ISID Institute for Studies in Industrial Development
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## A District Level Analysis Using Economic Census

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ISID Institute for Studies in Industrial Development
An institution of Indian Council of Social Science Research (Ministry of Education)
4 Vasant Kunj Institutional Area, New Delhi – 110 070
*Phone:* +91 11 2689 1111 | *E-mail:* info@isid.org.in | *Website:* https://isid.org.in

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# Manufacturing Units and Employment in India: A District Level Analysis Using Economic Census

*Surya Tewari*[*]

[***Abstract**: District as a unit of planning and development was understood long back in India. The current emphasis on One District One Product is a reflection of importance attributed to districts. Manufacturing development is the core of this strategy. The untapped potential of manufacturing makes such strategy imminent. The first step in that direction should be to understand where each state stand with respect to manufacturing and how it is changing over time. The analysis is made with respect to manufacturing units and workers using third (1990) and sixth (2013) economic census. Gini coefficient, location quotient and Local Moran's I is computed. Gini shows comparatively higher levels of intra-state concentration in states like Gujarat, Tamil Nadu, Jharkhand, Madhya Pradesh, and Arunachal Pradesh. Himachal Pradesh, Uttarakhand, and Haryana depict the same with respect to workers. In general, across all states there are increasing levels of concentration from 1990 to 2013. At NIC 2-digit high intra-state disparities are basically associated with high technology manufacturing. As far as specilaisation is concerned majority of the districts depict lower values of location quotient. Local Moran's I show existence of few clusters in the country with their position roughly remains the same in both 1990 and 2013. In Delhi NCR clustering with respect to workers is found to have intensified during the time period considered.*]

***Keywords**: Manufacturing, Economic Census, Clustering, One District One Product.*

## 1. Introduction

As per Census 2011, India comprises of 640 districts. The vast size and diversity of India give unique attributes to each of the country's districts. The diversity is not just in physical terms, but in social, cultural, and economic aspects as well. To give a glimpse of the scale of diversity, in terms of population, it is Thane (Maharashtra) with 1.11 crore persons at one extreme, and Dibang Valley (Arunachal Pradesh) with a population of 8,004 having an average density of one person per sq km on the other. In terms of economic parameters, in the state of Uttar Pradesh, for example, one finds Gautam Budh Nagar (Noida is located in this district) with GDP of over Rs 1.02 lakh crore and net per capita income of Rs 5.9 lakh per annum in 2018–19. In the same state, Shravasti district has GDP of Rs 2.9 crore and per capita income of Rs 37682 (GoUP, 2020). Similar differences are seen with other states as well.[1]

[*] Assistant Professor, ISID, New Delhi, India; Email: surya@isid.org.in

[1] Observation from past data of the states. The district domestic product is not updated timely by the

The question that emerges is, are the districts sacrosanct in their physical dimensions? It is important to note that the boundaries of the districts can be altered, and new districts may be created. It is under the purview of the state governments to create, alter, or abolish existing districts (GOI, 1956; GOI, 2014; *The Hindu*, 2021a). This can be done either through executive order or a law passed by the state assembly. Many states follow the executive route and issue a notification in the official gazette for the same.[2] Using this power, Telangana raised its number of districts to 33 from 10.

Yet districts are at the heart of effective and efficient regional planning. In a large and diverse country such as India, districts are better placed to meet the needs of the people. A district is considered as an appropriate size to meet local needs and aspirations as it is large enough to effect distribution of resources and small enough to be viewed as whole and ensure people's participation. Administrative and technical expertise and availability of data are an added advantage to take district as a unit of planning. Within districts there are urban and rural areas, with the former governed by municipalities and the latter by panchayats.[3] There is an intermediary administrative unit of sub-district that consists of some municipalities and panchayats.[4] In the 2011 Census, there were 5,924 sub-districts, 7,935 towns and 6,40,867 villages. As per the latest data available, districts have increased to 737 with the number of municipalities at 4,767 and panchayats numbered 2,62,694 (Local Government Directory website).[5]

Whatever be the size of a district, each district is unique in its own way. It is therefore important that conscious efforts are made to strengthen its capabilities, and to achieve its

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states. From the information collected from Directorate of Economics and Statistics of States, states like Maharashtra, Bihar, Haryana, Karnataka, Odisha, and West Bengal provide data in old series of 2004–05 and that, too, in general up to 2013–14. The new series of 2011–12 was introduced in 2015, which has not been released. In the case of Gujarat no data whatsoever is available. In the case of Manipur, Mizoram, Meghalaya, and Jharkhand the series is 1999–2000 that makes the data around 2-decade old.

