning and dressing of leather	1.92	2.26	1.94	1.13	18.80	4.73	27.85	16.64	15.57	3.82
20	wood and wood products	-4.31	-10.39	2.68	-69.73	32.70	-0.60	20.79	23.19	-2.77	19.18
21	paper and paper products	-1.80	-0.90	1.94	2.47	3.15	2.32	10.29	10.25	2.05	17.60
22	publishing, printing	-0.95	7.00	-2.83	2.01	24.18	3.62	12.73	-4.63	3.13	21.08
23	coke, petroleum and nuclear fuel	-6.31	-2.57	4.38	4.64	5.73	15.93	8.15	16.96	7.17	15.30
24	chemicals and chemical products	-1.73	1.75	2.51	6.89	7.65	8.71	4.16	20.17	-3.10	12.43
25	rubber and plastic products	9.45	1.66	7.52	8.41	4.04	11.77	8.50	23.53	24.91	-5.23
26	other non-metallic mineral products	1.92	10.42	-11.43	9.78	9.30	13.62	14.29	20.52	0.38	14.48
27	basic metals	-4.75	6.38	8.55	-3.62	9.50	16.24	23.53	9.38	-16.54	24.93
28	fabricated metal products	-11.84	7.68	-2.26	13.80	20.83	25.64	23.59	1.37	4.03	24.55
29	machinery and equipment n.e.c.	-0.82	-2.21	1.54	19.68	12.78	13.54	15.17	39.10	-5.29	10.82
30	office, accounting and computing machine	3.98	1.99	13.28	19.90	-13.06	3.48	30.42	-30.87	28.37	-17.73
31	electrical machinery and apparatus n.e.c	-14.29	7.05	-4.36	5.14	17.41	11.29	24.37	1.37	11.20	20.19
32	radio, television etc.	0.70	16.26	-6.07	3.86	12.99	-2.98	24.88	42.53	10.16	-20.88
33	medical, precision and optical instrument	7.80	8.47	4.03	-10.15	4.23	18.64	48.08	-18.97	1.98	28.02
34	motor vehicles, trailers and semi-trailers	-4.18	10.70	9.81	15.89	6.77	13.74	17.55	4.88	16.22	20.28
35	other transport equip.	-0.82	6.83	5.25	7.63	5.49	16.62	-3.65	1.67	10.31	9.04
36	furniture; manufacturing n.e.c.	9.00	15.00	11.37	20.61	14.94	18.61	-0.56	10.03	-3.50	15.44
37	recycling	47.39	69.74	5.99	30.88	-16.57	126.59	-26.08	53.95	20.16	-10.68
OO	other industries	11.04	-1.64	13.81	12.76	24.43	40.48	-4.11	32.81	11.77	4.80
XX	**all industries**	**-3.49**	**3.90**	**1.83**	**6.33**	**10.05**	**12.36**	**11.93**	**12.51**	**1.06**	**12.88**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table T10: Percentage contribution of estimated Total Emoluments at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	0.03	0.03	0.04	0.06	0.06	0.03	0.04	0.02	0.02	0.02
15	food products and beverages	11.26	10.87	10.29	10.00	9.88	9.46	9.30	8.77	8.95	8.60
16	tobacco products	1.77	1.75	1.69	1.60	1.42	1.23	1.04	1.00	0.94	0.93
17	textiles	11.79	11.51	11.27	11.10	10.71	10.67	9.67	8.84	8.82	8.69
18	wearing apparel	2.51	2.74	2.90	3.46	3.88	3.87	3.77	3.70	3.47	3.39
19	tanning and dressing of leather	1.14	1.12	1.12	1.07	1.15	1.07	1.23	1.27	1.45	1.34
20	wood and wood products	1.19	1.02	1.03	0.29	0.35	0.31	0.34	0.37	0.36	0.38
21	paper and paper products	2.26	2.16	2.16	2.08	1.95	1.77	1.75	1.71	1.73	1.80
22	publishing, printing	2.01	2.07	1.98	1.90	2.14	1.97	1.99	1.68	1.72	1.84
23	coke, petroleum and nuclear fuel	2.52	2.37	2.43	2.39	2.29	2.37	2.29	2.38	2.52	2.58
24	chemicals and chemical products	13.99	13.70	13.79	13.86	13.56	13.12	12.21	13.04	12.50	12.45
25	rubber and plastic products	3.24	3.17	3.34	3.41	3.22	3.21	3.11	3.41	4.22	3.54
26	other non-metallic mineral products	4.70	5.00	4.34	4.49	4.45	4.50	4.60	4.93	4.89	4.96
27	basic metals	11.22	11.49	12.24	11.10	11.04	11.42	12.61	12.26	10.12	11.20
28	fabricated metal products	3.48	3.61	3.46	3.70	4.07	4.55	5.02	4.52	4.66	5.14
29	machinery and equipment n.e.c.	7.28	6.85	6.83	7.69	7.88	7.96	8.19	10.13	9.49	9.32
30	office, accounting and computing machine	0.48	0.47	0.53	0.59	0.47	0.43	0.50	0.31	0.39	0.29
31	electrical machinery and apparatus n.e.c	4.16	4.29	4.03	3.98	4.25	4.21	4.68	4.21	4.64	4.94
32	radio, television etc.	2.14	2.39	2.21	2.16	2.21	1.91	2.13	2.70	2.94	2.06
33	medical, precision and optical instrument	1.24	1.29	1.32	1.12	1.06	1.12	1.48	1.06	1.07	1.22
34	motor vehicles, trailers and semi-trailers	5.45	5.80	6.26	6.82	6.62	6.70	7.03	6.56	7.54	8.04
35	other transport equip.	2.99	3.07	3.17	3.21	3.08	3.19	2.75	2.49	2.71	2.62
36	furniture; manufacturing n.e.c.	1.51	1.67	1.83	2.08	2.17	2.29	2.03	1.99	1.90	1.94
37	recycling	0.01	0.01	0.01	0.02	0.01	0.03	0.02	0.03	0.03	0.02
OO	other industries	1.64	1.55	1.73	1.84	2.08	2.59	2.22	2.62	2.90	2.69
XX	**all industries**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table T11: Year-wise growth of estimated Employee for major Industries at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	180.99	-1.49	56.94	35.51	13.64	-42.15	59.22	-58.58	31.24	-16.66
15	food products and beverages	-1.94	0.13	-0.86	3.54	3.63	6.09	1.96	3.01	2.77	3.20
16	tobacco products	2.09	-0.84	-2.09	-1.16	0.05	-6.23	-6.44	8.79	-7.14	-1.74
17	textiles	-8.27	-0.30	2.70	4.47	5.74	35.68	-19.51	7.56	2.26	4.90
18	wearing apparel	-4.19	5.82	12.99	18.74	20.36	5.64	10.11	-0.36	2.64	-0.76
19	tanning and dressing of leather	5.79	0.11	-0.30	2.68	16.02	0.13	27.33	13.02	1.56	14.76
20	wood and wood products	2.69	-5.68	2.60	-33.51	11.40	6.83	12.92	0.50	10.61	6.91
21	paper and paper products	-6.33	3.40	0.48	1.84	-0.23	6.99	32.23	-7.94	-1.25	8.97
22	publishing, printing	-4.91	7.56	-6.32	2.19	16.84	7.24	0.32	3.20	7.10	9.55
23	coke, petroleum and nuclear fuel	1.07	1.95	5.91	7.29	7.31	5.60	21.04	3.40	8.50	-6.74
24	chemicals and chemical products	-4.77	-0.81	-1.94	6.01	5.16	6.26	1.81	9.10	4.45	9.80
25	rubber and plastic products	6.73	-2.82	6.48	9.27	4.25	8.06	5.04	19.62	10.80	7.19
26	other non-metallic mineral products	5.18	28.03	-23.81	15.16	10.44	14.82	1.49	15.54	2.55	15.70
27	basic metals	-3.78	-1.41	0.87	7.02	11.48	19.45	5.32	10.97	-0.45	13.11
28	fabricated metal products	-9.35	6.30	-0.54	13.16	16.61	20.14	16.49	-5.83	9.85	20.84
29	machinery and equipment n.e.c.	-4.18	-0.51	-2.37	17.75	6.44	12.16	7.87	40.51	-18.36	19.40
30	office, accounting and computing machine	1.89	-9.53	19.51	21.30	-15.76	20.22	9.41	-27.91	12.09	-0.63
31	electrical machinery and apparatus n.e.c	-3.13	1.05	-3.78	8.76	15.72	9.91	11.38	3.39	15.46	14.12
32	radio, television etc.	-9.49	4.53	-5.05	1.42	13.60	-9.32	29.81	1.47	46.99	-21.67
33	medical, precision and optical instrument	-9.48	9.91	0.36	-4.24	14.57	8.51	10.28	-6.82	166.74	-60.66
34	motor vehicles, trailers and semi-trailers	-2.67	6.70	6.65	17.91	6.86	13.48	14.25	9.23	21.55	15.49
35	other transport equip.	-8.96	2.29	1.89	6.16	7.68	21.08	-14.94	9.21	3.60	16.66
36	furniture; manufacturing n.e.c.	10.27	6.13	10.39	19.32	7.67	16.97	-2.00	10.34	-4.65	11.56
37	recycling	72.96	2.52	15.25	52.65	-8.08	86.00	-21.28	91.35	6.64	-6.90
OO	other industries	-0.08	-0.69	-0.42	13.73	9.96	20.08	-3.78	13.42	0.73	14.85
XX	**all industries**	**-2.97**	**2.39**	**-0.83**	**7.41**	**7.78**	**13.35**	**1.20**	**8.37**	**4.10**	**7.66**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table T12: Percentage contribution of estimated Employee at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	0.08	0.07	0.12	0.15	0.16	0.08	0.13	0.05	0.06	0.05
15	food products and beverages	16.86	16.49	16.48	15.89	15.27	14.29	14.40	13.69	13.51	12.95
16	tobacco products	6.36	6.16	6.09	5.60	5.20	4.30	3.98	3.99	3.56	3.25
17	textiles	15.25	14.85	15.38	14.96	14.67	17.56	13.97	13.86	13.62	13.27
18	wearing apparel	4.09	4.23	4.82	5.33	5.95	5.54	6.03	5.54	5.47	5.04
19	tanning and dressing of leather	1.89	1.84	1.85	1.77	1.91	1.69	2.12	2.21	2.16	2.30
20	wood and wood products	1.02	0.94	0.97	0.60	0.62	0.58	0.65	0.60	0.64	0.64
21	paper and paper products	2.17	2.19	2.22	2.11	1.95	1.84	2.41	2.04	1.94	1.96
22	publishing, printing	1.45	1.52	1.44	1.37	1.48	1.40	1.39	1.32	1.36	1.38
23	coke, petroleum and nuclear fuel	0.89	0.88	0.94	0.94	0.94	0.87	1.04	1.00	1.04	0.90
24	chemicals and chemical products	9.82	9.52	9.41	9.28	9.06	8.49	8.54	8.60	8.63	8.80
25	rubber and plastic products	3.47	3.30	3.54	3.60	3.48	3.32	3.45	3.80	4.05	4.03
26	other non-metallic mineral products	6.02	7.53	5.79	6.20	6.36	6.44	6.46	6.88	6.78	7.29
27	basic metals	7.00	6.74	6.85	6.83	7.06	7.44	7.75	7.93	7.59	7.97
28	fabricated metal products	3.45	3.58	3.59	3.78	4.09	4.34	4.99	4.34	4.58	5.14
29	machinery and equipment n.e.c.	4.94	4.80	4.73	5.18	5.12	5.06	5.40	7.00	5.49	6.09
30	office, accounting and computing machine	0.25	0.22	0.27	0.31	0.24	0.25	0.27	0.18	0.20	0.18
31	electrical machinery and apparatus n.e.c	2.89	2.86	2.77	2.81	3.01	2.92	3.21	3.07	3.40	3.61
32	radio, television etc.	1.31	1.33	1.28	1.21	1.27	1.02	1.31	1.22	1.73	1.26
33	medical, precision and optical instrument	0.76	0.81	0.82	0.73	0.78	0.75	0.81	0.70	1.79	0.65
34	motor vehicles, trailers and	3.24	3.38	3.63	3.98	3.95	3.95	4.46	4.50	5.25	5.64
	semi-trailers										
35	other transport equip.	2.16	2.16	2.21	2.19	2.19	2.34	1.96	1.98	1.97	2.13
36	furniture; manufacturing n.e.c.	1.63	1.69	1.88	2.08	2.08	2.15	2.08	2.12	1.94	2.01
37	recycling	0.02	0.02	0.02	0.03	0.02	0.04	0.03	0.05	0.05	0.04
OO	other industries	2.99	2.90	2.91	3.08	3.15	3.33	3.17	3.32	3.21	3.42
XX	**all industries**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table T13: Year-wise growth of estimated number of Units for major Industries at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	37.50	-20.45	65.71	29.31	19.33	-12.29	21.02	-57.89	26.25	-7.92
15	food products and beverages	-2.10	1.41	0.10	6.39	1.43	0.13	1.79	3.28	0.97	30.29
16	tobacco products	-8.16	3.43	20.14	4.00	4.47	-3.53	-2.01	3.76	-4.88	11.96
17	textiles	-7.40	1.65	2.12	3.73	2.14	8.87	-14.47	17.56	3.95	37.16
18	wearing apparel	-2.67	0.73	-3.54	6.49	7.42	0.33	-0.22	9.91	-5.40	65.11
19	tanning and dressing of leather	-1.30	1.19	-1.68	-1.84	6.54	-1.76	12.00	-5.21	9.73	45.06
20	wood and wood products	-4.54	-4.81	2.75	-12.17	-0.66	1.35	4.00	-2.97	8.77	22.29
21	paper and paper products	-1.34	2.87	2.96	5.14	-0.37	3.17	5.89	13.21	-0.82	33.07
22	publishing, printing	-9.19	5.54	-1.28	4.26	5.87	2.92	-2.63	5.08	-1.12	34.49
23	coke, petroleum and nuclear fuel	-3.49	7.12	-3.16	7.84	4.75	-6.94	9.22	-10.72	24.02	21.94
24	chemicals and chemical products	-0.86	-1.72	-1.63	5.09	2.31	0.64	1.01	7.67	0.03	33.56
25	rubber and plastic products	4.42	-3.92	2.68	3.23	1.77	6.05	4.99	1.81	0.11	42.04
26	other non-metallic mineral products	0.69	-0.83	1.53	11.70	5.87	7.76	5.07	4.66	5.31	30.97
27	basic metals	-4.38	-2.06	-1.27	3.27	7.30	7.84	-0.17	11.23	3.06	26.10
28	fabricated metal products	-2.83	-1.04	1.71	1.08	4.87	5.68	9.46	-4.38	10.70	33.55
29	machinery and equipment n.e.c.	-5.09	0.63	-0.85	11.52	1.53	0.45	2.06	6.59	-0.56	36.38
30	office, accounting and computing machine	-17.41	-11.35	9.76	11.11	-10.00	6.11	-8.90	5.17	0.00	17.49
31	electrical machinery and apparatus n.e.c	4.43	-4.93	-0.18	1.42	3.72	-0.57	6.13	10.11	3.49	30.08
32	radio, television etc.	-5.51	-3.14	-7.60	0.40	3.50	-7.53	10.65	21.13	-8.72	41.47
33	medical, precision and optical instrument	-7.89	6.92	3.59	-1.78	-0.40	3.95	-5.26	6.38	-12.96	30.11
34	motor vehicles, trailers and semi-trailers	1.94	6.07	-5.00	12.19	-0.78	6.26	1.50	10.63	14.31	22.77
35	other transport equip.	8.90	-10.85	-7.66	15.32	-5.08	-5.78	4.78	5.80	-4.92	35.61
36	furniture; manufacturing n.e.c.	6.21	-10.01	10.67	22.20	-4.62	3.43	-5.02	19.83	-6.40	36.66
37	recycling	282.35	-24.62	-2.04	45.83	25.71	64.77	-36.55	58.70	-15.07	12.10
OO	other industries	-0.59	-2.34	3.16	5.43	3.38	4.86	2.95	5.79	1.44	34.61
XX	**all industries**	**-2.07**	**-0.46**	**0.87**	**5.64**	**2.79**	**3.25**	**1.16**	**6.10**	**2.29**	**33.22**

