

## **Industrial Structure and Performance in Andhra Pradesh and Gujarat vis-à-vis India: A Comparative Study using ASI Data**

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### ***Abstract***

*This paper examines the industrial structure and performance, at all India, AP and Gujarat levels using the ASI data from 2000-01 to 2010-11 on some of the major structural and technical parameters. To analyze the structural changes at all India and selected states level, variables like the number of factories, fixed capital, working capital, total number of workers, net value added, gross fixed capital formation, total input, total output and depreciation are used. To examine the industrial performance, structural ratios such as workers per factory, fixed capital per factory, gross real output per worker and net real value added per worker and technical coefficients like fixed capital to gross output (capital output ratio) and net value added to gross output are employed.*

*Analysis established that, some of the key industrial indicators like fixed capital, working capital, total output and net value added both at the selected states and national level were observed to be increasing during the period of study. The analysis also confirmed that the number of factories operating under Factories Act, 1948 in AP, Gujarat and at all India level has marginally increased. The growth in the Gross fixed capital formation showed a mixed response of rise and fall.*

*The analysis of structural ratios confirmed that the ratio of real output per worker at national and states level has increased, the ratio of number of workers per factory and the ratio of fixed capital per factory has mildly increased. Finally, the technical coefficient viz., the capital output ratio was found to be dropping.*

*On the whole the analysis revealed that the industrial sector of Gujarat is significantly contributing to the national average compared to AP.*

### **I. Background**

1.1 The Indian Industrial sector has gained momentum in the last decade or so with the proactive role by the government of India in general and by the respective states in particular. Several proactive industrial promotion and investment policies have been initiated and implemented by many states to usher growth of the industrial sector. To promote industrial investments, single window clearance and provision of several economic

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incentives has become the norm of the day for many states. Also, over a period of time the states have thrived to establish world class industrial infrastructure (such as ports, airports, expressways, quality power supply, water supply) along with ensuring supply of power at the cheapest industrial tariff, promoting entrepreneurial energies in private as well as public sector. More importantly, a positive mindset and increased skilled labour force across the industries in the states have also played constructive role in the overall development and growth of the industrial sector.

1.2 Against this backdrop, if one observes over the last decade or so the Indian industrial sector has grown tremendously though the industrial sector experienced some dip in the growth during 2011-12 and thereafter largely on account of the global economic meltdown (Table 1). During 2004-05 to 2008-09, India's average growth rate of net state domestic product in industry was 8.54 percent. The major contributors of this growth among other states are the southern states such as Andhra Pradesh, Karnataka and Tamil Nadu (Table 1). Similarly, states like Bihar, Gujarat, Madhya Pradesh, Maharashtra and Orissa among others have also contributed significantly to this impressive growth (Table 1). For instance, the average growth rate of net state domestic product in industry of Orissa and Gujarat was 17.53 percent and 12.65 percent respectively during 2004-05 to 2008-09.

1.3 Today, the state of Gujarat is considered as one of the highly industrialized states in India. Gujarat's Gross State Domestic Product (GSDP) and per capita Net State Domestic Product (NSDP) have increased significantly showing all signs of a developed, urbanized and progressive economy. Gujarat has strategically developed some of the key sectors like energy, industry and agriculture. It has been observed that the domino effects of economic liberalization is very much clearly evident in Gujarat vis-à-vis other states and it has emerged stronger and a beacon of hope for the rest of the country in terms of economic and industrial development leading the way for other states to emulate.

1.4 Today, Gujarat has a reputation of being a highly investor-friendly state which has helped the state to attract high volumes of industrial investment besides making it the most favoured investment destination in the country. More importantly, the investment climate and industry friendly policies of Gujarat have made it industrially vibrant state in the country. Today, Gujarat is among the top few states in India to attract investments and create jobs. In line with this the state began organizing the Vibrant Gujarat Global Investment Summit from 2003 onwards to showcase Gujarat as a major investment destination.

1.5 On the industrial infrastructure facade, Gujarat has moved from conventional industrial clusters to industrial estates and advanced further to establish several Special Economic Zones (SEZs) mainly to boost manufacturing sector, increase exports and generate employment. The State has further moved to set up truly world class huge-sized Special Investment Regions (SIRs) by enacting Gujarat Special Investment Regions Act in 2009 to provide for establishment, operation and management of large size investment regions and industrial areas and to specially enable their development as global hubs of economic activities supported by world class infrastructure, premium civic amenities, centre of excellence and proactive policy framework.

1.6 Establishing these SIRs is in line with the upcoming Dedicated Freight Corridor between Delhi and Mumbai and the Delhi-Mumbai Industrial Corridor. Similarly, these SIRs will have a great synergy with Gujarat's upcoming International Finance Tech-City popularly known as Gujarat International Finance Tech-City.

1.7 The state has also established the District Industries Centres which function at the districts level in the State. The main purpose of establishing them is to provide all assistance under one roof to the entrepreneurs engaged in dispersed and diversified industries and to those proposing to establish small and cottage industries.

1.8 On the same lines, the state of Andhra Pradesh (AP) has also shown significant growth in the state economy both in terms of GSDP and per capita NSDP and is also considered as highly industrially progressing state. Especially in the last decade, AP has witnessed significant and remarkable growth in all the three sectors of the state economy. Over a period of time AP has taken a number of economic measures and initiatives to promote industrial establishment, investment and growth mainly after economic liberalization. One such prominent measure is the enactment of "Industrial Single Window Clearance Act" in 2002 for speedy processing and issue of various approvals, clearances and permissions required for setting up of an industrial undertaking and also to create an investment friendly environment in the State.

1.9 Continuing the trend of providing various industrial incentives, the government of AP has approved a new "Industrial Investment Promotion Policy 2005-2010" emphasizing on creation of quality infrastructure, building industrial competency in women, improving quality competitiveness, promoting export, creating environmental friendly climate, attracting foreign direct investment and other mega investments, providing access to market, securing intellectual property rights, fostering industrial clusters, prevention of industrial sickness, preventing migration and permitting industries to exit are some of the highlights of the aforesaid industrial policy.

1.10 Apart from its industrial policies the government has provided additional benefits for the establishment of industries and promotion of investment from time to time. Prominent among them are: (1) The provision of "Industrial Infrastructure Development Fund" (IIDF) to provide infrastructure facilities such as roads, electricity, water drainage and other infrastructure facilities at the doorstep of the proposed industry in all those areas identified by the state government as industrial areas and (2) The introduction of Critical Infrastructure Balancing Scheme (CIBS) to the industrial Associations, Service Societies and other NGOs for the development of certain critical infrastructure which are essential to guarantee the viability of the infrastructure projects and for the up gradation of the infrastructure amenities such as water supply, electric sub-stations, laying of roads or effluent treatment plants in the existing industrial estates, Small Scale Industries (SSI) clusters identified under the SSI cluster development programme.

1.11 Today, the state of AP has several industrial parks which directly or indirectly provide quality infrastructural facilities. Prominent among them are Mega Infrastructure Park, Apparel Export Park, Hardware Park, Genome Valley, Bio Technology Park, Food Processing Park, Green Industrial Park and also a Special Economic Zone (SEZ) at

Visakhapatnam. Further, the state has provided a network of Industrial Estate (IEs) and Industrial Development Areas for locating industries at specific growth points. For instance, the gas exploration in the Krishna Godavari basin raised scope for setting up of Petro-Chemical Complexes and a host of gas based industries.