[2] For renaming a district, the clearance has to come from the centre.

[3] The urban local body is referred to as municipal corporation, municipal council, and town panchayat, depending upon the size of urban area. A municipal corporation administers larger urban area. It is also known as nagar nigam or mahanagar palika. A municipal council administers smaller urban area and is also know known as nagar palika or nagar palika parishad or municipality. Town panchayat also known as nagar panchayat is for a transitional area; that is, it is an area in transition from a rural area to an urban area. Nagar panchayats also include town municipal councils, small town committees, town councils, and notified area committees. The rural local body is three-tiered with village panchayat at the level of village, block/intermediate panchayat at the level of sub district, and district panchayat at the level of district. Panchayats at the intermediate level may not be constituted in a state having a population not exceeding twenty lakhs (MOSPI, undated).

[4] Sub-district is variously called as tehsil/taluka/mandal for the purpose of revenue administration and block for the purpose of development.

[5] As per the directory, in a country as a whole there are 240 municipal corporations, 1895 municipal councils and 2632 town panchayats governing urban areas and 661 district panchayats, 6,673 intermediate panchayats, 2,55,360 village panchayats for rural areas (accessed on October 21, 2021).

meaningful parity with others. Economic and social development is paramount for any district to develop. The relation between social and economic infrastructure and growth is well understood (Panagariya, Chakraborty and Rao, 2015).

Economic component in the form of reducing poverty, and raising income and employment opportunities have always been at the core of planning at district level. Accentuation of social inequalities are co-terminus.

Which economic sector is better placed to raise employment levels, and productivity? The contribution of services is modest in terms of employment vis-à-vis output (Amirapu and Subramanian, 2015; and, GOI, 2019). They are also disparate in nature. While the financial, insurance, real estate, and business services are experiencing higher productivity, have domestic and international convergence, are tradable, and somewhat expanding, but are highly skilled in nature (see GOI, 2015a). The low-end services employ large labour forces but have low productivity and are mainly survival-based. The share of low productive and unskilled labour is predominant in the service sector (Pattanaik and Nayak, 2011; Chandrasekhar, 2018-19; Mahambare and Dhanarj, 2021).

Manufacturing even when informal is better placed than informal services. Organised manufacturing is also found to have better position than organised services for relatively less educated youth (Goldar, undated). Moreover, there is a great scope of manufacturing growth as there is no full utilisation of manufacturing potential.

From the focus of the government, the harmony between manufacturing growth and socioeconomic development is well understood. The *One District One Product (ODOP)* initiative of Government of India under Atmanirbhar Bharat Abhiyan is a step in that direction.[6] ODOP initiative aims at selecting, branding, and promoting at least one export/manufactured product from each district of the country (Invest India website). The scheme is expected to enable growth in employment, attract investment, and boost exports. Holistic socioeconomic development of the district and balanced regional development across districts is also expected from the scheme. The state governments are also engaging in this initiative (PIB, 2022). The states are separately identifying products for each of their

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[6] The ODOP initiative is introduced as a part of centrally sponsored PM Formalisation of Micro Enterprises (PMFME) Scheme of Ministry of Food Processing Industry (MoFPI). The '*District as Export Hub'* initiative of Ministry of Commerce and Industry has been merged with the ODOP initiative (PIB, 2021 *a*). MoFPI has approved ODOP for 707 districts (MoFPI, 2020; MoFPI, 2021). The support will be extended through credit, common services, marketing support to unorganised micro enterprises in food processing. PMFME scheme as of now will be available for a period of five years from 2020–21 to 2024–25 with an outlay of Rs 10,000 crores and target to assist 2 lakh micro enterprises in food processing.