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Table T14: Percentage contribution of estimated number of Units at NIC 2004 2-digit level for ASI 2001-02 to ASI2010-11

NIC 2004 2-digit level		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
14	other mining and quarrying	0.07	0.05	0.09	0.11	0.13	0.11	0.13	0.05	0.06	0.04
15	food products and beverages	18.27	18.61	18.47	18.60	18.35	17.80	17.91	17.43	17.21	16.83
16	tobacco products	1.93	2.00	2.38	2.35	2.39	2.23	2.16	2.11	1.96	1.65
17	textiles	9.77	9.98	10.10	9.92	9.85	10.39	8.79	9.73	9.89	10.18
18	wearing apparel	2.55	2.58	2.47	2.49	2.60	2.53	2.50	2.59	2.39	2.96
19	tanning and dressing of leather	1.83	1.86	1.81	1.68	1.74	1.66	1.84	1.64	1.76	1.92
20	wood and wood products	2.76	2.64	2.69	2.24	2.16	2.12	2.18	2.00	2.12	1.95
21	paper and paper products	2.63	2.72	2.77	2.76	2.67	2.67	2.80	2.99	2.89	2.89
22	publishing, printing	2.25	2.38	2.33	2.30	2.37	2.36	2.27	2.25	2.18	2.20
23	coke, petroleum and nuclear fuel	0.69	0.74	0.71	0.73	0.74	0.67	0.72	0.61	0.73	0.67
24	chemicals and chemical products	8.23	8.12	7.92	7.88	7.84	7.65	7.64	7.75	7.58	7.60
25	rubber and plastic products	5.52	5.33	5.42	5.30	5.25	5.39	5.59	5.37	5.25	5.60
26	other non-metallic mineral products	9.15	9.11	9.17	9.70	9.99	10.42	10.83	10.68	11.00	10.81
27	basic metals	5.25	5.16	5.05	4.94	5.16	5.39	5.32	5.57	5.62	5.31
28	fabricated metal products	6.22	6.19	6.24	5.97	6.09	6.23	6.74	6.08	6.58	6.59
29	machinery and equipment n.e.c.	6.56	6.63	6.52	6.88	6.80	6.62	6.67	6.71	6.52	6.67
30	office, accounting and computing machine	0.14	0.13	0.14	0.15	0.13	0.13	0.12	0.12	0.12	0.10
31	electrical machinery and apparatus n.e.c	3.17	3.03	3.00	2.88	2.90	2.80	2.93	3.04	3.08	3.01
32	radio, television etc.	0.87	0.84	0.77	0.73	0.74	0.66	0.72	0.83	0.74	0.78
33	medical, precision and optical instrument	0.71	0.76	0.78	0.73	0.70	0.71	0.66	0.67	0.57	0.55
34	motor vehicles, trailers and semi-trailers	2.13	2.27	2.14	2.27	2.19	2.25	2.26	2.36	2.63	2.43
35	other transport equip.	1.63	1.46	1.33	1.46	1.35	1.23	1.27	1.27	1.18	1.20
36	furniture; manufacturing n.e.c.	1.72	1.55	1.70	1.97	1.83	1.83	1.72	1.94	1.78	1.82
37	recycling	0.05	0.04	0.04	0.05	0.06	0.10	0.06	0.09	0.08	0.07
OO	other industries	5.92	5.81	5.94	5.93	5.96	6.05	6.16	6.14	6.09	6.15
XX	**all industries**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table T15: Year-wise growth of selected characteristics at 2000-01 constant prices for ASI 2001-02 to ASI2010-11

Categories	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Gross Value Added										
All India	**0.88**	**14.00**	**9.37**	**17.61**	**15.01**	**19.42**	**14.64**	**4.17**	**11.57**	**11.96**
Census	-0.11	17.37	15.06	14.44	16.03	16.72	17.10	-1.60	9.34	15.52
Pseudo Cen	24.22	22.04	72.99	-66.55	83.26	9.24	38.66	-28.86	-14.10	17.04
True Cen	-1.07	17.14	12.08	20.88	14.55	16.98	16.39	-0.53	9.99	15.49
Sample	3.87	4.24	-9.16	30.66	11.32	29.57	6.30	25.71	18.11	2.33
Fixed Capital										
All India	**4.57**	**0.66**	**1.41**	**0.68**	**14.23**	**11.80**	**12.41**	**16.59**	**22.13**	**12.66**
Census	3.67	1.39	3.64	-3.08	18.22	8.82	16.98	11.81	23.65	11.36
Pseudo Cen	4.50	10.60	57.55	-65.30	70.53	30.54	20.94	-24.78	8.50	45.67
True Cen	3.63	0.97	0.96	1.75	16.84	7.98	16.79	13.58	24.13	10.40
Sample	8.23	-2.17	-7.53	17.63	-0.60	25.01	-5.20	39.28	16.35	17.93
Total Output										
All India	**1.97**	**14.45**	**7.76**	**22.26**	**11.40**	**19.45**	**9.99**	**11.06**	**11.59**	**18.50**
Census	1.97	14.45	7.76	22.26	11.40	19.45	9.99	11.06	11.59	18.50
Pseudo Cen	0.22	16.65	13.55	20.96	12.63	17.88	14.11	5.93	7.60	21.34
True Cen	7.02	12.08	81.30	-61.34	62.20	27.62	27.44	-47.72	3.16	23.62
Sample	-0.15	16.92	9.73	28.65	11.24	17.48	13.52	8.61	7.70	21.28
Total Input										
All India	**2.22**	**14.56**	**7.38**	**23.37**	**10.58**	**19.45**	**8.89**	**12.78**	**11.59**	**20.01**
Census	0.32	16.45	13.14	22.78	11.75	18.19	13.31	8.00	7.16	22.82
Pseudo Cen	3.85	9.88	83.33	-60.13	58.11	31.75	25.34	-51.61	8.39	25.20
True Cen	0.11	16.86	9.08	30.85	10.37	17.61	12.74	11.15	7.13	22.77
Sample	5.85	11.14	-3.51	24.69	8.04	22.31	-0.75	24.67	21.15	14.63
Total Emoluments										
All India	**-3.49**	**3.90**	**1.83**	**6.33**	**10.05**	**12.36**	**11.93**	**12.51**	**1.06**	**12.88**
Census	-4.69	3.88	6.04	1.62	8.83	10.53	16.34	4.31	-0.39	15.40
Pseudo Cen	9.43	17.75	63.70	-65.21	55.11	19.37	27.95	-47.01	2.49	26.44
True Cen	-5.18	3.32	3.40	6.48	7.73	10.23	15.91	6.41	-0.44	15.17
Sample	-0.06	3.93	-9.69	21.46	13.34	17.09	1.17	35.49	4.18	7.67
Estimated Employee										
All India	**-2.97**	**2.39**	**-0.83**	**7.41**	**7.78**	**13.35**	**1.20**	**8.37**	**4.10**	**7.66**
Census	-3.75	2.00	5.09	2.52	7.72	7.97	9.19	3.91	0.29	9.69
Pseudo Cen	0.82	8.93	53.34	-57.44	46.14	25.08	17.95	-52.01	-12.89	12.35
True Cen	-4.03	1.55	1.71	8.85	6.14	7.00	8.61	7.95	0.71	9.62
Sample	-1.83	2.96	-9.33	15.56	7.88	21.29	-9.28	15.41	9.52	5.01

Note: 01-02 means growth of 2001-02 over 2000-01 and so on.

Annexure - II

GFCF deflator: Gross fixed capital formation values were taken for 2000-01 to 2010-11 in current prices and for 2004-05 prices. Ratio of them were calculated to derive on implicit price deflators for each year, then keeping 2000-01 as base, GFCF deflators were generated.

WPI deflator: Financial year wise WPI for Manufactured products values were taken for 2000-01 to 2004-05 from 93-94 series and 2005-06 to 2010-11 values were taken from 2004-05 series and used the linking factor on 2004-05 series values.