1.12 To accelerate the industrial growth, AP has taken up several initiatives by enhancing the infrastructure network through road widening and surface improvement of roads, upgrading the local airports to international airports, extension and introduction of new trains and railway lines, development of new sea ports, increasing the power generation by promoting new power projects and so on. The focus is on development of key sectors like pharmaceuticals, biotechnology, food processing and agro-based, chemicals, leather, textiles, precision components, aero-space engineering, electronics and semiconductors and automobile & auto-components to accelerate the industrial growth in the state by creating sector specific industrial infrastructure such as Biotech Parks, Textile Parks, Leather Parks, Auto Parks, Fabcity and Hardware Parks.

## II. Growth and Sectoral Contribution: AP, Gujarat and All India

2.1 The most important aggregate of the state accounts is the growth of GSDP. This is a crucial macro economic indicator used to measure the growth and to study the structural changes taking place in the state's economy. The growth estimates of GSDP over a period of time reveal the extent and direction of the changes in the level of economic development. The growth of GSDP at factor cost is regarded as the most important single economic indicator to measure the growth and pattern of economic development of a state. The state economies normally mirror the national economy growth patterns. Therefore, in order to study the state GDP growth trends, it is important to examine the growth pattern experienced by India. Therefore, a comparative picture of real growth of India vis-à-vis AP and Gujarat during 2005-06 to 2011-12 is depicted in Figure<sup>2</sup> 1.

2.2 As can be observed from Figure 1, India registered a high year-on-year real growth rate especially during 2005-06 to 2007-08. The registered year-on-year growth was 9.48 percent, 9.57 percent and 9.32 percent respectively during 2005-06 to 2007-08. There was some deceleration in growth of real GDP (6.72 percent) during 2008-09 which again increased to 8.39 percent during 2009-10 and 2010-11. However, the year-on-year growth of GDP fell to 6.48 percent during 2011-12 (Figure 1). This high growth momentum is popularly attributed to policy reforms initiated in 1991 that led to greater private sector participation and entrepreneurial activity, market reforms that increased the flow of foreign investments into the country and globalization which gave a boost to India's trade.

2.3 During 2007-08, the world was shaken by the onset of the financial crisis that began in the US and other developed economies. India, though showing immense resilience, could not completely escape the recessionary winds. There was thus a decline in the country's growth momentum in the year 2008-09 due to the ripple effect of the global financial crisis hitting the economy. As a result the country's GDP expanded at a modest rate of 6.72 per cent in the year 2008-09. However, the Indian economy exhibited some

<sup>2</sup> Figures 1 to 33 are compiled by authors based on the data collected from CSO and RBI database.

recovery in the second half of the year 2009-10 on account of strong domestic demand and due to effectiveness of policy responses by the government and the central bank which helped improve the growth rate.

2.4 Gujarat has performed well since the economic reforms began in the country and liberalization has benefited the state perhaps more than any other state in India. Especially, Gujarat could manage a high real growth during 2005-06 to 2011-12 compared to AP (Figure 1). The economy of Gujarat witnessed a deceleration beginning 2006-07 which again increased to 11 percent in 2007-08 before falling again to 6.787 percent during economic crisis. From 2009-10 onwards the state of Gujarat has been growing steadily above India's GDP growth.

2.5 Contrary to Gujarat's deceleration, during 2006-07 and 2007-08 the state economy of AP registered a handsome growth (11.18 percent and 12.02 percent respectively). However, during 2008-09 (6.88 percent) and 2009-10 (4.53 percent) AP experienced a deceleration in growth. From 2010 onwards both the selected states could increase their respective SGDP moderately. The decline in the growth of these states of late can perhaps partly be attributed to the sub-prime crisis and fear of recessionary conditions across the globe. The fall in the total industrial output and a negative growth of agricultural sector in some of the years led to further decline. The growth in the industrial sector is mainly dependent on the performance of the manufacturing sector (a key sub sector of industry). The industrial sector in India showed significant resilience in the face of global economic crises that began in the year 2007-08 and which continued well into 2008-09. However, there were glimpses of revival in 2009-10 with manufacturing performing better than the previous two years (CII, 2012).

2.6 The percentage share of AP's GSDP at factor cost vis-à-vis all India compared to Gujarat is considerably significant and higher. For instance, the percentage share of AP's GSDP vis-à-vis all India has been consistently recorded at around 7.5 percent during 2004-05 to 2011-12 (Figure 2) which means that nearly 7.5 percent of national income of the country is contributed alone by the state of AP. The important point to be noted here is the percentage share of Gujarat's GSDP at factor cost vis-à-vis all India has been considerably increasing during 2004-05 to 2011-12.

2.7 The sectoral contribution of GDP provides the requisite information regarding the relative position of different sectors in the economy which not only exhibits the relative importance of these sectors in the economy's overall income national income but also helps the policy makers to develop the sectors lagging behind and also to encourage the sectors which are leading in front. The structure of the Indian economy as well as of the several state economies has undergone significant changes over time. At India and respective selected state levels, the percentage share of the industrial<sup>3</sup> and tertiary<sup>4</sup> sector

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<sup>3</sup> This sector is also known as secondary sector which generally includes income generated from industrial mining and quarrying, manufacturing both registered and un-registered and electricity, gas and water supply.

<sup>4</sup> This sector is also known as tertiary sector which generally includes income generated from construction, transport, storage and communication, trade, hotels and restaurant, banking and insurance, real estate, ownership of dwellings and business services, public administration, defense and quasi-government bodies.

in GDP and GSDP respectively has increased phenomenally where as the percentage share of the agricultural<sup>5</sup> sector in GDP and GSDP respectively has decreased significantly over a period of time (Table 2 and 3).

2.8 For example, India's share of the industrial sector in GDP has increased from 16.6 percent to 25.9 percent during the period from 1950-51 to 1980-81 where as the share of the services sector increased from 30.3 percent during the same period. It started growing rapidly thereafter and this phenomenon became more prominent in the 1990s. Thereafter, since 1980-81, the share of the industry sector has remained in the range of 26 to 28 percent of GDP, while the entire decline in share of agriculture has been balanced by an increase in share of the services sector (Table 2).

2.9 The industrial sector is of particular importance to Gujarat compared to AP (24 percent of GSDP) which consistently contributed about 40 percent to GSDP during 2004-05 to 2011-12 (Table 3). The prominence of this sector in Gujarat's GSDP can be seen from its high level of contribution which remained more or less stable despite the economic turbulence.

2.10 The sectoral share of primary sector in the GSDP of the selected states has been declining over the period of time as has been the experience of the Indian economy (Table 3). As evidenced, the sectoral share of agriculture and other allied activities in the GSDP of Gujarat declined from 16.08 percent in 2004-05 to 12.92 percent by the end of 2011-12 (Table 3). Similarly, the sectoral share of agriculture and other allied activities in the GSDP of AP declined from 25.07 percent in 2004-05 to 19.29 percent by the end of 2011-12 (Table 3). This declining share of primary sector indicates significant structural changes in economies of these selected states over the period of time.