*Atmanirbhar Bharat Abhiyan* is a bunch of measures first introduced on May 12, 2020 to deal with COVID-19 situation, to make the country self-reliant, and to strengthen domestic manufacturing (PIB *b*, 2021; PIB *c*, 2021). Earlier introduced measures and new measures were announced under the Abhiyan from time to time.

district as recently done by Andhra Pradesh (*The Hindu*, 2021b). This is separate from what has been identified for Ministry of Food Processing Industries.

Emphasis on manufacturing at district level is credited to Uttar Pradesh, which pioneered this initiative in 2018 (GoUP, 2018). Through this initiative the state aims to create a product-specific traditional industrial hub in each district of the state. Infrastructure development, access to finance, skill development and marketing assistance are focus areas for assistance.

The creation of 100 million additional jobs in manufacturing and raising its share to 25% in GDP (GOI, 2011; GOI, 2016) could be made possible if such spatial focus is made. Manufacturing share still hovers around 17% in GDP which should have been as envisaged in 2011 and 2014. As any district with its rural and urban constituents is the fundamental area where any policy decision is implemented, the focus on district would bring about the right mix of manufacturing for growth. In the sense that state would develop industries which are best suited to its local advantages and capacities. There is no point in developing all sorts of industries in a state if there are in vogue and practiced by other states. There is thus a need to have tailor made policies rather than template based. It is also important to note that industrial development in any state may not restrict to its own districts, it may spillover to adjoining districts in other states, but as the state exercise authority over its own territory, district can become a prime focus for regional industrialisation. For the success of regional industrialisation across districts in two or more states there is a need to develop similar capacities and coordination between governments which is hard to attain as one sees with industrial corridors programme (Tripathy, 2017; Chhataraj, 2018).

As there is lack of research on the status of manufacturing at district level as also on regional growth patterns of manufacturing, there is a need to undertake the one. The already existing district data analysed at temporal scale could help understand the dynamics of manufacturing at the district level and supplement the baseline studies conducted by states under ODOP. Human resource mapping could be further attempted based on such data.

In the context of the above background, this paper focuses on two main objectives: one, to map the spatial pattern of manufacturing units at the district level between pre and post reform period and second, to map the spatial pattern of manufacturing workers at the level of the districts in the same time period. The objectives are attempted through Economic Census data of third and sixth round (hereinafter EC-3 and EC-6) with third covering time period of 1990 and sixth conducted in 2013-14.

The paper is divided into seven sections. The next section 2 describes the database and methodology. Section 3 analyses the growth in manufacturing at the level of districts between EC-3 & EC-6. Section 4 measures concentration and specialisation at district level across states. Section 5 maps clustering as existing with respect to manufacturing units and workers separately for both the economic censuses. Section 6 sums up the paper.

## 2. Database and Methodology

### Database

The paper is based on EC-3 (1990) that covers the pre reform period, and EC-6 (2013) that captures the post-reform context. First of all, the manufacturing data of total units and total workers was extracted for both the censuses. Further, NIC 1987 basis of EC-3 was concorded with respect to NIC 2008 followed in EC-6 (see Tewari, 2022 for detail). The next step was to match the districts as EC-6 was based on Census 2011 and EC-3 on Census 1991. In this part district boundaries of 1990 were followed and hence the data of EC-6 was redistributed to districts as in EC-3.

In EC-6 based on Census 2011, there should have been 640 districts, in EC-3 based on Census 1991, 466 districts.[7]