CPI deflator: Month-wise CPI for Industrial Workers values were averaged for each financial year, i.e., from April 2000 to March 2001 for the year 2000-2001. Deflators were calculated as ratio of each year to that of 2000-2001, keeping 2000-2001 as base year. The values of the deflator were given below:

Table T16: Year-wise value of different deflators used

Financial Year	WPI	CPI	WPI deflator	CPI deflator	GFCF deflator
(1)	(2)	(3)	(4)	(5)	(6)
00-01	141.7	444.17	1.00000000	1.00000000	1.00000000
01-02	144.3	463.33	0.98198198	0.95863309	0.96736193
02-03	148.1	481.75	0.95678596	0.92198582	0.94571249
03-04	156.5	500.33	0.90543131	0.88774151	0.90119026
04-05	166.3	519.5	0.85207456	0.85498877	0.83703175
05-06	170.32	542.42	0.83194158	0.81886619	0.80826617
06-07	179.97	578.92	0.78735406	0.76723766	0.76695053
07-08	188.57	614.5	0.75145477	0.72280987	0.72949645
08-09	200.19	670.5	0.70782070	0.66244096	0.68068591
09-10	204.63	753.5	0.69246206	0.58947136	0.64920918
10-11	216.31	832.33	0.65507836	0.53364037	0.61542569

GFCF deflators were used for Fixed Capital, WPI deflators were used for Total Outputs and Gross Value Added and CPI deflators were used for Total Emoluments.

An Empirical Analysis on Total Factor Productivity Growth, Employment & Wages in Indian Basic Metal Industry: 1980-81 to 2010-11

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Abstract

This paper attempts to measure productivity performance of the Indian Basic Metal Industry during the period 1980-81 to 2010-11. To measure total factor productivity growth & various other related performance indicators a non-parametric approach, namely, Malmquist Data Envelopment Analysis has been used. A comparative analysis between the pre (1980-81 to 1990-1991) & post liberalisation (1991-92 to 2010-11) era has also been taken up in this study. The paper also seeks to examine the impact of liberalization on the overall employment scenario in the Indian Basic Metal Industry. From the estimated employment function it is clear that the relationship between real wage rate and employment is negative, as is expected.

1. Introduction

1.1 Since 1991, a series of market-based reforms have been initiated by the Indian Government, which was supposed to bring about noteworthy changes in the industrial sector. Relaxation of the licensing rule, reduction in tariff rates, removal of restriction on import of raw materials and technology, price decontrol, rationalization of customs and excise duty, enhancement of the limit of foreign equity participation etc. are among those which have been introduced in early 90s.

1.2 In this paper, total factor productivity growth, employment estimates and the causal relationship between real wage rate and total factor productivity growth as well as the relationship between real wage rate and the partial labour productivity are presented for Indian Basic Metal industry at aggregate level over the period 1980-81 to 2010-11. A comparative analysis between the pre & post liberalisation era has also been taken up in this study. The pre-reform period is 1980-81 to 1990-1991 & the post-reform period is 1991-92 to 2010-11. This is a sufficiently large number of years that witnessed highly restricted, partially liberalized and fully liberalized regimes,

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with a view to compare meaningfully the growth pattern in total factor productivity (TFP) and employment scenario in the pre-reform period with that of the post-reform period.

1.3 A strong raw material production base, a vast pool of skilled and unskilled personnel, cheap labour, good export potential and low import content are some of the salient features of the Indian Basic Metal industry. This is a traditional, robust, well established industry, enjoying considerable demand in the domestic as well as global markets.

1.4 A Brief Survey of Literature

1.4.1 The concept of technical efficiency indicates the degree of success in the utilization of productive resources. Technical efficiency is considered to be an important determinant of productivity growth and international competitiveness in any economy (Taymaz and Saatci, 1997). There are different schools of thought in estimating the technical efficiency. Technical efficiency consists of maximizing the level of production that can be obtained from a given combination of factors. In the Indian context, number of studies examined the technical efficiency of the manufacturing industry, e.g., Page (1984), Little et al. (1987), Patibandla (1998), Mitra (1999), Agarwal (2001), and Mitra et al. (2002), Bhandari et al. (2007a, 2007b) and many others. Krishna and Mitra (1998) investigate the effects on competition and productivity on the dramatic 1991 trade liberalization in case of Indian manufacturing. Using firm-level data from a variety of industries, they find some evidence of an increase in the growth rate of productivity. Driffield and Kambhampati (2003) estimate frontier production functions for six manufacturing industries. Their findings suggest an increase in overall efficiency in five out of the six manufacturing industries in the post-reform period. Mukherjee and Ray (2005) examine the efficiency dynamics of a 'typical' firm in individual states during the pre and post-reform years. Their findings establish no major change in the efficiency ranking for different states after the reforms was initiated. Using a panel dataset of 121 Indian manufacturing industries from 1981 to 1998, Pattnayak and Thangavelu (2005) find evidence of total factor productivity improvements for most of the industries after the reform period.

1.4.2 While the 1991 economic reform was radical, India adopted a gradualist approach to reform, meaning a frustratingly slow pace of

implementation (Ahluwalia, 2002). It suggests that it is more appropriate to examine the effect of liberalization on manufacturing sectors' efficiency using a longer time span for both pre and post-reform. How did this economic reform program shifted Indian manufacturing into global stage and influencing technical and scale economies of major industries? In answering this question, we employ a nonparametric approach in explaining productivity changes, technical progress and scale efficiencies of industries within the sector. In this paper, we examine the impact of liberalization on the technical efficiency of Indian Basic Metal industry by comparing pre and post economic reform periods.

1.4.3 Analysis of technical efficiency of manufacturing industries in developing countries has received considerable attention in the economic literature in recent years. Recent literature includes Onder et al. (2003) for Turkey, Pham et al. (2009) for Vietnam, Margono et al. (2010) for Indonesia, and Mastromarco (2008) for less-developed countries among others. Technical efficiency is concerned with how closely the production unit operates to the frontier for the production possibility set. The historical roots of a rigorous approach to efficiency measurement can be traced to the works of Debreu (1951) and Farrell (1957). Over the past three decades, a variety of approaches, parametric and non-parametric, have been developed to investigate the failure of producers to achieve the same level of efficiency. A detailed survey on such methodologies is seen in Kalirajan and Shand (1999). In parametric models, one specifies an explicit functional form for the frontier and econometrically estimates the parameters using sample data for inputs and output, and hence the accuracy of the derived technical efficiency estimates is sensitive to the nature of the functional form specified. In contrast, the method of Data Envelopment Analysis (DEA) introduced by Charnes et al. (1978) and further generalized by Banker et al. (1984) offers a non-parametric alternative to parametric frontier production function analysis. A production frontier is empirically constructed using linear programming methods from observed input-output data of sample decision making units (DMUs). In this study, we adopt the output-oriented (OO) DEA that seeks the maximum proportional increase in output production, with input levels held fixed. The non-parametric approach entails constructing an envelope of the most productive groups to serve as the frontier for the productive performance of all manufacturing industry groups. Thus, there will be one production frontier for each year of the sample, with differences

between the frontiers of any two years representing the technical change between those years. By exploiting the computational strength of DEA, the Malmquist productivity-change index may be decomposed into multiplicative factors that can be attributed to technical change (TC), technical efficiency change (TEC) and scale efficiency change (SEC). Lovell (1996) gives a clear description of how the DEA based Malmquist approach implements such a decomposition.

1.4.4 Kumar (2012) showed that wage rate & labour productivity are inter related to each other and they are positively related in case of long run relationship. Hence Efficiency wage hypothesis has been proved true as real wages determined level of productivity. Klein(2012) examine that the rapid growth of the real wage, which outpaced the labor productivity growth in most of the sectors have played an important role in suppressing employment creation. The paper also found that while there is a co-integrating link between the real wage and labor productivity, the deviations from equilibrium are persistent and thus contribute to a weak link between real wage growth and labor productivity growth in the short term. Nayak & Patra(2013) examine the relationship between wage rate and productivity on manufacturing sector and on the basis of these analysis they argued that wage rate & labour productivity are positively correlated.

1.4.5 The Paper is organized as follows: Section 2 depicts methodology & database. Total Factor Productivity, employment estimates and the causal relationship between real wage rate and total factor productivity growth & real wage rate and partial labour productivity are presented in section 3. Section 4 present concluding remarks.

1.5 Objectives of our study

Main objectives of our study are as follows:

1. To estimate the total factor productivity growth (TFPG) of Indian Basic Metal industry in terms of Malmquist Productivity Index.
2. To evaluate the impact of liberalization on TFPG.
3. To estimate the employment function.
4. To examine the impact of liberalization on employment.
5. To assess the causal relationship between real wage rate and TFPG.

6. To evaluate the causal relationship between real wage rate and partial labour productivity.

2. Methodological Issues

2.1 Description of Data & Measurement of Variables

2.1.1 The present study is based on industry-level time series data taken from several issues of Annual Survey of Industries, National Accounts Statistics, CMIE, Economic Survey, Statistical Abstracts (several issues) & RBI bulletin etc. covering a period of 31 years from 1980-81 to 2010-11. Selection of time period is largely guided by availability of data. The entire period is sub-divided into two phases, 1980-81 to 1990-91 & 1991-92 to 2010-11 (Pre-reform phase and Post-reform phase). Sub-division of total period has been taken logically so as to assess conveniently, the impact of liberalization on total factor productivity growth and employment.

2.1.2 In the present paper we have tried to estimate the trend in TFPG and Employment for the Indian Basic Metal industry at 2-digit level of Industrial Classification.

2.1.3 Now, output in this context is measured as real gross value added. The GDP deflator has been used as the deflator of gross value added.

2.1.4 In this study Labour index is formed as a weighted sum of number of heads in two groups (Workers & Other employees), weights being the relative group remunerations. Relevant data are obtained from ASI & Indian Labour Statistics.

2.1.5 So far as capital input is concerned we have taken into account the perpetual inventory method. In our study, real gross fixed capital stock is taken as the measure of capital input. Deflator used is obtained from data on GFCF at current and constant prices. Data for the above purpose are obtained from various issues of ASI & NAS published by CSO.

2.1.6 So far as price index is concerned, to calculate real wage rate, we have taken up consumer price index (CPI) for industrial labourers (IL). Data for CPI is obtained from Handbook of Statistics on the Indian Economy published by RBI.

2.2 Econometric Specification of Malmquist Productivity Index

2.2.1 The conventional setup of Färe et al. (1992) is adopted in modelling the problem as transformation of a vector of inputs $x^t \in R_+^n$ into a vector of output $y^t \in R_+^m$ .The production technology at each time period t, denoted S^t, is identified as the set of all technologically feasible input-output combinations at time t (Lovell, 1996). It is constructed from the data as:

$$S^t = \{(x^t, y^t) | x^t \text{ can produce } y^t\} \quad (1)$$

Fare, Grosskopf, Noriss & Zhang (1994) followed Shephard (1970) to define the output distance function at time 'τ' as:

$$D_0^t (x^t, y^t) = \inf \{\theta \mid (x^t, y^t / \theta) \in S^t\} = (\sup \{ \theta \mid (x^t, \theta\, y^t) \in S^t\})^{-1} \quad (2)$$

The subscript '0' is used to denote the output based distance function. Note that, $D_0^t (x^t, y^t) \leq 1$; if and only if $(x^t, y^t) \in S^t$, & $D_0^t (x^t, y^t) = 1$; if and only if (x^t, y^t) is on the frontier of the technology. In the latter case, Farrell (1957) argued that the firm is technically efficient.

To define the Malmquist index, Fare et al. (1994) defined distance function with respect to two different time periods:

$$D_0^t (x^{t+1}, y^{t+1}) = \inf \{\theta \mid (x^{t+1}, y^{t+1} / \theta) \in S^t\} \quad (3)$$

&

$$D_0^{t+1} (x^t, y^t) = \inf \{\theta \mid (x^t, y^t / \theta) \in S^{t+1}\} \quad (4)$$

The distance function in (3) measures the maximal proportional change in output required to make (x^{t+1}, y^{t+1}) feasible in relation to technology at time 't'. Similarly, the distance function in (4) measures the maximal proportional change in output required to make (x^t, y^t) feasible in relation to technology at time (t+1). The output-based Malmquist TFP productivity index can then be expressed as:

$$M_0 (x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_0^{t+1} (x^{t+1}, y^{t+1})}{D_0^t (x^t, y^t)} \left[\frac{D_0^t (x^{t+1}, y^{t+1})}{D_0^{t+1} (x^{t+1}, y^{t+1})} \frac{D_0^t (x^t, y^t)}{D_0^{t+1} (x^t, y^t)} \right]^{\frac{1}{2}}$$

The term outside the brackets shows the change in technical efficiency while the geometric mean of the two ratios inside the brackets measures the shift in technology between the two period 't' & 't+1'; this could be called technological progress. So :

$$\text{Efficiency change} = \frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^{t}(x^{t}, y^{t})} \tag{6}$$

$$\text{Technical change} = \left[\frac{D_0^{t}(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})} \frac{D_0^{t}(x^{t}, y^{t})}{D_0^{t+1}(x^{t}, y^{t})}\right]^{\frac{1}{2}} \tag{7}$$

In each of the formulas i.e., equation(6) & (7) , a value greater than one indicates a positive growth of TFP (an improvement) from a period 't' to 't+1' and a value smaller than one represents deteriorations in performance over time.