2.11 However, the percentage share of tertiary sector of AP and Gujarat has registered growth. For instance in Gujarat it has increased from 43.92 percent in 2004-05 to 46.01 percent by the end of 2011-12 (Table 3). Similarly, the sectoral share of tertiary sector in the GSDP of AP has increased from 50.65 percent in 2004-05 to 56 percent by the end of 2011-12 (Table 3). The main reason for this sectoral shift from agriculture to industry to services sector during 2000s could be attributed to the growth of sub-sectors of tertiary sectors like construction, transport, storage and communication, trade, hotels and restaurant, banking and insurance, real estate and business services and insurance in all both the selected states which have recorded phenomenal growth.

2.12 From the aforementioned facts it is clear that Gujarat and AP among other states have emerged as one of the highly industrially progressing states in India. Therefore, the objective of the present paper is to conduct a comparative study, analyzing the structural changes, structural ratios and technical coefficients of the Indian industrial sector with that of the state of AP and Gujarat using ASI data. This will show us the relative importance of AP and Gujarat with the other states of the country in the overall growth of the industrial sector.

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<sup>5</sup> This sector is also known as primary sector which generally includes income generated from agriculture, forestry and logging and fishing.

2.13 The rest of the paper is organized as follows: Section III deals with the sources and nature of the data used in the analysis. Section IV examines the structural changes in the patterns of some of the important variables besides with examining the share of AP and Gujarat vis-à-vis all India. Section V analyses the industrial performance using some of the structural and technical coefficients comparing the industrial performance of India with that of AP and Gujarat. Section VI presents some of the key findings of the present study. Finally Section VII summarizes the key notes of the present paper.

### **III. Sources and Nature of the Data**

3.1 The present study uses the data collected from Annual Survey of Industries (ASI) compiled by Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation, Government of India. Important structural and technical variables relevant to the industrial sector have been collected from 2000-01 to 2010-11 in general at all India level and in particular at AP and Gujarat level from the various issues of ASI.

3.2 To examine the industrial structure and performance of the industries registered under Factories Act, 1948; at all India and AP and Gujarat level the present study uses the following variables: Number of Factories, Fixed Capital, Working Capital, Total Number of Workers, Net Value Added, Gross Fixed Capital Formation, Total Input, Total Output and Depreciation. The concepts and the definitions as adopted by ASI pertaining to these variables are discussed in the respective section of analysis.

### **IV. Analysis of the Structural Parameters: A Comparison**

4.1 In the following section an attempt is made to examine the changes in the industrial structure by analyzing and comparing important structural variables at India and selected states level. As mentioned earlier, the analysis is carried out covering a period of 2000-01 to 2010-11. To study the structural changes at national and state level the important variables used for the analysis are the Number of Factories, Fixed Capital, Working Capital, Total Number of Workers, Net Value Added, Gross Fixed Capital Formation, Total Input, Total Output and Depreciation.

#### **Number of Factories**

4.2 The primary unit of the enumeration in the survey is a factory in the case of manufacturing industries, a workshop in the case of repair services, an undertaking or a licensee in the case of electricity, gas and water supply undertakings and an establishment in the case of bidi and cigar industries (ASI, various issues). As noted earlier, the data collected from the respective industrial units relate to their accounting year ended on any day between 1<sup>st</sup> April and 31<sup>st</sup> March of the respective fiscal year. This implies that in any particular financial year, if the number of factories are de-registered in comparison to the preceding year, it indicates that there is a decline in the number of factories in that particular year operating under Sections 2(m)(i) and 2(m)(ii) of the Factories Act, 1948.

4.3 In figures 3 and 4, it is evident that there is a year on year marginal rise in the number of factories registered in both AP and Gujarat and at the all India level during the

period of study. It is observed that at all India level and Gujarat the number of factories registered have declined during 2001-02 to 2003-04 before they started marginally rising from 2004-05 onwards. Especially, from 2004-05 onwards the number of factories operating at all India level and Gujarat have increased where as in case of AP a year on year marginal rise in the number of factories was evident during the entire period of study. By the end of 2010-11, it is observed that the number of factories registered have steeply increased<sup>6</sup> at all India level, AP and Gujarat. Also, it is important to note that the number of factories operating under Sections 2(m)(i) and 2(m)(ii) of the Factories Act, 1948 in AP are considerably high compared to Gujarat. The initial decline from 2001-02 to 2003-04 at all India level and Gujarat may be due to inefficient operation of some factories in production and therefore might have become non-viable which led to the closure of those units.

4.4 AP's percentage share of number of factories vis-à-vis all India, stood between 10 percent to 12 percent where as Gujarat's percentage share of number of factories vis-à-vis all India, stood between 9 percent to 10 percent during the period of study (see figure 5). This clearly shows that AP has considerable and significant share in the factory sector as compared to Gujarat vis-à-vis all India.

### **Fixed Capital**

4.5 According to ASI, fixed capital represents the depreciated value of fixed assets owned by the factory and those that have a normal productive life of more than one year as on the closing day of the accounting year. Fixed capital includes land including leasehold land, buildings, plant and machinery, furniture and fixtures, transport equipment, water system and roadways and other fixed assets such as hospitals, schools, used for the benefit of the factory personnel. These fixed assets are not expected to vary in the short-run (Pani, (2007) and are generally used as an index of measuring the size of the firm. Baumol (1959) noted that the larger the firm size, the higher are the profits and perhaps earn profits at a higher rate than the small size firms. Thus, higher the investment in fixed capital, higher will be the profits besides the unit getting the benefits of economies of large scale production.

4.6 The year on year growth of the fixed capital, at the national as well as at the selected states level has been observed to be increasing during the study period (see figures 6 and 7). During the entire period of study it is evident from figure 7 that the level of fixed capital of Gujarat is significantly higher compared to AP suggesting that the level and pace of investment in fixed assets in AP is not as much as in case of Gujarat during the study period.

4.7 AP's percentage share of fixed capital vis-à-vis national level stood around 6 percent to 9 percent where as Gujarat's percentage share vis-à-vis national level stood around 16 percent to 20 percent indicating that though the number of factories is high in

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<sup>6</sup> This steep increase in number of factories can be attributed to the changes made in the methodology adopted for estimating the number of factories for ASI 2010-11.



AP compared to Gujarat the contribution of Gujarat is significantly high in fixed capital formation vis-à-vis national level.

### **Working Capital**

4.8 First, ASI defines working capital as the sum total of the Physical Working Capital which comprises of total inventories including raw materials and components, fuels and lubricants, spares, stores and others, semi-finished goods and finished goods as on the closing day of the accounting year. Second, working capital also includes the cash deposits in hand and at bank and the net balance receivable over amounts payable at the end of the accounting year. Working capital is required to meet day to day operational needs of a manufacturing unit and the various components of working capital held by a business enterprise helps in stabilising the production without any interruption.

4.9 As evident from the figures 9 and 10, the working capital at the national and at the selected states level has year on year mildly increased with some fluctuations observed in case of AP where it declined during 2005-06. During the entire period of study it is observed from figure 10 that the level of working capital of Gujarat is significantly higher than AP suggesting that the level of various components of working capital held by a business enterprise in AP is lower and the same may destabilize the production with regular or irregular interruptions. However, the examined trend of growth in working capital at all India, AP and Gujarat can be stated as satisfactory which also mildly increased along with the fixed capital of the manufacturing units as seen earlier during the study period.