In EC-3 the data was of 444 districts instead of 466. While there was official mention of no data for Lakshadweep (1) and Jammu & Kashmir (14), the data was also not there for six of the seven districts of Chhattisgarh and Hyderabad (Telangana). As data for Lakshadweep (1), Jammu Kashmir (22), Chhattisgarh (17), and Hyderabad had to be removed from consideration in EC-6, the number of districts left in EC-6 were 599. These 599 districts were reduced to 444 for comparative analysis between EC-3 and EC-6. Instead of 2011, districts of 1991 have been used. This is due to the fact that data was not available for units lower than districts i.e., tehsils or talukas. Had it been their tehsils could have been combined to form new districts as existing in 2011. It is important to note that tehsils' boundaries are generally maintained in creating new districts or altering the boundaries of districts. It was also possible to divide the data of EC-3 based on the percentage area of old districts gone into formation of new districts. But with that process, the district data obtained may or may not correspond to the new district. That way the credibility of district level analysis would have been compromised. Taking 1990 districts as base was therefore the best option. As all but 21 new districts had come from one district, combining new district data with its parent district was easy. It was only in 21 districts that random distribution of EC-6 data had to be done. Once the districts were decided, the data of that district in EC-6 was transferred to its parent district that was there in EC-3. In case of 21 EC-6 districts, the percentage area of these districts from their older districts was computed. From the total area of each of these 21 districts, the proportion that had to go into the old district was computed (area from old district/total area of the new district*100). In the same proportion, EC-6 data was distributed to old districts. To illustrate, Patan in Gujarat is derived from Banaskantha and Mahesana district with areas of 209.023 sq km and 5994.14 sq km respectively. From the total area of Patan (6203.16 sq km), 96.6% data is given to Mahesana and 3.4% to Banaskantha district. The data is then distributed randomly following Euler's theorem.

[7] EC-6 contained 642 districts instead of 640 as Delhi is shown to have 11. Shahdara and South East which were not separate districts in Census 2011 are shown as districts in EC-6. Delhi, therefore, is shown as one district.

**Methodology**

In order to analyse inequality or, say, concentration in manufacturing units and workers at the level of states, Gini coefficient has been computed.[8] Gini values ranges from 0 to 1, with 0 indicating equal distribution, and 1 as highest concentration. It is standard to consider, Gini values of 0.4 as indicating alarming levels of concentration (UNRISD, 2013).

The steps followed in computing Gini coefficient can be understood from the example of total manufacturing units for, say, state A: (a) Computing of percentage of manufacturing units to total units in the district, (b) Sorting the data obtained in step A, from largest to smallest, (c) Calculating district-wise percentage share of manufacturing units from total manufacturing units in the state ($Y_i$), (d) Calculating district-wise percentage share of total units ($X_i$), (e) Computing cumulative percentages of data obtained in step C and D such that last cumulative percentage of both is 100, (f) Computing $X_iY_{i+1}$ and $Y_iX_{i+1}$. Obtaining totals of both, and (g) Finally, application of the formula, $G=\frac{1}{100\times100}(\sum_{i=1}^{n} X_iY_{i+1}) - (\sum Y_iX_{i+1})$.

Gini coefficient is also computed for 2-digit of the manufacturing. In this part, the $Y_i$ variable is 2-digit of manufacturing and $X_i$ is total manufacturing. The robustness of Gini has been checked by computing summary statistic-based convergence methods. Following Barro and Sala-i-Martin (1991) and subsequent studies such as those by Ghatak and De (2020), unconditional beta (β) and sigma (σ) convergence are computed. So, in β convergence if a coefficient on initial log of manufacturing variables (units or workers) in a regression of growth of the variables is negative then one can expect convergence. Such negative coefficient may support lower inequality if obtained in Gini. As β convergence is a necessary condition, for sufficient condition σ convergence is computed. Sigma convergence measures change in dispersion over time of underlying variable, which is manufacturing unit and worker in the study.

To examine the change in intensity of manufacturing units and workers LQ has been used. LQ measures specialisation with respect to interested variable for each spatial unit vis-à-vis region. When mapped, LQ also gives areas of specialisation/concentration; in other words, it depicts clustering. LQ is calculated, say, for total manufacturing units as,

$$LQ_i = \frac{\frac{MU_i}{TU_i}}{\frac{MU}{TU}}$$

*where*, $MU_i$ = manufacturing units in district i (i= 1 to 444),
$TU_i$ = total units in district i,
$MU$ = total manufacturing units in the country,
$TU$ = total of total units in the country.

In LQ, value of unity denotes state performance equals country average. Values more than unity indicate better than national performance with higher and increasing values

[8] The words inequality and concentration have been interchangeably in the literature. Increase in inequality means increasing concentration.

indicating greater or increasing degree of specialisation. Vice versa is the case when values are less than unity. LQ is also calculated with respect to 2-digits of manufacturing in order to see to what extent states are specialised as per the manufacturing groups.