We can decompose the total factor productivity growth in following way as well:

MTFPI = Technical Efficiency change X Technical Change

(Catching up effect) (Frontier effect)

2.2.2 MTFPI is the product of measure of efficiency change (catching up effect) at current period 't' and previous period 's' (averaged geometrically) and a technical change (frontier effect) as measured by shift in a frontier over the same period. The catching up effect measures that a firm is how much close to the frontier by capturing extent of diffusion of technology or knowledge of technology use. On the other side frontier effect measures the movement of frontier between two periods with regards to rate of technology adoption. In DEA-Malmquist TFP Index does not assume all the firms or sectors are efficient so therefore any firm or sector can be performing less than the efficient frontier. In this methodology we will use the output oriented analysis because most of the firms and sectors have their objective to maximize output in the form of revenue or profit. It is also assumed that there is constant return to scale (CRS) technology to estimate distance function for calculating Malmquist TFP index and if technology exhibits constant return to scale (CRS), the input based and output based Malmquist TFP Index will provide the same measure of productivity change.

2.3 The Employment Function

2.3.1 In this paper, employment generated in the concerned industry is obtained by estimating the employment function which shows the relationship between employment, output and real wage rate (real cost of labour). The specification of employment function frequently used in empirical studies is given below:

$$\log (L) = a + b \log (w/p) + c \log (Y) + m \log (L_{-1}) + \alpha DT + u$$

Where, 'L' implies labour, 'Y' is the real value added output, '(w/p)' is the real wage rate (nominal wage deflated by the consumer price index), 'L_{-1}' is the labour with one year lag and 'u' is the random error term. One period lag of the dependent variable is considered here to capture the impact of past real wages on employment. The coefficient of 'log (w/p)' is expected to be negative since an increase in real wage rate (labour cost) should reduce employment. Again, we may state that the coefficient of 'log (Y)' may be expected to be positive because an increase in output should increase employment. It may further be added that the lagged structure underlying the above model requires the coefficients of 'log (L -1)' to lie between '0' and '1'. The short run elasticity of employment with regard to the real wage rate is given by 'b' and the long run elasticity by '[b/ (1-m)]'. Again the short run elasticity of employment with regard to output is given by 'c' and the long run elasticity by '[c/ (1-m)]'. DT is the intercept dummy which is time variant and it is used to catch the impact of liberalization on employment of the Indian Basic Metal industry.

3. Empirical Results of MTFP Growth

In this section, we have presented the estimates of total factor productivity growth and its components using Malmquist Productivity Index under two inputs- labour & capital and one output framework. Estimation of annual TFP growth rate of Indian Basic Metal industry for the pre and post-reform period at aggregate level are presented in Table: 3.1 & Table: 3.2 respectively.

Since the technical change is more than unity for both the pre and post reform period so we can say that there is an overall improvement in technical change.

We also found that the entire period (1980-81 to 2010-11) shows a positive

TFP growth and it is 3.6%. Now, From Table 3.1, it is seen that, during the pre-reform period, the Indian Basic Metal industry experienced an overall positive TFP growth of 4.3%. During the post reform period, from Table 3.2, we can clearly see that the overall growth of TFP is positive and it is 3.3% indicates that the total factor productivity growth fall form pre to post reform period. This result reveals that in post reform period, decline in the industry's TFPG is due to its productivity based frontier capability.

3.1 **Empirical results from estimated Employment Function for the Indian Basic Metal Industry:-**

3.1.1 Now, as stated in Methodology, the employment function is given by,

$$\text{Log } L = a + b \text{ Log } (w/p) + c \text{ Log } (Y) + m \text{ Log } (L_{-1}) + \alpha DT + u$$

So far as Basic Metal industry is concerned, the estimated employment function is given by,

$$\text{Log } L = 0.80 - 0.629 \text{ Log } (w/p) + 0.209 \text{ Log } (Y) + 0.543 \text{ Log } (L_{-1}) + 0.016DT$$

(6.037)* (- 5.221)* (2.856)* (6.836)* (3.864)*

Here, t-statistics are given in the parenthesis and the model is summarised as, R^2= 0.995 and $\bar{R}^2$= 0.993, F= 1401.598. The coefficient of 'Log (w/p)' is expected to be negative since an increase in teal wage rate should reduce the employment. Here, the coefficient of 'Log (w/p)' is negative, as it is expected. The coefficient of 'Log (Y)' is positive as is expected and it is 0.209 implies that increase in output should increase the employment. The coefficient of 'Log (L_{-1})' also lies between '0' and '1' as is expected and it is highly significant, indicating a significant lag in the adjustment of actual employment to its desired level. The Coefficient of 'DT' is positive and it is also highly significant implying a positive impact of liberalization on employment generation of the Indian Basic Metal industry. Here, the short run elasticity of employment with respect to real wage rate is 0.629 and that of the long run elasticity is 0.457. Similarly, the short run elasticity of employment with regard to output is 0.209 and that of the long run it is 0.457.

3.2 Empirical results from the causal relationship between real wage rate and total factor productivity growth for the Indian Basic Metal Industry:-

3.2.1 From unit root testing, we have the following results as presented in Table 3.2.1, 3.2.3 & 3.2.4.

3.2.2 The result of ADF unit root tests is presented in Table-3.2.1. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for real wage rate (W/P). Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1). Now at the first difference of the ADF test, the optimum lag selection is based on Schwartz Information Criteria (SIC). Table 3.2.2 suggest that the appropriate lag length is 2 for the considering variables.

3.2.3 The result of Phillips-Perron unit root tests is presented in Table-3.2.3. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for real wage rate (W/P). Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1).

3.2.4 The result of DF-GLS detrending unit root tests is presented in Table-3.2.4. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for real wage rate (W/P). Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1).

Results from Cointegration Test :

3.2.5 Having established the time series properties of the data, the test for presence of long-run relationship between the variables using the Johansen Cointegration test was conducted. The Johansen approach can determine the number of cointigration vectors for any given number of non-stationary variables of the same order. The results reported in Table-3.2.5 suggest that the null hypothesis of no cointegrating vectors can be rejected at 1% level of significance. It can be seen from the trace statistics that we have one co-integration equation at both 1% and 5% level.

3.2.6 From Johansen Cointegration test result the normalized cointegration equation can be written as:

$$W/P = \underset{(1.85***)}{-8.62} + \underset{(5.27*)}{7.01\ TFP}$$

From the above normalized cointegration equation we can say that one unit change in TFP leads to 7.01 unit change in real wage rate for the Indian Basic Metal industry. t-statistics are given in the parenthesis which are also significant at 10% (***) and l% (*) level of significance. Thus we can say that there is a long-run relationship between real wage rate and total factor productivity growth.

Findings from Granger Causality Test :

3.2.7 The results of Pairwise Granger Causality between real wage rate (W/P) and total factor productivity growth (TFPG) for the Indian Basic Metal industry are presented in Table-3.2.6. The results reveal that there is a unidirectional causal relationship between TFPG and real wage rate (W/P). Our result confirms that TFP is the Granger cause of (W/P) at lag 2, 3 & 4.

3.2.8 The finding from our study, is quite natural and is in conformity with the studies made by Rath. B. N and Madheswaran. S (2007).

3.3 Empirical results from the causal relationship between real wage rate and partial labour productivity growth for the Indian Basic Metal Industry:-

3.3.1 The results of unit root testing are presented in Table 3.3.1, 3.3.3 and 3.3.4.

3.3.2 The result of ADF unit root tests is presented in Table-3.3.1. Each variable is tested in their level, first difference and second difference with intercept only as well as trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for both the variables and therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1). Now as all the series are stationary after first difference we can proceed to the granger causality test to check the causal relation between the variables. For the ADF test, the optimum lag selection is based on Schwartz Information Criterion.

Table-3.3.2 suggest that the appropriate lag length is 1 for the partial labour productivity and for real wages the appropriate lag length is 2.

3.3.3 The result of Phillips-Perron unit root tests is presented in Table-3.3.3. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for both real wage rate (W/P) and partial labour productivity (Y/L). Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1).

3.3.4 The result of DF-GLS detrending unit root tests is presented in Table-3.3.4. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for both the variables. Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1).

Results from Cointegration Test :

3.3.5 Having established the time series properties of the data, the test for presence of long-run relationship between the variables using the Johansen Cointegration test is conducted. The Johansen approach can determine the number of cointigration vectors for any given number of non-stationary variables of the same order. The results reported in Table-3.3.5. suggest that the null hypothesis of no cointegrating vectors can be rejected at 1% level of significance. It can be seen from the trace statistics that we have one co-integration equation at both 1% and 5% level.

3.3.6 From Johansen Cointegration test result the normalized cointegration equation can be written as:

$$\underset{}{W/P} = \underset{(4.12^*)}{-0.2889} + \underset{(3.01^*)}{0.027051}\ (Y/L)$$

From the above normalized cointegration equation we can say that one unit change in (Y/L) leads to 0.027 unit change in real wage rate for the Indian Basic Metal industry. t-statistics are given in the parenthesis which are also significant at l% (*) level of significance. Thus we can say that there is a long-run relationship between real wage rate and partial labour productivity.

Findings from Granger Causality Test :

3.3.7 The results of Pairwise Granger Causality between real wage rate (W/P) and partial labour productivity for the Indian Basic Metal industry are presented in Table-3.3.6. The results reveal that there is a unidirectional causal relationship between partial and real wage rate (W/P). Our result confirms that partial labour productivity is the Granger cause of (W/P) at lag 2, 3 & 4.

3.3.8 This result is also the conformity of the study made by Klein (2012) & Kumar (2012).

4. Conclusions

The following are the major findings of our study:

First, the result on the overall productivity displays there is a declining trend of MTFPG in post reform period as compared to pre reform period for the Indian Basic Metal industry.

Second, the result from estimated employment function depicts the negative relationship between employment and real wage rate.

Third, from employment function estimation for the Indian Basic Metal industry, we observe a positive relation between output growth and employment.

Fourth, there is an increase in employment, for the concerned industry due to liberalization policies.

Fifth, there is a positive and long-run causal relationship between real wage and total factor productivity growth for the Indian Basic Metal industry. The direction of causality is from total factor productivity to real wage rate.

Last, but not the least, our result also confirms a significant causal and long-run relationship between real wage rate and partial labour productivity for the Indian Basic Metal industry. The direction of causality is from partial labour productivity to real wage rate.