4.10 AP's percentage share of working capital vis-à-vis national level stood around 5 percent to 7 percent where as Gujarat's percentage share vis-à-vis national level stood around 12 percent to 18 percent during the study period. During 2005-06, AP's percentage share of working capital vis-à-vis national level was recorded as low as 2.90 percent thereafter it mildly started increasing (see figure 11). However, it is important to note that a better management of working capital investment both at the national and at the states level is desired to keep the pace of production and unwarranted interruption of production there by increasing the level of efficiency.

### **Total Workers**

4.11 Total number of workers defined by ASI includes "all persons employed directly or through any agency whether for wages or not and engaged in any manufacturing process or in cleaning any part of the machinery or premises used for manufacturing process or in any other kind of work incidental to or connected with the manufacturing process or the subject of the manufacturing process".

4.12 Comparing the pattern of total workers involved in the production process at national level it can be observed that especially from 2004-05 onwards there is a drastic raise in the level of employment (see figure 12) before which some fluctuations were observed during 2000-01 to 2003-04. Similarly, the total work force in both the selected states also increased drastically from 2004-05 onwards (see figure 13).

4.13 The important point to note is that from 2000-01 to 2006-07, the total work force in AP was significantly higher compared to Gujarat. However, from 2007-08, the growth of total work force in Gujarat was mildly higher compared to the state of AP indicating a secular decline in the level of employment in AP. Overall, in comparison with national level and AP, the state of Gujarat has shown a reasonably better pattern of growth in the total workforce by registering a growth of around 71.51 percent during the period of study as against the national growth of 59.20 percent and AP's growth of 44.84 percent.

4.14 From 2000-01 to 2006-07 AP's share of total workforce compared to Gujarat's share vis-à-vis national level was high which thereafter declined and the state of Gujarat's share mildly increased (see figure 14). Over all, the state of AP consistently accounted for nearly, 9 percent to 12 percent of total workforce of the country during the study period thereby providing potential employment to the working class of the economy (see figure 14). Gujarat's percentage share of total workforce vis-à-vis India was recorded between 9 percent to 10 percent during the study period.

### **Total Input**

4.15 According to ASI, total input consists of expenditure incurred on total fuels and materials consumed as well as expenditure incurred on overheads like cost of contract and commission work done by others on materials supplied by the factory, cost of materials consumed for repair and maintenance of factory's fixed assets including cost of repairs and maintenance work done by others to the factory's fixed assets, inward freight and transport charges, rates and taxes (excluding income tax), postage, telephone and telex expenses, insurance charges, banking charges, cost of printing and stationery and purchase value of goods sold in the same condition as purchased.

4.16 It is evident from the figures 15 and 16 that the total input (cost of production) has a positive slope, rising continuously during the study period both at the national level and at the selected states level. However, it is observed from figure 16 that the total input cost is substantially higher in Gujarat compared to AP during the study period. At the national level, the total input cost has recorded a growth of 26.88 percent where as a growth of 49.09 percent and 30.49 percent has been registered in case of AP and Gujarat manufacturing firms respectively during 2010-11 as compared to the corresponding previous year. Though the total input cost is higher in Gujarat, the growth of total input cost is higher in AP. Thus, the rise in the cost of inputs both at national and states level suggests that the overall expenditure of the manufacturing units have been rising which needs immediate attention of the management. However, a trade-off between the growth of input cost with that of growth of output can be drawn if and only if the proportionate growth of output is more than the proportionate growth of input cost in which case the raised input cost can be absorbed by the gains from the increased output.

### **Total Output**

4.17 Total output represents the value of the all products and by products manufactured by a unit. As can be observed from the figures 17 and 18, the total output has steadily increased both at national level, AP and Gujarat level in the last decade. At the national

level, the total output has recorded a growth of 25.51 percent where as a growth of 47.83 percent and 28.16 percent has been registered in case of AP and Gujarat manufacturing firms respectively during 2010-11 as compared to the corresponding last year.

4.18 Though the value of total output is higher in Gujarat, the growth of total output is higher in AP. However, as observed earlier the growth in the input cost is much higher than the growth of output both at all India and at the selected states level which requires the attention of management to check the current distortion.

4.19 During the study period, AP's and Gujarat's percentage share of total output vis-à-vis at all-India level on an average respectively stood around 6.5 percent and 16.5 percent of the total output. Gujarat's contribution therefore, can be regarded as a significant share of contribution in the total output of the country (see figure 19).

### **Depreciation**

4.20 Depreciation is the consumption cost of fixed assets which results due to wear and tear and obsolescence during the working life of the fixed capital. Since depreciation is also a cost of production, a proper mechanism is required by the manufacturing units to see that depreciation costs are not high in any particular year. During the last decade, it is evident that the depreciation cost has been steadily raising both at all India and at the selected states level (see figures 20 and 21).

4.21 For instance, during 2010-11 as compared to the corresponding previous year, the depreciation cost has increased to an extent of 14.79 percent at all India level and in case of Gujarat, the increase was around 10.16 percent which is less than the national level. However, with respect to AP, during the same period, the depreciation cost has mildly increased to only about 1.43 percent. This suggests that, there is an urgent need to bring down the depreciation cost both at national and states level in order to improve the overall profits of the manufacturing firms.

### **Net Value Added**

4.22 Net value added of a manufacturing firm is the difference between the value of output and the total value of input cost plus depreciation. The net value added is the actual contribution of factors of production and is also considered as the component which makes up the domestic product of an economy (Pani, 2007). Thus, this measure of variable shows the relative contribution of the industrial sector to the states domestic product. Figures 22 and 23 illustrate that the net value added at national and states level has been steadily increasing implying that the relative contribution of the industrial sector to the states domestic product has been significantly rising in the last decade.

4.23 As far as Gujarat's contribution to the nation's total net value added is concerned, on an average it stood around 13 percent (see figure 24) during the study period where as AP's contribution to the nation's total net value added is concerned, on an average it contributed only about 6 percent. Thus, the contribution of Gujarat's industrial sector to the national domestic product is significant and as observed, Gujarat's net value added is consistently rising which illustrates the relative importance of Gujarat's industrial sector vis-à-vis at national level.

## **Gross Fixed Capital Formation (GFCF)**

4.24 GFCF is defined as the new additions to the existing fixed capital and generally includes investments in plant and machinery, furniture and fixtures and land and building. Investment in fixed assets is considered as long-term investment which is the earning asset of a manufacturing unit that determines the overall level of output at any particular point of time.

4.25 GFCF, at all India level shows a very mild fall with fluctuations, particularly during 2002-03 (see figure 25). However, from 2002-03 onwards GFCF has increased steadily during the study period. GFCF in case of AP has increased steadily during the study period where as in case of Gujarat it has been fluctuating. Particularly, during 2001-02 the GFCF in Gujarat steeply raised before it fell sharply to an extent of 77.72 percent by the end of 2002-03.

4.26 Thereafter, since 2003-04 the GFCF in Gujarat has grown with fluctuations. As evidenced from figure 26, the GFCF of Gujarat is higher than that of AP. This suggests that there has been improved investment in fixed capital in the state of Gujarat compared to AP in the last decade or so.