As Gini or LQ takes any spatial unit independent of surrounding spatial unit, to clearly examine the spatial concentration, the local Moran's I from the family of local spatial statistics or LISA (Local Indicators of Spatial Association) is computed. LISA was suggested by Anselin (1995). Local Moran's I consider each location vis-à-vis surrounding location and hence is a measure of spatial dependence or spatial auto correlation. From the measure one could identify clusters. It is important to note that there may be a case that Gini is showing non-concentration while there is clustering at the local level. The clustering may be too weak to be aggregates up to concentration at higher level. Also, the increasing Gini may be an indication of increasing formation of clusters and vice versa. Local Moran's I compute correlation between given values and its spatial lag values. In the present case, correlation of a district value (with respect to manufacturing units and workers) is tested with its spatial lag value which is district value weighted by its spatial weight. Spatial weight is computed either by following contiguity criteria or distance criteria. In contiguity, queen's weight is followed which is based on the principle that two districts would be considered as neighbours if at least one point on the boundary of one district is touching the neigbouring district. In distance matrix, weights are decided on the basis of range of distance chosen. So, a distance range of, for example, 150 km could be distance to consider two districts as neighbours. The distance is measured from the centroid of one district to all other districts and those falling under the distance range chosen are taken as neighbours. Now the statistical significance of district value with its spatial lag is computed. If the district value is high and its correlation with spatial lag is also significantly higher, we have high-high cluster. Reverse is the case in low-low cluster. We may also have low-high or high-low cluster which are the outliers. So, what we get are high-high (HH-hotspot); low-low (LL-coldspot), high-low (HL-outlier), and low-high (LH-outlier) clusters with HH and LL indicate spatial clustering of similar values and LH and HL of dissimilar values depicting spatial heterogeneity. Moran's I value ranges from -1 to +1. The p-value is taken as $<0.05$. The analysis is undertaken on R software.

## 3. Growth of Manufacturing Units and Workers

Between 1990 (EC-3) and 2013 (EC-6), one finds a large many districts recording negative growth rate in terms of manufacturing workers (Figure 2). The decline has also happened with respect to manufacturing units, but it is limited to few districts (Figure 1). In terms of the total number of such districts, it is 118 in case of workers and 44 in respect to units (Table 1).

As observed in Figure 1, the decline is distinctly seen in the districts of Madhya Pradesh, Jharkhand, and Arunachal Pradesh. In case of workers (Figure 2), the decline appears

widespread with higher number of districts experiencing a decline in the states of Jharkhand, Madhya Pradesh, Karnataka, and Arunachal Pradesh.

**Figure 1: Growth in Manufacturing Units (1990–2013)**

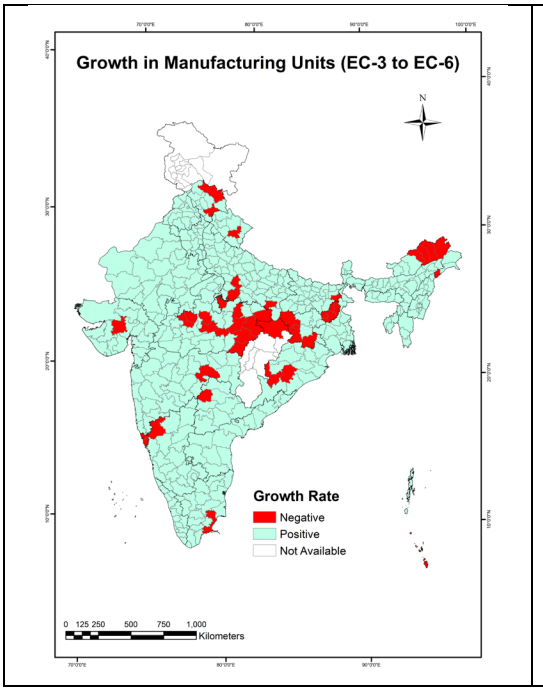
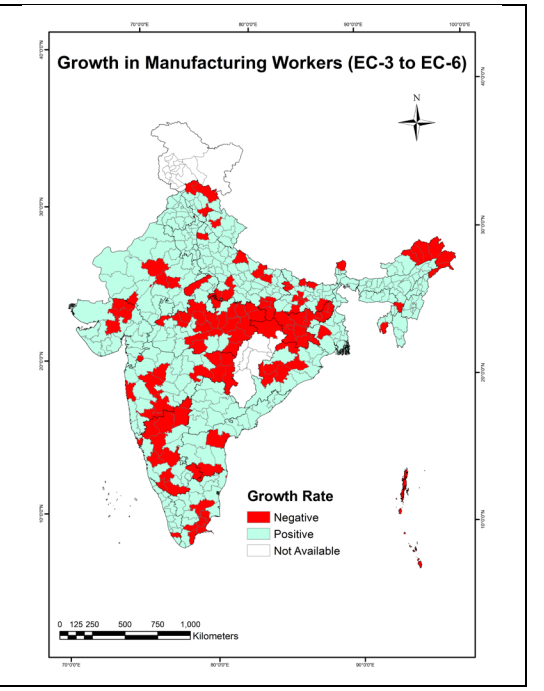