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Table: 3.1 – Malmquist Index Summary of Annual Means for Pre-reform Period

Year	EFFCH	TECHCH	PECH	SECH	MTFPCH
1980-81	-	-	-	-	-
1981-82	1.000	1.333	1.000	1.000	1.333
1982-83	1.000	0.825	1.000	1.000	0.825
1983-84	1.000	0.913	1.000	1.000	0.913
1984-85	1.000	0.916	1.000	1.000	0.916
1985-86	1.000	1.308	1.000	1.000	1.308
1986-87	1.000	0.705	1.000	1.000	0.705
1987-88	1.000	1.350	1.000	1.000	1.350
1988-89	1.000	1.126	1.000	1.000	1.126
1989-90	1.000	1.001	1.000	1.000	1.001
1990-91	1.000	1.179	1.000	1.000	1.179
Mean	**1.000**	**1.043**	**1.000**	**1.000**	**1.043**

Source: Authors own estimate by using DEAP software, version 2.1

Table: 3.2 – Malmquist Index Summary of Annual Means for Post-reform Period

Year	EFFCH	TECHCH	PECH	SECH	MTFPCH
1991-92	1.000	0.971	1.000	1.000	0.971
1992-93	1.000	1.065	1.000	1.000	1.065
1993-94	1.000	1.013	1.000	1.000	1.013
1994-95	1.000	1.317	1.000	1.000	1.317
1995-96	1.000	0.877	1.000	1.000	0.877
1996-97	1.000	0.856	1.000	1.000	0.856
1997-98	1.000	1.322	1.000	1.000	1.322
1998-99	1.000	0.939	1.000	1.000	0.939
1999-2000	1.000	1.281	1.000	1.000	1.281
2000-01	1.000	0.683	1.000	1.000	0.683
2001-02	1.000	0.497	1.000	1.000	0.497
2002-03	1.000	1.071	1.000	1.000	1.071
2003-04	1.000	2.778	1.000	1.000	2.778
2004-05	1.000	1.029	1.000	1.000	1.029
2005-06	1.000	0.914	1.000	1.000	0.914
2006-07	1.000	1.136	1.000	1.000	1.136
2007-08	1.000	1.114	1.000	1.000	1.114
2008-09	1.000	1.020	1.000	1.000	1.020
2009-10	1.000	1.033	1.000	1.000	1.033
2010-11	1.000	0.922	1.000	1.000	0.922
Mean	**1.000**	**1.033**	**1.000**	**1.000**	**1.033**

Source: Authors own estimate by using DEAP software version 2.1

Table 3.2.1: Results from ADF Unit Root Test

Variables	Intercept Only			Trend & Intercept		
	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
TFP	-5.59*	-5.89*	-3.40*	-5.56*	-5.76*	-4.31**
W/P	2.71	-4.32*	-7.28*	0.95	-5.36*	-7.56*

Source: Authors own estimate. (*, **, *** represents the significance level at 1%, 5% & 10% respectively)

Table 3.2.2: Selection of Appropriate Lag Length by SIC

Lags	SIC			
	TFP		W/P	
	Intercept Only	Trend & Intercept	Intercept Only	Trend & Intercept
1	10.97607	11.09738	4.256444	4.197497
2	10.92124*	11.04383*	4.235239*	4.172746*

Source: Authors own estimate

The asterisks (*) in the table 3.2.2 indicates the best (that is, minimized) values of the SIC.

Table 3.2.3: Results from Phillips-Perron Unit Root Test

Variables	Intercept Only			Trend & Intercept		
	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
TFP	-8.546580*	-18.60614*	-24.69985*	-10.95804*	-17.60549*	-24.07862*
W/P	3.432757	-4.631864*	-21.38441*	1.255157	-5.400801*	-33.99322*

Source: Authors own estimate. (*, **, *** represents the significance level at 1%, 5% & 10% respectively)

Table 3.2.4: Results from DF- GLS detrending Unit Root Test

Variables	Intercept Only			Trend & Intercept		
	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
TFP	-5.404652*	-7.079355*	-9.154866*	-5.642743*	-7.575941*	-5.798021*
W/P	2.444572	-4.382769*	-7.433553*	-2.185829	-5.509402*	-7.884532*

Source: Authors own estimate. (*, **, *** represents the significance level at 1%, 5% & 10% respectively)

Table 3.2.5: Johansen Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.5423718362759643	30.74536953571982	25.32	30.45
At most 1	0.2711961262303088	8.857817297819248	12.25	16.26

Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

*(**) denotes rejection of the hypothesis at the 5%(1%) level

Table 3.2.6: Granger Causality test Results

Null Hypothesis	Lag	Observations	F-Statistics	Probability	Decision
TFP does not Granger Cause Real wage rate	1	29	2.11071	0.1578	Accept
	2	28	3.94444	0.0330	Reject
	3	27	3.25069	0.0422	Reject
	4	26	3.53909	0.0268	Reject
Real wage rate does not Granger Cause TFP	1	29	0.68525	0.4150	Accept
	2	28	0.24766	0.7826	Accept
	3	26	0.31707	0.8129	Accept
	4	27	1.12451	0.3760	Accept

Source: Authors own estimate.

Table 3.3.1: Results from ADF Unit Root Test

Variables	Intercept Only			Trend & Intercept		
	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
Y/L	-0.14	-6.40*	-4.24*	-2.75	-3.91**	-4.32**
W/P	2.71	-4.32*	-7.28*	0.95	-5.36*	-7.56*

Source: Authors own estimate. (*, **, *** represents the significance level at 1%, 5% & 10% respectively)

Table 3.3.2: Selection of Appropriate Lag Length by SIC

Lags	SIC			
	Y/L		W/P	
	Intercept Only	Trend & Intercept	Intercept Only	Trend & Intercept
1	6.015457*	5.967715*	4.256444	4.197497
2	6.129633	6.050285	4.235239*	4.172746*

Source: Authors own estimate

The asterisks (*) in the table 3.3.2 indicates the best (that is, minimized) values of the SIC.

Table 3.3.3: Results from Phillips-Perron Unit Root Test

Variables	Intercept Only			Trend & Intercept		
	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
Y/L	0.747532	-7.696103*	-25.78026*	-2.560786	-16.31150*	-25.54813*
W/P	3.432757	-4.631864*	-21.38441*	1.255157	-5.400801*	-33.99322*

Source: Authors own estimate. (*, **, *** represents the significance level at 1%, 5% & 10% respectively)

Table 3.3.4: Results from DF- GLS detrending Unit Root Test

Variables	Intercept Only			Trend & Intercept		
	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
Y/L	0.126185	-6.495927*	-1.541922	-2.707495	-3.159232***	-2.383759
W/P	2.444572	-4.382769*	-7.433553*	-2.185829	-5.509402*	-7.884532*

Source: Authors own estimate. (*, **, *** represents the significance level at 1%, 5% & 10% respectively)

Table 3.3.5: Johansen Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.3566944491219758	32.43499713622686	25.32	30.45
At most 1	0.1767983454583746	9.642068452648944	12.25	16.26

Trace test indicates 1 cointegrating equation at the 1% level

*(**) denotes rejection of the hypothesis at the 5%(1%) level

Table 3.3.6: Granger Causality test Results

Null Hypothesis	Lag	Observations	F-Statistics	Probability	Decision
Partial labour productivity does not Granger Cause Real wage rate	1	29	1.1903	0.1781	Accept
	2	28	4.67399	0.0230	Reject
	3	27	4.10934	0.0274	Reject
	4	26	4.57102	0.0238	Reject
Real wage rate does not Granger Cause Partial labour productivity	1	29	0.76091	0.5270	Accept
	2	28	0.28103	0.7941	Accept
	3	26	0.24999	0.8289	Accept
	4	27	1.51890	0.1271	Accept

Source: Authors own estimate.

SECTION II

PROVISIONAL RESULTS OF SIXTH ECONOMIC CENSUS ALL INDIA REPORT

[Excerpts from the All India Report of Provisional Results of Sixth Economic Census]

PROVISIONAL RESULTS OF SIXTH ECONOMIC CENSUS
ALL INDIA REPORT

Highlights

- The Sixth Economic Census (EC) covered all States and Union Territories of Indian Union.
- Fieldwork was conducted during January, 2013 to April, 2014 in collaboration with State/UT Governments.
- The EC enumerated all establishments engaged in various agricultural and non-agricultural activities excluding crop production, plantation, public administration, defence and compulsory social security.
- Enumeration Blocks of Population Census, 2011 were used as the primary geographical units for collection of data.
- Data for handicraft/handloom establishments were collected for the first time.
- Total number of establishments counted is about 58.5 million.
- Nearly 59.9% of the establishments belong to rural areas.
- About 20.5% of the establishments operate from outside household without fixed structure.
- About 3.8% of the establishments are engaged in handicraft/ handloom activities.
- Growth rate in number of establishments over Fifth EC (2005) is 41.7%.
- Total number of persons employed is about 128 million with rural share of 51.9%.
- Percentage of hired workers is about 45.7%.
- Percentage of female workers is 25.6%.
- Growth rate in total employment over Fifth EC (2005) is 34.4%.

SIXTH ECONOMIC CENSUS

1. Introduction

1.1 Economic Census (EC) is the complete count of all establishments (i.e. units engaged in production and/or distribution of goods and services not for the purpose of sole consumption) located within the geographical boundaries of the country. In India five Economic Censuses have been conducted in the past. These were conducted during 1977, 1980, 1990, 1998 and 2005. The Sixth EC was conducted during January, 2013 to April, 2014 in all the States and Union Territories of the country in collaboration with State/UT Governments. Overall guidance at all-India level was provided by Economic Census Unit of the Economic Statistics Division, Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation (MOSPI), Government of India.

1.2 The Sixth EC proposes to provide up to date information on number of establishments and number of persons employed therein, activity wise, of all the sectors (excluding crop production, plantation, public administration, defence and compulsory social security) of the country including their distribution at all-India, State, district, and at village/ward levels for comprehensive analysis of the structure of the economy (micro, macro and regional levels).

2. Objectives

2.1 In the fast developing Indian economy the necessity for a reliable, comprehensive and timely data pertaining to various sectors including the services sector and especially the unorganized components of the respective sectors at regular intervals, for planning and policy formulations, needs no emphasis. In a vast country like India with more than 58 million establishments likely to be in operation, filling up with the data gaps that do exist particularly for the unorganized segment of the economy is a real challenge. Main objectives for conduct of the Sixth Economic Census are as under:

i) To provide detailed information on operational and economic variables, activity wise, of all the establishments (excluding crop production, plantation, public administration, defence and compulsory social security) of the country including its distribution

at all-India, State and sub-State levels for comprehensive analysis of the structure of the economy and for benchmark purposes; To provide similar data at lower geographical levels like tehsils/villages in case of rural areas and towns/wards in case of urban areas for decentralized planning required under 73rd and 74th Constitutional Amendments;

ii) To generate information on number of exporting establishments, employing 10 or more workers, activity wise and area wise in operation;

iii) To provide information on number of workers working in establishments, activity wise and area wise in operation;

iv) To provide information on number of workers working in unorganised sector (i.e. establishments employing less than ten workers);

v) To provide updated Directory of Establishments employing 10 or more workers for local level planning purposes and also for using as a 'list frame' for conduct of survey of such establishments in the non-manufacturing/services sector; and

vi) To provide an up to date 'area frame' containing information on number of establishments and number of workers by industry, by type of ownership of the establishments, etc at the village/block level, from which sample villages/blocks could be drawn as the primary sampling units for collecting detailed information about the establishments in the follow-up sample surveys of establishments.

The activities covered in the Sixth Economic Census have a share of about 86% in total GDP of the country.

3. Scope and Coverage

3.1 The Sixth EC was conducted in all the States/UTs. All economic activities (agricultural and non-agricultural), except those involved in crop production and plantation, public administration, defense and compulsory social security, related to production and/or distribution of goods and/or services other than for the sole purpose of own consumption were covered.

However, as were done in earlier censuses, the following activities were kept out of the purview of the Sixth EC:

i) Establishments of shelter-less and nomadic population, which keep on moving from place to place and camp either without shelter or with makeshiftshelter.

ii) Establishments engaged in some illegal activities like smuggling, gambling, beggary, prostitution, etc.

iii) Domestic servants, whether they work in one household or in a number of households, drivers, etc. who undertake jobs for others on wages.

iv) All wage-paid employees of casual nature.

v) Household members engaged in household chores.

vi) Persons doing different types of jobs depending on the availability of work e.g. loading, unloading, helping a mason or a carpenter, doing earthwork for a contractor.

vii) Household members working for other households and earning some money which is insignificant.

viii) Households in which none of the members is engaged in any gainful activity i.e. households depending on remittance, rent, interest, pension etc.

4. Committees and Working Groups at Central Level

4.1 A Standing Committee was constituted under the Chairmanship of Chief Statistician of India & Secretary, MOSPI, to look into various aspects and provide overall direction and guidance for conduct of Sixth Economic Census. The Members of the Committee for the Sixth Economic Census inter-alia include Registrar General and Census Commissioner of India, Adviser (Financial Resources) and Adviser (Perspective Planning) both from the Planning Commission, Chief Economic Adviser, Ministry of Finance and other officers of the level of Additional Secretary/Joint Secretary of the Central Ministries/Departments concerned like Ministry of Micro, Small and Medium Enterprises, Commerce and Industry, Women & Child Development, Panchayati Raj, Rural Development and Labour &

Employment as well as DG (CSO), DG & CEO (NSSO), Additional DGs heading National Accounts Division, Social Statistics Division, Training Division, Field Operations Division, Survey Design and Research Division, Data Processing Division, DDG (Computer Centre) and DDG (CSO IS Wing). Six State Governments namely, Jammu & Kashmir, Assam, Maharashtra, Tamil Nadu, Uttar Pradesh and West Bengal were represented by their respective Directors General/ Directors from Directorate of Economics & Statistics. The Standing Committee also included other experts from esteemed educational institutions in the field of Statistics and Economics and Ex-DGs of CSO.