4.27 On an average during the last decade the percentage share of Gujarat's GFCF vis-à-vis all India significantly stood around 16 percent where as AP's average percentage share of GFCF vis-à-vis national level was about 6 percent (see figure 27). However, AP's percentage share of GFCF vis-à-vis national level is seen marginally increasing over the period of time.

## **V. Analysis of the Structural Ratios and Technical Coefficients: A Comparison<sup>7</sup>**

5.1 With the help of structural ratios and technical coefficients, one can assess the overall performance of the industrial sector. In the following section an attempt is made to assess the industrial performance of India in general and AP and Gujarat in particular by comparing structural ratios and technical coefficients. Structural ratios such as, workers per factory, fixed capital per factory, real output per worker and net real value added per worker (both output and value added have been deflated) have been used to examine the structural performance of the manufacturing units. To examine the technical coefficients, ratios like fixed capital to gross output (capital output ratio) and net value added to gross output have been utilized.

### **Real Output per Worker**

5.2 Real output per worker is one of the partial measures of efficiency and is also known as partial factor productivity. It is known as a measure of partial factor productivity because output is a function of factors of production viz., land, labour, capital and organization whose proportion in the overall production is determined by the concerning

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<sup>7</sup> The framework used here for analysis is similar to that of (Pani, 2007)

technology set. This structural ratio gives information about the production capability of workers alone and thus throws light on their contribution in the overall production process.

5.3 Figure 28 shows that the real output per worker, at all India level and at selected states level has a positive slope during the period of the study. This implies that, both at the national and states level the average labour productivity is increasing and the labour force of India is positively contributing in the overall production of manufacturing units. However, the average level of labour productivity of Gujarat is higher than the average level of labour productivity at national level. The average level of labour productivity of AP is lower than the national average level of labour productivity (see figure 28).

### **Real Value Added per Worker**

5.4 Similarly, the ratio of real value added per worker also depicts the average productivity of labour and is also one of the partial measures of productivity. Figure 29 shows that net real value added per worker, both at all India and states level also show a similar increasing trend which was witnessed earlier in real output per worker ratio. This suggests that in India, AP and Gujarat the productivity of labour force involved in the manufacturing process is positively contributing to the overall production process. However, as observed in both the cases AP's average labour productivity is below the national average where as Gujarat's average labour productivity is above the national average which is a matter of concern for AP and perhaps needs attention.

### **Workers per Factory**

5.5 The ratio of number of workers per factory measures not only the size of the manufacturing firm but also reflects the concentration of workers in the factory which ultimately influences the productivity of the factory. Figure 30, depicts that the average factory size at national level in terms of employment reflected by the ratio of number of workers per factory has mildly increased during 2000-01 to 2009-10 before falling back by about 19 percent in 2010-11 corresponding to previous year<sup>8</sup>. The ratio of number of workers per factory in AP and Gujarat has shown a trend of fluctuations of raising and falling during the study period. During 2010-11, with respect to AP, the average factory size in terms of employment reflected by the ratio of number of workers per factory fell to an extent of 24 percent corresponding to the previous year where as in case of Gujarat the ratio declined to an extent of 18 percent corresponding to the previous year. The important point to observe is that both the selected states average factory size as well as India's average factory size more or less remained similar with little deviations during some years.

### **Fixed Capital per Factory**

5.6 This ratio measures the average factory size in relation to the investments in fixed assets of the manufacturing unit. Figure 31, shows that the average factory size in terms of

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<sup>8</sup> This decline can be attributed to the change in the methodology adopted for estimating the number of factories for ASI 2010-11 which has resulted in the steep increase in number of factories.

investments in fixed capital has been mildly increasing since 2000-01 onwards, both at national and selected states level with little fluctuations here and there. However, at the end of 2010-11 the ratio of fixed capital per factory declined drastically<sup>9</sup> in all the three cases. Importantly, it can also be observed that the average factory size in Gujarat is higher compared to AP and all India level, implying that the average level of investment in fixed assets in Gujarat is higher where as AP is lying below the national average indicating a declining investment in fixed assets.

### **Value Added to Output**

5.7 As mentioned earlier, net value added is the difference between the value of output and the value of input cost plus depreciation of a manufacturing firm. Thus, the ratio of value added to output is one of the important technical coefficients that depict the cost structure of a manufacturing unit. If a particular manufacturing firm is able to manufacture one or more of its products under its single roof then it can reduce the overall production cost substantially. This not only improves the productivity of the firm but also improves the competitiveness of the firm in the market. In figure 32, it is seen that the net value added to output has remained more or less constant with some fluctuations during some years both at national and at the selected states level during the study period. This implies an increasing share of inputs cost in the total value of output which needs to be corrected. Importantly, figure 32 indicates that the state of Gujarat is really doing well compared to AP and national level as the share of inputs cost in the total value of output seems to be less thereby reducing the cost of manufacturing and increasing productivity.

### **Capital Output Ratio**

5.8 Capital output ratio is the ratio of fixed capital to output which illustrates the relationship between the amount of units of capital required to produce a certain given level of output of a manufacturing unit. If a manufacturing firm has a high capital output ratio, it requires a large amount of capital units to produce a given level of output during any specified period and vice-versa. The capital output ratio has been steadily declining both at all India and at the selected states level suggesting the substitution of labour intensive techniques for capital incentive techniques (see figure 33).

5.9 However, during the early stages 2000's, the capital output ratio of Gujarat was well above the national average as well as AP suggesting that the manufacturing units in Gujarat were using more capital than labour in the production process in contrast to all India level and AP (see figure 33).

## **VI. Major Findings**

6.1 Some of the major findings from the analysis of the structural parameters are listed below:

- The number of factories registered in AP, Gujarat and at all India level has marginally increased.

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<sup>9</sup> *ibid*

- The number of factories operating under Sections 2(m)(i) and 2(m)(ii) of the Factories Act, 1948 in AP are considerably high compared to Gujarat.
- AP's percentage share of number of factories vis-à-vis all India, stood between 10 percent to 12 percent where as Gujarat's percentage share of number of factories vis-à-vis all India, stood between 9 percent to 10 percent.
- The year on year growth of the fixed capital, at the national as well as at the selected states level has been observed to be increasing during the study period.
- The level of fixed capital of Gujarat is found significantly higher than AP.
- AP's percentage share of fixed capital vis-à-vis national level stood around 6 percent to 9 percent where as Gujarat's percentage share vis-à-vis national level stood around 16 percent to 20 percent.
- The working capital at the national and at the selected states level has year on year mildly increased.
- The level of working capital of Gujarat is significantly higher than AP.
- AP's percentage share of working capital vis-à-vis national level stood around 5 percent to 7 percent where as Gujarat's percentage share vis-à-vis national level stood around 12 percent to 18 percent during the study period.
- From 2004-05 onwards there was a drastic raise in the level of employment at national level, AP and Gujarat.
- From 2000-01 to 2006-07, the total work force in AP was significantly higher compared to Gujarat. However, from 2007-08, the growth of total work force in Gujarat was mildly higher compared to the state of AP.
- AP consistently accounted for nearly, 9 percent to 12 percent of total workforce where as Gujarat's percentage share of total workforce was recorded between 9 percent to 10 percent during the study period.
- Total output and input registered a positive growth during period of study.
- AP's and Gujarat's percentage share of total output vis-à-vis at all-India level on an average respectively stood around 6.5 percent and 16.5 percent of the total output.
- The net value added at national and states level has been steadily increasing.
- Gujarat's contribution to the nation's total net value added on an average stood around 13 percent where as AP's contribution stood only about 6 percent.
- GFCF, at all India and selected states level showed a mixed trend of rise and fall during the study period.