**Figure 2: Growth in Manufacturing Workers (1990–2013)**




*Source:* Constructed using EC-3 & EC-6 Database

**Table 1: State-wise Districts Recording Negative Growth Rate**

| *State/UT* | *Total Districts* | *Manufacturing Units* | *Manufacturing Workers* |
|---|---|---|---|
| | | *No. Negative (in %)* | *No. Negative (in %)* |
| Andaman & Nicobar Island | 2 | 1 (50) | 2 (100) |
| Andhra Pradesh | 13 | 0 | 2 (15) |
| Arunachal Pradesh | 11 | 5 (45) | 7 (64) |
| Assam | 23 | 0 | 1 (4) |
| Bihar | 29 | 1 (3) | 9 (31) |
| Chandigarh | 1 | 0 | 1 (100) |
| Chhattisgarh | 1 | 1 (100) | 1 (100) |
| Dadra & Nagar Haveli | 1 | 0 | 0 |
| Daman & Diu | 2 | 0 | 0 |
| Delhi | 1 | 0 | 0 |
| Goa | 2 | 2 (100) | 1 (50) |
| Gujarat | 19 | 1 (5) | 4 (21) |
| Haryana | 16 | 0 | 0 |

| *State/UT* | *Total Districts* | *Manufacturing Units* | *Manufacturing Workers* |
|---|---|---|---|
| | | *No. Negative (in %)* | *No. Negative (in %)* |
| Himachal Pradesh | 12 | 2 (17) | 3 (25) |
| Jharkhand | 13 | 8 (62) | 12 (92) |
| Karnataka | 20 | 1 (5) | 11 (55) |
| Kerala | 14 | 0 | 1 (7) |
| Madhya Pradesh | 38 | 12 (32) | 21 (55) |
| Maharashtra | 30 | 1 (3) | 11 (37) |
| Manipur | 8 | 0 | 0 |
| Meghalaya | 5 | 0 | 0 |
| Mizoram | 3 | 0 | 0 |
| Nagaland | 7 | 0 | 0 |
| Odisha | 13 | 2 (15) | 5 (38) |
| Puducherry | 4 | 0 | 1 (25) |
| Punjab | 12 | 0 | 0 |
| Rajasthan | 27 | 0 | 4 (15) |
| Sikkim | 4 | 0 | 1 (25) |
| Tamil Nadu | 21 | 2 (10) | 7 (33) |
| Telangana | 9 | 1 (11) | 0 |
| Tripura | 3 | 0 | 1 (33) |
| Uttar Pradesh | 54 | 3 (6) | 10 (19) |
| Uttarakhand | 9 | 1 (11) | 1 (11) |
| West Bengal | 17 | 0 | 1 (6) |
| **Total** | **444** | **44 (10)** | **118 (27)** |