4.2 The Committee was assisted by a Working Group headed by Prof. S. P. Mukherjee, Retired Professor and Head, Department of Statistics, Calcutta University for development of concepts & definitions, strategy for conduct of field work, tabulation of data and dissemination of results. All the technical and secretarial assistance to the Committees and Working Group was provided by the Economic Census Unit of Economic Statistics Division, CSO.

5. Changes Made in the Sixth Economic Census

i) Coverage:

- The practice followed since the Second EC to cover all agricultural activities excluding crop production and plantation was continue in EC

- In case of non-agricultural activities, establishments engaged in ublic administration, defense and compulsory social security activities were excluded during Sixth EC as such information is already available with the Government and also due to the difficulties faced in collecting information from such establishments during the Fifth EC.

ii) Changes Made in the Schedules:

In Sixth EC two schedules were canvassed, viz., i) House and Establishment Listing Schedule(6A) and ii) Directory of Establishment Schedule (6C) (See Annexure-III) in place of three schedules canvassed during Fifth EC. House and Establishment Listing Schedule of Sixth EC was formed by

merging 'House List' and 'Enterprise Schedule' of the Fifth EC. Further, the 'Address Slip' Schedule of Fifth EC was modified and renamed as **Directory of Establishment Schedule** in Sixth EC for developing Business Register.

The third schedule 'Establishment Abstract' (Schedule 6B) was a derived schedule of summary information based on the information contained in House and Establishment Listing Schedule, which was required to be prepared by each enumerator. This summary information has been used to generate provisional results contained in this report.

iii) **Inclusion of New Items/Changes Made in Main Schedule i.e., House and Establishment Listing Schedule:**

a. Number of members in the household (HH);

b. Number of only wage earners/salaried employees in the HH;

c. Number of establishments outside HH with fixed structure owned by HH members;

d. Number of establishments outside HH without fixed structure owned by HH members;

e. Number of establishments inside HH owned by HH members; Items under 'a' to 'e' above were included at the household level to guard against possible under-listing of establishments located within the household or those without fixed structure);

f. Broad activity code (all activities divided into two-digit 24 broad activity codes);

g. Three-digit NIC Codes recorded in place of four-digit NIC codes earlier, to minimize wrong reporting of NIC codes;

h. Data collected for handicraft/handloom establishments for the first time;

i. Information on ownership of proprietary establishments collected for transgender for the first time;

j. Religion of the owner of proprietary establishments;

k. Nature of operation: 'Non perennial' was divided into casual and seasonal; and

l. Bar Codes along with Form Number were used for the first time to facilitate proper accounting of canvassed schedules.

iv) **Items Excluded from the Main Schedule i.e., House and Establishment Listing Schedule:**

a. Information on subsidiary activity (only information on major activity collected);

b. Power used in entrepreneurial activity (confined to Directory of Establishment schedule);

c. Registration code (confined to Directory of Establishment schedule);

d. Number of children (male/female) usually working.

v) **New Items Added in Directory of Establishment Schedule:**

a. Does a computer and/or internet facility exist in the establishment?

b. Whether using power in production of goods and services?

c. Whether an exporting unit?

d. Address of main office along with that of branch office with PAN and TAN numbers

e. Registration information under 9 codes.

PROVISIONAL RESULTS OF SIXTH ECONOMIC CENSUS

[Excluding crop production, plantation, public administration, defence & compulsory social security services activities]

(Figures are purely provisional)

S. No.	Item	Rural India	Urban India	India
1.	a) Number of establishments (in 000)	35,023	23,447	58,470
	b) Percentage share	59.9%	40.1%	100.0%
2.	a) Number of establishments (in 000)			
	i) Outside household without fixed structure	7,333	4,646	11,979
	ii) Handicraft/Handloom	1,294	899	2,193
	b) Percentage share in total establishments			
	i) Outside household without fixed structure	20.94%	19.81%	20.49%
	ii) Handicraft/Handloom	3.69%	3.83%	3.75%
3.	Growth rate (%) in number of establishments over Fifth Economic Census*	39.28%	45.57%	41.73%
4.	a) Number of persons employed (in 000)	66,289	61,419	127,708
	b) Percentage share	51.9%	48.1%	100.0%
5.	Percentage of hired workers in the total persons employed	34.67%	57.59%	45.69%
6.	Percentage of total female workers in the total persons employed	30.90%	19.80%	25.56%
7.	Growth rate (%) in total employment over Fifth Economic Census*	31.59%	37.46%	34.35%

* The intervening period of fieldwork between Fifth and Sixth ECs differ from State/UT to State/UT.

Figures are purely provisional

Tables 1.1 Total Number of Establishments and Total Persons Employed: Rural (Excluding Crop Production, Plantation, Public Administration, Defense & Compulsory Social Security Services Activities)

State/UT	Total Number of Establishments				No. of Persons Employed on Last Working Day					No. of Handicraft /Handloom Establishments
					Hired		Non-Hired			
	Outside HH* With fixed Structure	Outside HH Without fixed Structure	Inside HH	All	Male	Female	Male	Female	All	
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	509062	986551	1632251	3127864	1076554	545583	2476500	1686563	5785200	100403
Arunachal Pradesh	13800	1513	3975	19288	22646	10623	9857	4945	48071	168
Assam	500975	513551	396728	1411254	771134	286749	1273219	272345	2603447	73132
Bihar	657200	189769	364200	1211169	541076	175019	1109553	167686	1993334	44106
Chhattisgarh	157806	226563	128319	512688	260656	127108	456727	292522	1137013	17572
Goa	13797	10748	7862	32407	32723	12211	23555	16786	85275	667
Gujarat	420614	437762	1518858	2377234	992650	301087	2040122	1522088	4855947	25520
Haryana	260906	91279	296200	648385	556810	157193	556596	181215	1451814	15350
Himachal Pradesh	183039	70968	81480	335487	287027	122205	248264	72139	729635	11742
J&K	196728	37716	69763	304207	226115	85464	237627	45926	595132	46054
Jharkhand	182287	67778	98768	348833	257755	108023	265519	55996	687293	15043
Karnataka	535025	232186	911232	1678443	852774	475356	1239886	758588	3326604	39371
Kerala	607734	273011	934924	1815669	742199	465274	1116262	955455	3279190	16074
Madhya Pradesh	402668	185726	502717	1091111	520258	245528	943982	330810	2040578	30543
Maharashtra	1075411	497205	1936006	3508622	1745895	471920	3025616	1361779	6605210	58984
Manipur	21694	50717	64584	136995	49927	19015	91618	81887	242447	38915
Meghalaya	47364	15372	10429	73165	74156	36449	43444	30578	184627	3255
Mizoram	8417	2479	8235	19131	12915	8086	8699	8592	38292	667
Nagaland	14689	7227	11465	33381	27810	17105	22687	15096	82698	4495
Odisha	555540	475008	564380	1594928	743782	260014	1314770	866910	3185476	136791
Punjab	421008	86817	310902	818727	561022	217011	733918	186239	1698190	9074
Rajasthan	815688	343922	729256	1888866	1135035	287402	1661242	614973	3698652	95519
Sikkim	7776	6191	7600	21567	17232	12218	14534	7869	51853	711
Tamil Nadu	534111	440339	1701061	2675511	1120964	628476	1779403	1332004	4860847	63349
Telangana	236809	426775	516304	1179888	557943	376220	878311	533442	2345916	28941
Tripura	96223	29869	18582	144674	53179	31429	127475	20190	232273	6443
Uttar Pradesh	1440365	592268	2127692	4160325	1424219	456958	4381240	1480108	7742525	173622
Uttarakhand	134794	24208	76343	235345	221932	84607	194429	47076	548044	6625
West Bengal	1096977	996153	1471693	3564823	1482816	457068	3017091	1006998	5963973	230098
A& N Islands	7393	5601	1791	14785	13315	5748	13421	5483	37967	105
Chandigarh	1049	829	362	2240	1409	223	2138	169	3939	26
D& N Haveli	2399	252	473	3124	33224	2396	1894	359	37873	16
Daman & Diu	1284	680	135	2099	9945	2822	1764	401	14932	13
Delhi	4847	3686	4140	12673	10484	2295	12148	2885	27812	266
Lakshadweep	282	60	20	362	433	120	267	44	864	1
Puducherry	9615	1946	5904	17465	33785	13327	12369	6571	66052	95
Total	**11175376**	**7332725**	**16514634**	**35022735**	**16471799**	**6508332**	**29336147**	**13972717**	**66288995**	**1293756**

*HH: Household

Figures are purely provisional

Tables 1.2 Number of Establishments and Total Persons Employed: Urban (Excluding Crop Production, Plantation, Public Administration, Defence & Compulsory Social Security Services Activities)

State/UT	Total Number of Establishments				No. of Persons Employed on Last Working Day					No. of Handicraft/Handloom Establishments
					Hired		Non-Hired		All	
	Outside HH With fixed Structure	Outside HH Without fixed Structure	Inside HH	All	Male	Female	Male	Male		
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	428384	351221	329841	1109446	1006108	362193	946030	363404	2677735	58484
Arunachal Pradesh	13385	1345	2584	17314	22909	8803	12276	5056	49044	155
Assam	278045	149337	115107	542489	467021	91269	507367	65655	1131312	20632
Bihar	324195	62386	117708	504289	414008	53010	493094	40793	1000905	14129
Chhattisgarh	149717	34780	76583	261080	357868	90125	251796	46983	746772	7724
Goa	42833	13149	8937	64919	96878	40093	49283	22531	208785	709
Gujarat	990769	407354	215411	1613534	2362021	307128	1339191	199282	4207622	61086
Haryana	373217	57589	92284	523090	1018398	181540	525000	54559	1779497	11631
Himachal Pradesh	54177	10534	14666	79377	119386	31817	68530	12278	232011	877
J&K	157925	26867	18373	203165	227832	54679	190351	16301	489163	14343
Jharkhand	192523	44812	52973	290308	381699	93201	234572	26668	736140	5276
Karnataka	791275	189408	220366	1201049	1654413	631722	982128	275109	3543372	38757
Kerala	733702	277349	548847	1559898	1310364	694533	1039357	596214	3640468	15641
Madhya Pradesh	518172	161026	324560	1003758	853620	218485	992108	217608	2281821	33409
Maharashtra	1590824	473461	552995	2617280	3943193	992262	2363060	470894	7769409	68460
Manipur	22422	24397	33859	80678	38186	14289	50335	42623	145433	20232
Meghalaya	24168	4759	4666	33593	40418	22805	20098	14730	98051	672
Mizoram	15110	6682	13307	35099	23619	15939	16498	20136	76192	1880
Nagaland	21916	1603	4066	27585	31122	13643	18453	9258	72476	713
Odisha	235024	137920	115680	488624	480209	109693	469283	135345	1194530	18092
Punjab	474016	101573	117892	693481	908425	166349	710108	78878	1863760	10157
Rajasthan	688284	126235	204003	1018522	1148357	173661	992535	141465	2456018	70432
Sikkim	7778	1770	6634	16182	14782	7747	12574	6176	41279	525
Tamil Nadu	1309914	324670	742349	2376933	2441282	998451	1759128	750170	5949031	73968
Telangana	452065	231368	233259	916692	1548654	645270	812796	242992	3249712	17232
Tripura	63106	18366	11756	93228	56126	16916	90423	8477	171942	4237
Uttar Pradesh	1284767	404710	850934	2540411	2477862	382657	2769696	378126	6008341	175730
Uttarakhand	115681	20034	31275	166990	269767	55964	163589	19657	508977	3891
West Bengal	985414	718496	632788	2336698	2300800	449312	2330301	500278	5580691	126827
A& N Islands	6173	1463	1029	8665	15707	5788	7497	2075	31067	70
Chandigarh	27080	48439	6205	81724	112197	36190	78012	8636	235035	275
D& N Haveli	6177	746	562	7485	44953	7368	5116	638	58075	86
Daman & Diu	6595	1221	632	8448	49161	9881	6318	1115	66475	81
Delhi	458996	202754	218754	880504	1790790	245499	807571	113178	2957038	22047
Lakshadweep	1975	498	506	2979	4501	1523	2406	830	9260	17
Puducherry	26300	7625	7919	41844	74418	33274	31548	12402	151642	338
Total	**12872104**	**4645947**	**5929310**	**23447361**	**28107054**	**7263079**	**21148428**	**4900520**	**61419081**	**898815**