6.2 Some of the Major findings from the analysis of the Structural Ratios and Technical Coefficients are reported below:

- The ratio of real output per worker, at all India level and at selected states level has raised implying that at all India and states level the average labour productivity is increasing.

- The average level of labour productivity of Gujarat is higher than the average level of labour productivity of India and AP.
- The ratio of net real value added per worker, both at all India and states level has also increased.
- The ratio of number of workers per factory has mildly increased during 2000-01 to 2009-10.
- The ratio of number of workers per factory in AP and Gujarat has shown a trend of fluctuations of raising and falling during the study period.
- The ratio of fixed capital per factory has mildly increased since 2000-01 onwards at national and selected states level with little fluctuations.
- The average factory size in Gujarat is higher compared to AP and all India level, implying that the average level of investment in fixed assets in Gujarat is higher.
- The ratio of value added to output has remained more or less constant with some fluctuations during some years both at national and at the selected states level during the study period.
- The capital output ratio has been steadily declining both at all India and at the selected states level suggesting the substitution of labour intensive techniques for capital incentive techniques.

## VII. Concluding Observations and Remarks

7.1 In the present paper, an attempt was made to examine the industrial structure and performance at all India, AP and Gujarat level using the ASI data published by CSO from 2000-01 to 2010-11. First, to study the structural changes at national and selected states level variables like the number of factories, fixed capital, working capital, total number of workers, net value added, gross fixed capital formation, total input, total output and depreciation were employed. An attempt was also made to study the relative share of AP and Gujarat vis-à-vis all India for most of the structural variables. Second, to examine the industrial performance at all India, AP and Gujarat level structural ratios such as workers per factory, fixed capital per factory, gross output per worker and net value added per worker and technical coefficients like fixed capital to gross output (capital output ratio) and net value added to gross output were used.

7.2 The analysis of structural parameters showed that the number of factories registered in AP, Gujarat and at all India level has marginally increased. Some of the key variables like fixed capital, working capital, total output and net value added both at selected states and national level were seen increasing. The evidence suggested that from 2004-05 onwards there was a drastic raise in the level of employment at national level, AP and Gujarat. GFCF at national and selected states level showed a mixed trend of rise and fall during the study period.

7.3 The study found that the number of factories operating under Sections 2(m)(i) and 2(m)(ii) of the Factories Act, 1948 in AP were considerably high compared to Gujarat where AP's percentage share of number of factories vis-à-vis all India, stood between 10



percent to 12 percent where as Gujarat's percentage share of number of factories vis-à-vis all India, was found to be between 9 percent to 10 percent. It was also noted that the level of fixed capital in Gujarat was significantly higher than AP where Gujarat contributed around 16 percent to 20 percent. The level of working capital of Gujarat (about 12 percent to 18 percent) is was also found to be significantly higher than AP (around 5 percent to 7 percent). AP's and Gujarat's percentage share of total workforce was very much similar to the national average. Gujarat's percentage share of total output and contribution to the nation's total net value added was found to be significantly higher compared to AP.

7.4 The analysis of structural ratios revealed that the ratio of output per worker at national and selected states level has risen during the last decade of the study implying that both at all India and states level the average productivity of labour has been increasing. The average level of labour productivity of Gujarat was found to be higher than the average level of labour productivity of India and AP. The ratio of net value added per worker, at all India and states level was also found to be increasing.

7.5 The ratio of number of workers per factory was found fluctuating by raising and falling during the study period. Also, the ratio of fixed capital per factory was found to be mildly increasing especially since 2000-01 onwards at national and selected states level signifying that the average factory size in terms of investments in fixed capital has also mildly increased. It was noted that the average factory size in Gujarat was higher compared to AP and all India level implying that the average level of investment in fixed assets in Gujarat is higher. Finally, it was evident from the technical coefficient of capital output ratio, which was seen to be steadily declining at all India, AP and Gujarat level suggesting the substitution of labour intensive techniques for capital incentive techniques.

7.6 On the whole the analysis revealed that the industrial sector of Gujarat is significantly contributing to the national average compared to AP though the state of AP is also considerably contributing to the national average.

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**Table 1: Selected States-wise Growth Rate of Net State Domestic Product in Industry**

Selected States	Average (2000-01 to 2003-04)	Average (2004-05 to 2008-09)
Andhra Pradesh	5.62	6.61
Bihar	-4.77	5.80
Gujarat	3.95	12.65
Karnataka	8.84	8.32
Madhya Pradesh	-4.40	6.73
Maharashtra	1.35	9.24
Orissa	6.34	17.53
Tamil Nadu	1.97	7.25
<b>India</b>	5.63	8.54

Source: Planning Commission, Government of India, 2012

**Table 2: Sectoral Composition of India's GDP**

Year	Agriculture	Industry	Services
1950-51	53.1	16.6	30.3
1960-61	48.7	20.5	30.8
1970-71	42.3	24.0	33.8
1980-81	36.1	25.9	38.0
1990-91	29.6	27.7	42.7
2000-01	22.3	27.3	50.4
2010-11QE	14.5	27.8	57.7
2011-12AE	13.9	27	59.0

Source: Economic Survey, Government of India, 2012.

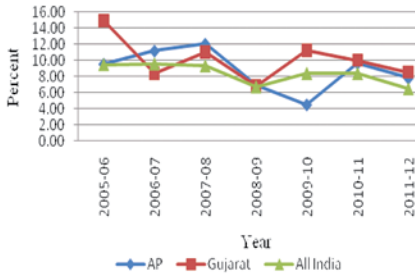
Notes: QE indicate quick estimates and AE indicate advanced estimates.

**Table 3: Sectoral Composition of GSDP in AP and Gujarat (At Constant Prices)**

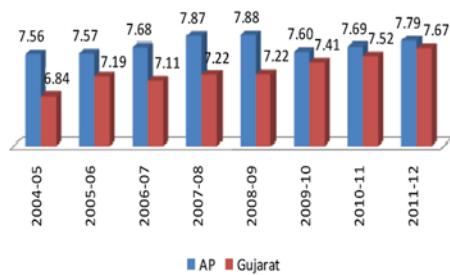
Year	Primary Sector		Secondary Sector		Tertiary Sector	
	AP	Gujarat	AP	Gujarat	AP	Gujarat
2004-05	25.07	16.08	24.28	40.00	50.65	43.92
2005-06	24.28	17.22	24.39	39.89	51.33	42.89
2006-07	22.27	15.77	25.80	40.27	51.93	43.96
2007-08	23.34	15.45	25.53	40.20	51.13	44.35
2008-09	22.00	13.43	25.59	40.10	52.40	46.47
2009-10	21.09	11.98	25.23	43.70	53.67	44.31
2010-11	20.64	13.19	24.74	42.36	54.63	44.45
2011-12	19.29	12.92	24.71	41.07	56.00	46.01

Source: Authors calculations based on the data collected from CSO and RBI database.

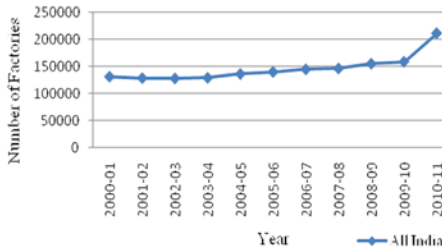
**Figure 1: Percentage Growth of GSDP of AP and Gujarat at factor cost vis-à-vis All India**



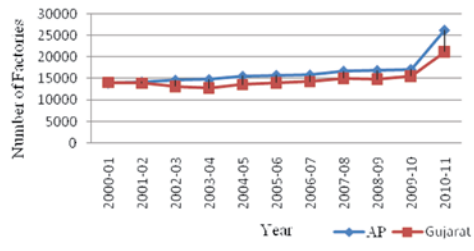
**Figure 2: Percentage Share of GSDP of AP and Gujarat at factor cost vis-à-vis All India**



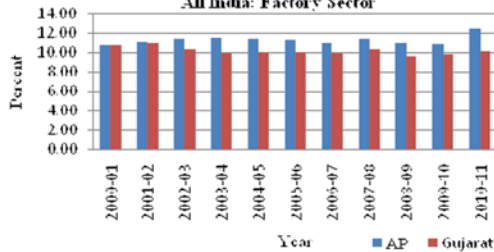
**Figure 3: Factory Sector (All India)**



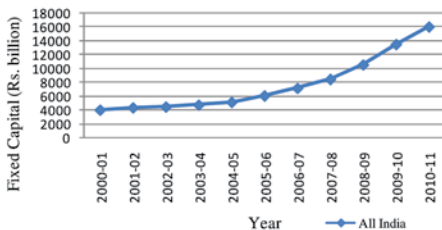
**Figure 4: Factory Sector (AP and Gujarat)**



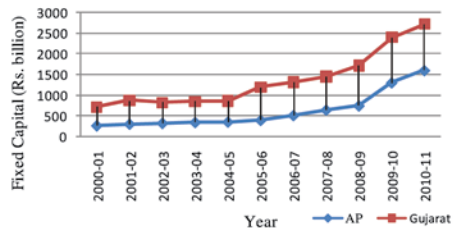
**Figure 5: AP and Gujarat Percentage Share vis-à-vis All India: Factory Sector**



**Figure 6: Fixed Capital (All India)**



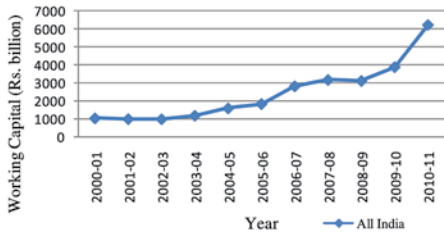
**Figure 7: Fixed Capital (AP and Gujarat)**



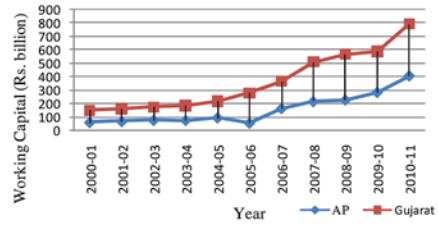
**Figure 8: AP and Gujarat Percentage Share vis-à-vis All India: Fixed Capital**



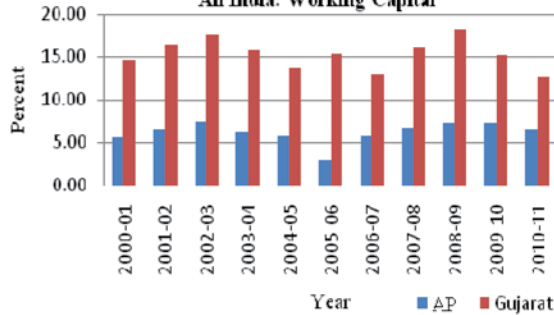
**Figure 9: Working Capital (All India)**



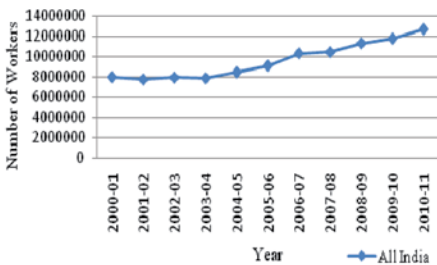
**Figure 10: Working Capital (AP and Gujarat)**



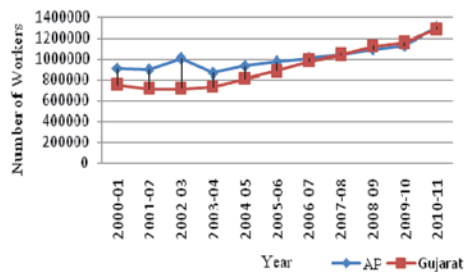
**Figure 11: AP and Gujarat Percentage Share vis-à-vis All India: Working Capital**



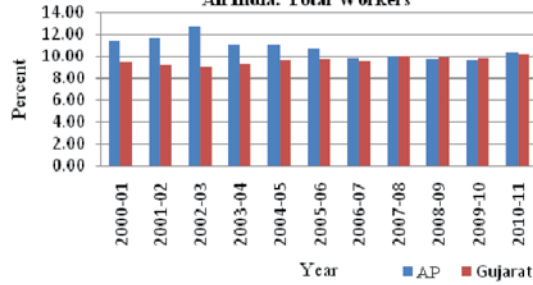
**Figure 12: Total Workers (All India)**



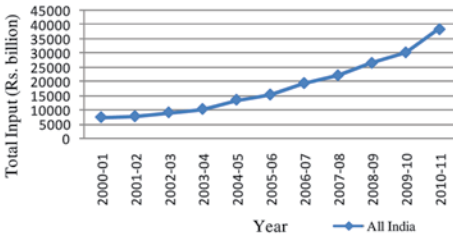
**Figure 13: Total Workers (AP and Gujarat)**



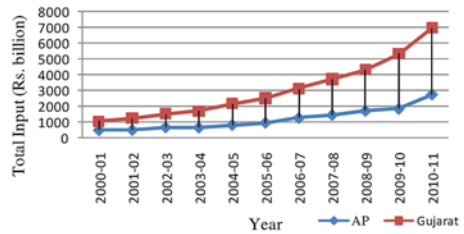
**Figure 14: AP and Gujarat Percentage Share vis-à-vis All India: Total Workers**



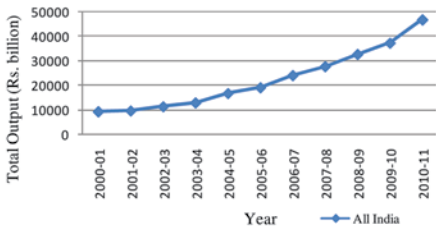
**Figure 15: Total Input (All India)**



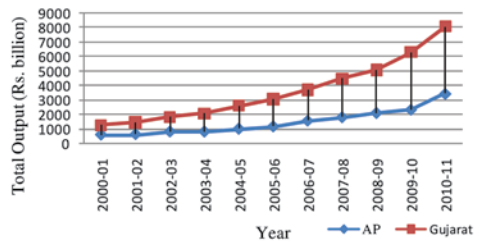
**Figure 16: Total Input (AP and Gujarat)**