Figures are purely provisional

Tables 1.3 Number of Establishments and Total Persons Employed: Combined (Excluding Crop Production, Plantation, Public Administration, Defense & Compulsory Social Security Services Activities)

State/UT	Total Number of Establishments				No. of Persons Employed on Last Working Day					No. of Handicraft/Handloom Establishments
					Hired		Not-Hired			
	Outside HH With fixed Structure	Outside HH Without fixed Structure	Inside HH	All	Male	Female	Male	Female	All	
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	937446	1337772	1962092	4237310	2082662	907776	3422530	2049967	8462935	158887
Arunachal Pradesh	27185	2858	6559	36602	45555	19426	22133	10001	97115	323
Assam	779020	662888	511835	1953743	1238155	378018	1780586	338000	3734759	93764
Bihar	981395	252155	481908	1715458	955084	228029	1602647	208479	2994239	58235
Chhattisgarh	307523	261343	204902	773768	618524	217233	708523	339505	1883785	25296
Goa	56630	23897	16799	97326	129601	52304	72838	39317	294060	1376
Gujarat	1411383	845116	1734269	3990768	3354671	608215	3379313	1721370	9063569	86606
Haryana	634123	148868	388484	1171475	1575208	338733	1081596	235774	3231311	26981
Himachal Pradesh	237216	81502	96146	414864	406413	154022	316794	84417	961646	12619
J&K	354653	64583	88136	507372	453947	140143	427978	62227	1084295	60397
Jharkhand	374810	112590	151741	639141	639454	201224	500091	82664	1423433	20319
Karnataka	1326300	421594	1131598	2879492	2507187	1107078	2222014	1033697	6869976	78128
Kerala	1341436	550360	1483771	3375567	2052563	1159807	2155619	1551669	6919658	31715
Madhya Pradesh	920840	346752	827277	2094869	1373878	464013	1936090	548418	4322399	63952
Maharashtra	2666235	970666	2489001	6125902	5689088	1464182	5388676	1832673	14374619	127444
Manipur	44116	75114	98443	217673	88113	33304	141953	124510	387880	59147
Meghalaya	71532	20131	15095	106758	114574	59254	63542	45308	282678	3927
Mizoram	23527	9161	21542	54230	36534	24025	25197	28728	114484	2547
Nagaland	36605	8830	15531	60966	58932	30748	41140	24354	155174	5208
Odisha	790564	612928	680060	2083552	1223991	369707	1784053	1002255	4380006	154883
Punjab	895024	188390	428794	1512208	1469447	383360	1444026	265117	3561950	19231
Rajasthan	1503972	470157	933259	2907388	2283392	461063	2653777	756438	6154670	165951
Sikkim	15554	7961	14234	37749	32014	19965	27108	14045	93132	1236
Tamil Nadu	1844025	765009	2443410	5052444	3562246	1626927	3538531	2082174	10809878	137317
Telangana	688874	658143	749563	2096580	2106597	1021490	1691107	776434	5595628	46173
Tripura	159329	48235	30338	237902	109305	48345	217898	28667	404215	10680
Uttar Pradesh	2725132	996978	2978626	6700736	3902081	839615	7150936	1858234	13750866	349352
Uttarakhand	250475	44242	107618	402335	491699	140571	358018	66733	1057021	10516
West Bengal	2082391	1714649	2104481	5901521	3783616	906380	5347392	1507276	11544664	356925
A& N Islands	13566	7064	2820	23450	29022	11536	20918	7558	69034	175
Chandigarh	28129	49268	6567	83964	113606	36413	80150	8805	238974	301
D& N Haveli	8576	998	1035	10609	78177	9764	7010	997	95948	102
Daman & Diu	7879	1901	767	10547	59106	12703	8082	1516	81407	94
Delhi	463843	206440	222894	893177	1801274	247794	819719	116063	2984850	22313
Lakshadweep	2257	558	526	3341	4934	1643	2673	874	10124	18
Puducherry	35915	9571	13823	59309	108203	46601	43917	18973	217694	433
Total	**24047480**	**11978672**	**22443944**	**58470096**	**44578853**	**13771411**	**50484575**	**18873237**	**127708076**	**2192571**

Figures are purely provisional

Table 2: State/UT wise Percentages of establishments and persons employed (Excluding Crop Production, Plantation, Public Administration, Defence & Compulsory Social Security Services Activities)

States/UTs	Establishments			% Share of State/UT in Total No. of Establishments	Persons Employed			% Share of State/UT in Total No. of Persons Employed
	Rural	Urban	Combined		Rural	Urban	Combined	
Andhra Pradesh	73.82	26.18	100.00	7.25	68.36	31.64	100.00	6.63
Arunachal Pradesh	52.70	47.30	100.00	0.06	49.50	50.50	100.00	0.08
Assam	72.23	27.77	100.00	3.34	69.71	30.29	100.00	2.92
Bihar	70.60	29.40	100.00	2.93	66.57	33.43	100.00	2.34
Chhattisgarh	66.26	33.74	100.00	1.32	60.36	39.64	100.00	1.48
Goa	33.30	66.70	100.00	0.17	29.00	71.00	100.00	0.23
Gujarat	59.57	40.43	100.00	6.83	53.58	46.42	100.00	7.10
Haryana	55.35	44.65	100.00	2.00	44.93	55.07	100.00	2.53
Himachal Pradesh	80.87	19.13	100.00	0.71	75.87	24.13	100.00	0.75
J&K	59.96	40.04	100.00	0.87	54.89	45.11	100.00	0.85
Jharkhand	54.58	45.42	100.00	1.09	48.28	51.72	100.00	1.11
Karnataka	58.29	41.71	100.00	4.92	48.42	51.58	100.00	5.38
Kerala	53.79	46.21	100.00	5.77	47.39	52.61	100.00	5.42
Madhya Pradesh	52.08	47.92	100.00	3.58	47.21	52.79	100.00	3.38
Maharashtra	57.28	42.72	100.00	10.48	45.95	54.05	100.00	11.26
Manipur	62.94	37.06	100.00	0.37	62.51	37.49	100.00	0.30
Meghalaya	68.53	31.47	100.00	0.18	65.31	34.69	100.00	0.22
Mizoram	35.28	64.72	100.00	0.09	33.45	66.55	100.00	0.09
Nagaland	54.75	45.25	100.00	0.10	53.29	46.71	100.00	0.12
Odisha	76.55	23.45	100.00	3.56	72.73	27.27	100.00	3.43
Punjab	54.14	45.86	100.00	2.59	47.68	52.32	100.00	2.79
Rajasthan	64.97	35.03	100.00	4.97	60.10	39.90	100.00	4.82
Sikkim	57.13	42.87	100.00	0.06	55.68	44.32	100.00	0.07
Tamil Nadu	52.95	47.05	100.00	8.64	44.97	55.03	100.00	8.46
Telangana	56.28	43.72	100.00	3.59	41.92	58.08	100.00	4.38
Tripura	60.81	39.19	100.00	0.41	57.46	42.54	100.00	0.32
Uttar Pradesh	62.09	37.91	100.00	11.46	56.31	43.69	100.00	10.77
Uttarakhand	58.49	41.51	100.00	0.69	51.85	48.15	100.00	0.83
West Bengal	60.41	39.59	100.00	10.09	51.66	48.34	100.00	9.04
A& N Islands	63.05	36.95	100.00	0.04	55.00	45.00	100.00	0.05
Chandigarh	2.67	97.33	100.00	0.14	1.65	98.35	100.00	0.19
D & N Haveli	29.45	70.55	100.00	0.02	39.47	60.53	100.00	0.08
Daman & Diu	19.90	80.10	100.00	0.02	18.34	81.66	100.00	0.06
Delhi	1.42	98.58	100.00	1.53	0.93	99.07	100.00	2.34
Lakshadweep	10.84	89.16	100.00	0.01	8.53	91.47	100.00	0.01
Puducherry	29.45	70.55	100.00	0.10	30.34	69.66	100.00	0.17
All India	**59.90**	**40.10**	**100.00**	**100.00**	**51.91**	**48.09**	**100.00**	**100.00**

Figures are purely provisional

Table 3: State/UT wise Percentage of establishments by type of Structure (Excluding Crop Production, Plantation, Public Administration, Defense & Compulsory Social Security Services Activities)

States/UTs	Rural			Urban			Combined		
	Outside HH With Fixed Structure	Outside HH Without Fixed Structure	Inside HH	Outside HH With Fixed Structure	Outside HH Without Fixed Structure	Inside HH	Outside HH With Fixed Structure	Outside HH Without Fixed Structure	Inside HH
Andhra Pradesh	16.28	31.54	52.18	38.61	31.66	29.73	22.12	31.57	46.31
Arunachal Pradesh	71.55	7.84	20.61	77.31	7.77	14.92	74.27	7.81	17.92
Assam	35.50	36.39	28.11	51.25	27.53	21.22	39.87	33.93	26.20
Bihar	54.26	15.67	30.07	64.29	12.37	23.34	57.21	14.70	28.09
Chhattisgarh	30.78	44.19	25.03	57.35	13.32	29.33	39.74	33.78	26.48
Goa	42.57	33.17	24.26	65.98	20.25	13.77	58.19	24.55	17.26
Gujarat	17.69	18.41	63.89	61.40	25.25	13.35	35.37	21.18	43.46
Haryana	40.24	14.08	45.68	71.35	11.01	17.64	54.13	12.71	33.16
Himachal Pradesh	54.56	21.15	24.29	68.25	13.27	18.48	57.18	19.65	23.18
J&K	64.67	12.40	22.93	77.73	13.22	9.04	69.90	12.73	17.37
Jharkhand	52.26	19.43	28.31	66.32	15.44	18.25	58.64	17.62	23.74
Karnataka	31.88	13.83	54.29	65.88	15.77	18.35	46.06	14.64	39.30
Kerala	33.47	15.04	51.49	47.04	17.78	35.18	39.74	16.30	43.96
Madhya Pradesh	36.90	17.02	46.07	51.62	16.04	32.33	43.96	16.55	39.49
Maharashtra	30.65	14.17	55.18	60.78	18.09	21.13	43.52	15.85	40.63
Manipur	15.84	37.02	47.14	27.79	30.24	41.97	20.27	34.51	45.23
Meghalaya	64.74	21.01	14.25	71.94	14.17	13.89	67.00	18.86	14.14
Mizoram	44.00	12.96	43.05	43.05	19.04	37.91	43.38	16.89	39.72
Nagaland	44.00	21.65	34.35	79.45	5.81	14.74	60.04	14.48	25.47
Odisha	34.83	29.78	35.39	48.10	28.23	23.67	37.94	29.42	32.64
Punjab	51.42	10.60	37.97	68.35	14.65	17.00	59.19	12.46	28.36
Rajasthan	43.18	18.21	38.61	67.58	12.39	20.03	51.73	16.17	32.10
Sikkim	36.06	28.71	35.24	48.07	10.94	41.00	41.20	21.09	37.71
Tamil Nadu	19.96	16.46	63.58	55.11	13.66	31.23	36.50	15.14	48.36
Telangana	20.07	36.17	43.76	49.31	25.24	25.45	32.86	31.39	35.75
Tripura	66.51	20.65	12.84	67.69	19.70	12.61	66.97	20.28	12.75
Uttar Pradesh	34.62	14.24	51.14	50.57	15.93	33.50	40.67	14.88	44.45
Uttarakhand	57.28	10.29	32.44	69.27	12.00	18.73	62.26	11.00	26.75
West Bengal	30.77	27.94	41.28	42.17	30.75	27.08	35.29	29.05	35.66
A& N Islands	50.00	37.88	12.11	71.24	16.88	11.88	57.85	30.12	12.03
Chandigarh	46.83	37.01	16.16	33.14	59.27	7.59	33.50	58.68	7.82
D& N Haveli	76.79	8.07	15.14	82.53	9.97	7.51	80.84	9.41	9.76
Daman & Diu	61.17	32.40	6.43	78.07	14.45	7.48	74.70	18.02	7.27
Delhi	38.25	29.09	32.67	52.13	23.03	24.84	51.93	23.11	24.96
Lakshadweep	77.90	16.57	5.52	66.30	16.72	16.99	67.55	16.70	15.74
Puducherry	55.05	11.14	33.80	62.85	18.22	18.93	60.56	16.14	23.31
All India	**31.91**	**20.94**	**47.15**	**54.90**	**19.81**	**25.29**	**41.13**	**20.49**	**38.39**

Figures are purely provisional

Table 4: Number of Handicraft & Handloom Establishments and their Percentage Distribution (Excluding Crop Production, Plantation, Public Administration, Defense & Compulsory Social Security Services Activities)

States/UTs	Rural		Urban		Combined	
	Number	% Distribution	Number	% Distribution	Number	% Distribution
Andhra Pradesh	100403	7.76	58484	6.51	158887	7.25
Arunachal Pradesh	168	0.01	155	0.02	323	0.01
Assam	73132	5.65	20632	2.30	93764	4.28
Bihar	44106	3.41	14129	1.57	58235	2.66
Chhattisgarh	17572	1.36	7724	0.86	25296	1.15
Goa	667	0.05	709	0.08	1376	0.06
Gujarat	25520	1.97	61086	6.80	86606	3.95
Haryana	15350	1.19	11631	1.29	26981	1.23
Himachal Pradesh	11742	0.91	877	0.10	12619	0.58
J&K	46054	3.56	14343	1.60	60397	2.75
Jharkhand	15043	1.16	5276	0.59	20319	0.93
Karnataka	39371	3.04	38757	4.31	78128	3.56
Kerala	16074	1.24	15641	1.74	31715	1.45
Madhya Pradesh	30543	2.36	33409	3.72	63952	2.92
Maharashtra	58984	4.56	68460	7.62	127444	5.81
Manipur	38915	3.01	20232	2.25	59147	2.70
Meghalaya	3255	0.25	672	0.07	3927	0.18
Mizoram	667	0.05	1880	0.21	2547	0.12
Nagaland	4495	0.35	713	0.08	5208	0.24
Odisha	136791	10.57	18092	2.01	154883	7.06
Punjab	9074	0.70	10157	1.13	19231	0.88
Rajasthan	95519	7.38	70432	7.84	165951	7.57
Sikkim	711	0.05	525	0.06	1236	0.06
Tamil Nadu	63349	4.90	73968	8.23	137317	6.26
Telangana	28941	2.24	17232	1.92	46173	2.11
Tripura	6443	0.50	4237	0.47	10680	0.49
Uttar Pradesh	173622	13.42	175730	19.55	349352	15.93
Uttarakhand	6625	0.51	3891	0.43	10516	0.48
West Bengal	230098	17.79	126827	14.11	356925	16.28
A& N Islands	105	0.01	70	0.01	175	0.01
Chandigarh	26	0.00	275	0.03	301	0.01
D& N Haveli	16	0.00	86	0.01	102	0.00
Daman & Diu	13	0.00	81	0.01	94	0.00
Delhi	266	0.02	22047	2.45	22313	1.02
Lakshadweep	1	0.00	17	0.00	18	0.00
Puducherry	95	0.01	338	0.04	433	0.02
All India	**1293756**	**100.00**	**898815**	**100.00**	**2192571**	**100.00**

Figures are purely provisional

Table 5 : Percentage of Hired Workers and Female Workers (Excluding Crop Production, Plantation, Public Administration, Defense & Compulsory Social Security Services Activities)

States/UTs	Percentage of Hired Workers out of Total Workers			Percentage of Female Workers out of Total Workers		
	Rural	Urban	Combined	Rural	Urban	Combined
Andhra Pradesh	28.04	51.10	35.34	38.58	27.10	34.95
Arunachal Pradesh	69.21	64.66	66.91	32.39	28.26	30.30
Assam	40.63	49.35	43.27	21.48	13.87	19.17
Bihar	35.92	46.66	39.51	17.19	9.37	14.58
Chhattisgarh	34.10	59.99	44.37	36.91	18.36	29.55
Goa	52.69	65.60	61.86	34.00	29.99	31.16
Gujarat	26.64	63.44	43.72	37.55	12.04	25.70
Haryana	49.18	67.43	59.23	23.31	13.27	17.78
Himachal Pradesh	56.09	65.17	58.28	26.64	19.01	24.79
J&K	52.35	57.75	54.79	22.08	14.51	18.66
Jharkhand	53.22	64.51	59.06	23.86	16.28	19.94
Karnataka	39.92	64.52	52.61	37.09	25.59	31.16
Kerala	36.82	55.07	46.42	43.33	35.46	39.19
Madhya Pradesh	37.53	46.98	42.52	28.24	19.11	23.42
Maharashtra	33.58	63.52	49.76	27.76	18.83	22.94
Manipur	28.44	36.08	31.30	41.62	39.13	40.69
Meghalaya	59.91	64.48	61.49	36.30	38.28	36.99
Mizoram	54.84	51.92	52.90	43.55	47.35	46.08
Nagaland	54.31	61.77	57.79	38.94	31.60	35.51
Odisha	31.51	49.38	36.39	35.38	20.51	31.32
Punjab	45.82	57.67	52.02	23.75	13.16	18.21
Rajasthan	38.46	53.83	44.59	24.40	12.83	19.78
Sikkim	56.80	54.58	55.81	38.74	33.73	36.52
Tamil Nadu	35.99	57.82	48.00	40.33	29.39	34.31
Telangana	39.82	67.51	55.90	38.78	27.33	32.13
Tripura	36.43	42.48	39.00	22.22	14.77	19.05
Uttar Pradesh	24.30	47.61	34.48	25.02	12.66	19.62
Uttarakhand	55.93	64.00	59.82	24.03	14.86	19.61
West Bengal	32.53	49.28	40.62	24.55	17.02	20.91
A& N Islands	50.21	69.19	58.75	29.58	25.31	27.66
Chandigarh	41.43	63.13	62.78	9.95	19.07	18.92
D& N Haveli	94.05	90.09	91.65	7.27	13.79	11.22
Daman & Diu	85.50	88.82	88.21	21.58	16.54	17.47
Delhi	45.95	68.86	68.65	18.63	12.13	12.19
Lakshadweep	64.00	65.05	64.96	18.98	25.41	24.86
Puducherry	71.33	71.02	71.11	30.12	30.12	30.12
All India	**34.67**	**57.59**	**45.69**	**30.90**	**19.80**	**25.56**

Figures are purely provisional

Table 6: Percentage Growth in Total Number of Establishments (Excluding Crop Production, Plantation, Public Administration, Defence & Compulsory Social Security Services Activities) and Employment in 2013 (Sixth EC) as compared to 2005 (Fifth EC)

States/UTs	Growth* in Establishments (%)			Growth in Employment (%)		
	Rural	Urban	Combined	Rural	Urban	Combined
Andhra Pradesh	52.12	56.59	53.27	24.46	34.48	27.46
Arunachal Pradesh	8.08	83.22	34.09	-9.65	67.48	17.73
Assam	108.36	81.61	100.17	85.55	65.11	78.84
Bihar	46.48	31.28	41.66	44.89	28.97	39.15
Chhattisgarh	20.13	33.00	24.19	25.02	48.64	33.42
Goa	-11.06	79.49	34.05	-16.90	91.54	38.95
Gujarat	77.58	53.66	67.07	73.54	40.51	56.47
Haryana	43.67	40.73	42.34	34.11	73.88	53.44
Himachal Pradesh	61.74	57.82	60.98	75.51	50.72	68.81
J&K	70.25	46.50	59.87	73.31	58.71	66.40
Jharkhand	20.12	50.90	32.38	19.27	54.10	35.06
Karnataka	6.90	28.51	14.97	0.95	32.88	15.24
Kerala	-13.02	124.58	21.33	-13.25	115.37	26.49
Madhya Pradesh	22.53	24.85	23.63	18.89	17.07	17.92
Maharashtra	70.34	25.06	47.52	55.95	23.48	36.54
Manipur	139.54	72.48	109.37	107.93	53.06	83.29
Meghalaya	35.07	23.90	31.34	48.46	29.09	41.11
Mizoram	8.72	21.37	16.58	27.89	42.26	37.11
Nagaland	75.56	82.75	78.74	28.08	33.03	30.34
Odisha	11.63	29.87	15.43	22.53	37.99	26.39
Punjab	65.46	22.39	42.47	64.32	24.39	40.69
Rajasthan	59.23	38.27	51.20	64.31	39.77	53.55
Sikkim	63.65	198.34	102.92	43.36	151.62	77.14
Tamil Nadu	0.32	41.11	16.11	-4.83	33.97	13.22
Telangana	58.12	114.67	78.70	19.68	53.78	37.37
Tripura	6.48	88.05	28.28	-2.07	80.89	21.67
Uttar Pradesh	90.06	40.80	67.80	92.46	57.16	75.26
Uttarakhand	20.67	34.57	26.08	47.20	69.36	57.10
West Bengal	29.44	64.12	41.26	10.11	33.62	20.35
A& N Islands	73.57	108.04	84.89	69.48	82.46	75.08
Chandigarh	-70.77	44.99	31.14	-68.67	33.82	26.97
D& N Haveli	-40.72	148.59	28.11	-19.30	222.71	47.79
Daman & Diu	-65.95	119.09	5.26	-70.56	620.28	35.81
Delhi	-51.90	20.89	18.35	-59.57	-11.25	-12.22
Lakshadweep	-80.16	169.59	14.03	-83.57	168.56	16.27
Puducherry	6.44	30.52	22.36	11.15	37.19	28.08
All India	**39.28**	**45.57**	**41.73**	**31.59**	**37.46**	**34.35**

*The intervening period between the two ECs varies from State/UT to State/UT

Concepts & Definitions of Important Terms

Concepts and definitions of some of the important terms used in the Sixth Economic Census are given below:

Establishment

The establishment is a unit situated in a single location in which predominantly one kind of economic activity is carried out such that at least a part of the goods and/or services produced by the unit goes for sale (i.e. entire produce is not for sole consumption).

Agricultural Establishment

An agricultural establishment for the purpose of Economic Census is one, which is engaged in production of agricultural goods (other than crop production & plantation by the farmers or a group of farmers or any agency), agricultural services, hunting, trapping & game propagation, where at least some part of the production or services is sold out. Establishments engaged in activities pertaining to crop production and plantations though in the agriculture sector are excluded from the coverage. Thus primarily cultivators themselves are excluded from the coverage of Sixth Economic Census.

Non-Agricultural Establishment

Establishments engaged in activities other than agricultural activities (like crop production & plantation, growing of tea, coffee, rubber, tobacco etc.) are termed as non-agricultural establishments.

Household

A household is a group of persons usually living together and taking their meals from a common kitchen. It includes temporary stay-aways (those whose total period of absence from household is expected to be less than six months) but excludes temporary visitors and guests (with expected total stay of less than 6 months). A group of persons, who are unrelated to each other, live in a census house but do not take their meals from a common kitchen would not constitute an institutional household.

Census House

A census house is a building or a part of a building having a separate main

entrance from the road or common courtyard or staircase, etc., used, or recognized as a separate unit. It may be occupied or vacant. It may be used for residential, commercial or for both purposes.

Enumeration Block

The ultimate area unit of enumeration in the Sixth EC is Population Census (2011) Enumeration Block (EB). An EB broadly covers about 120 households or a population of nearly 600 or so.

Handicraft/Handloom Activity

Handicraft describes a craft or occupation requiring skilled use of hands. Handicrafts are items made by hand, often using simple tools. These items can be functional, artistic and/ or traditional in nature.

Nature of Operation

If the entrepreneurial activity is carried on or likely to be carried on throughout the year more or less regularly, it is treated as perennial activity. If the activity of the establishment is confined to a particular season i.e. fixed months of a year, the same is called the seasonal activity. The economic activity of the establishment which is neither perennial nor seasonal is termed as casual.

Worker (Person Employed)

All persons (including children under 15 years of age) working on the last working day prior to the date of fieldwork in the establishment, either as owners, members of the household, co-owner or partner or family members helping the owner in running the establishment including other persons engaged by the establishment, whether hired or not, besides regular and salaried employees, casual/daily wage labourers are considered as workers for the establishment.

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