**Figure 17: Total Output (All India)**



**Figure 18: Total Output (AP and Gujarat)**



**Figure 19: AP and Gujarat Percentage Share vis-à-vis All India: Total Output**

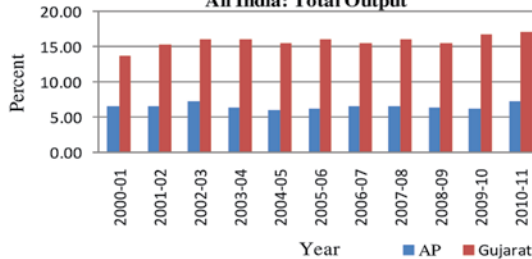


Figure 20: Depreciation (All India)

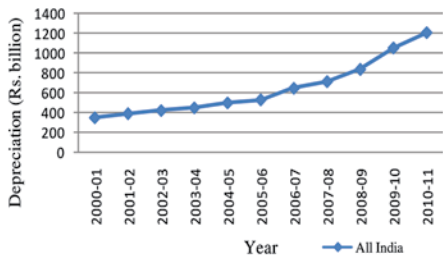


Figure 21: Depreciation (AP and Gujarat)

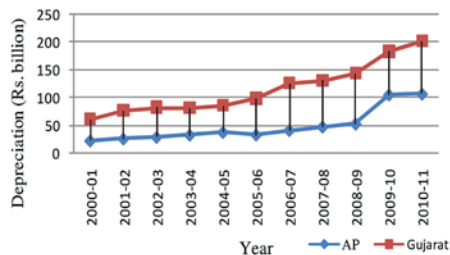


Figure 22: Net Value Added (All India)

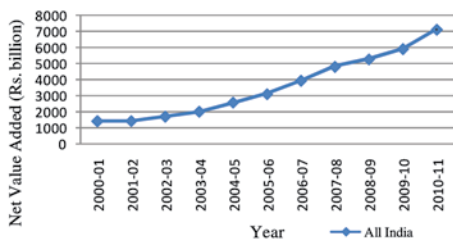


Figure 23: Net Value Added (AP and Gujarat)

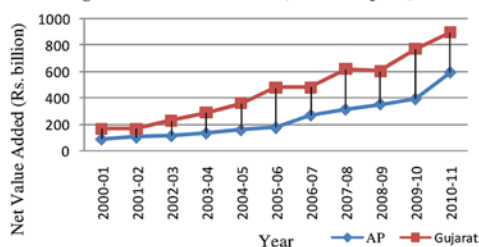


Figure 24: AP and Gujarat Percentage Share vis-à-vis All India: Net Value Added

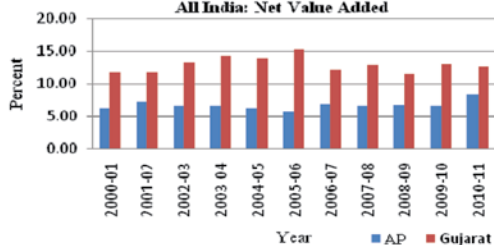


Figure 25: GFCF (All India)

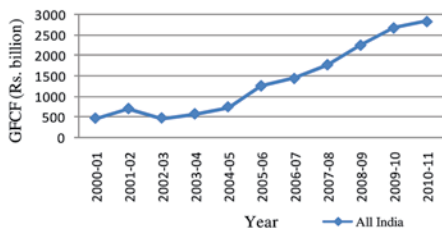
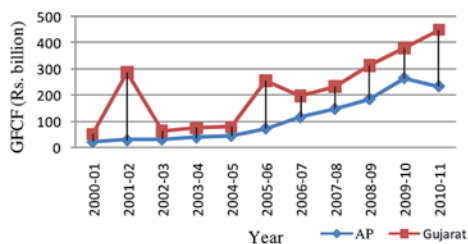
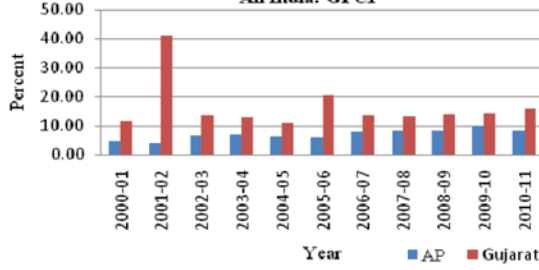


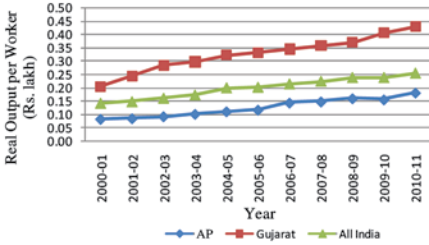
Figure 26: GFCF (AP and Gujarat)



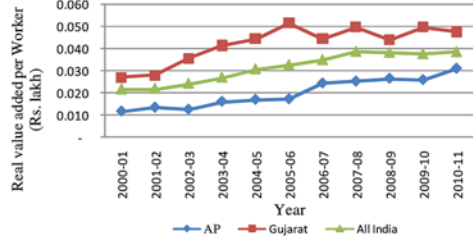
**Figure 27: AP and Gujarat Percentage Share vis-à-vis All India: GFCF**



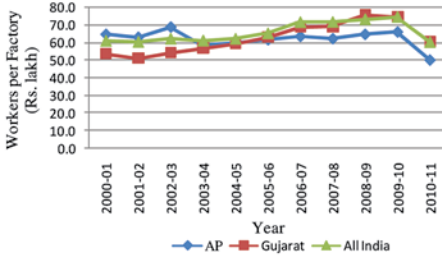
**Figure 28: Real Output per Worker : AP, Gujarat and All India**



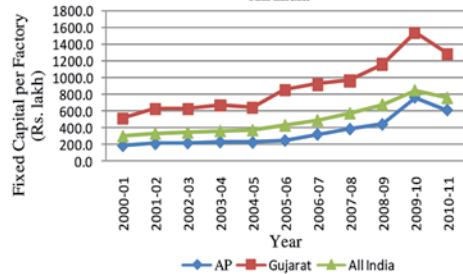
**Figure 29: Real Value added per Worker : AP, Gujarat and All India**



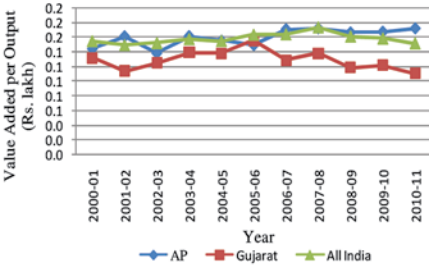
**Figure 30: Workers per Factory : AP, Gujarat and All India**



**Figure 31: Fixed Capital per Factory : AP, Gujarat and All India**



**Figure 32: Value Added per Output : AP, Gujarat and All India**



**Figure 33: Capital Output Ratio: AP, Gujarat and All India**