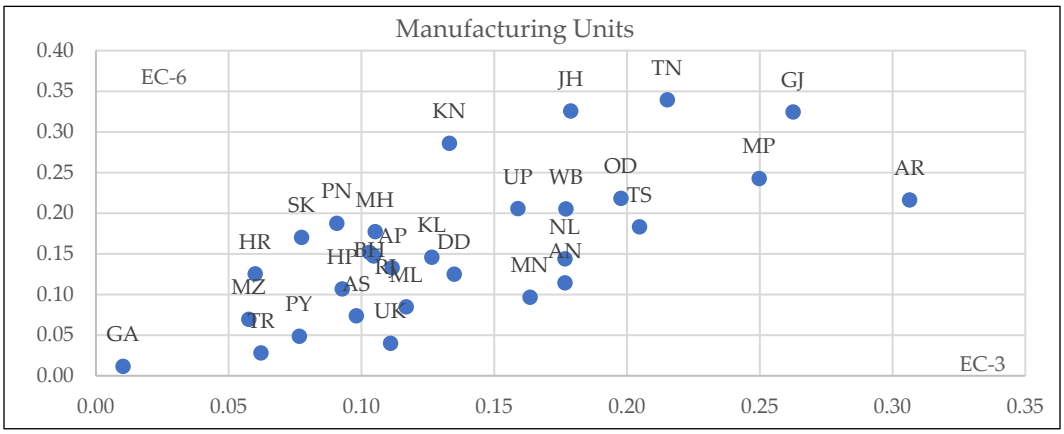
*Note:* Data for six districts of Chhattisgarh and one district of Telangana (Hyderabad) is not there for EC-3. Delhi is represented as one district.
*Source:* Based on Figures 1 and 2.

While Jharkhand has experienced a relatively large decline in workers as nearly all of its districts recorded negative growth, the decline is more than 50% in the case of districts in the states of Madhya Pradesh and Karnataka (Table 1). In the case of Arunachal Pradesh, 64% districts recorded negative growth.

## 4. Concentration and Specialisation of Manufacturing Units and Workers

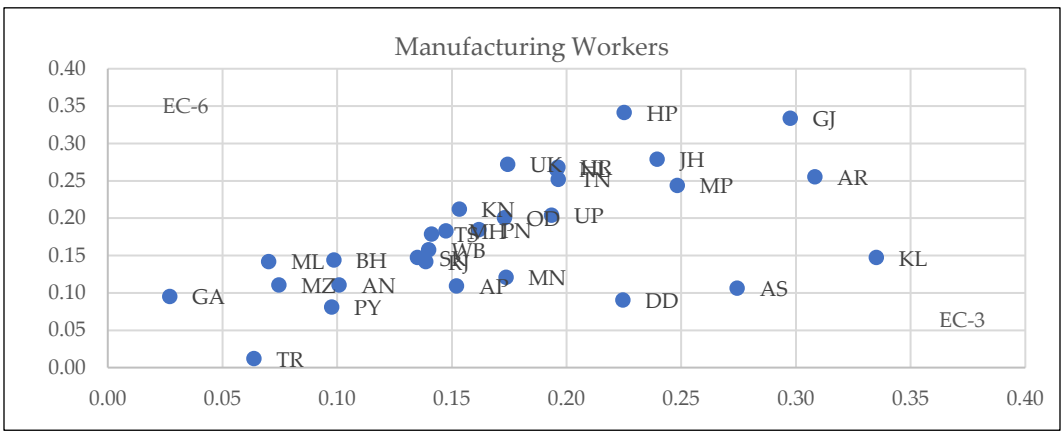
To the question of how far manufacturing units and workers are concentrated within states, the Gini coefficient computed for overall manufacturing units and workers reveal concentration values to be generally under 0.20. On a comparative basis, the districts of Gujarat, Jharkhand, Tamil Nadu, Madhya Pradesh, and Arunachal Pradesh show higher intra-state concentration both with respect to units and workers (Figures 3 and 4). The Gini values are between 0.25 and 0.30 in these states.

**Figure 3: Intra-state Gini for Manufacturing Units EC-3 (1990) & EC-6 (2013)**




*Source*: Constructed using EC-3 and E-6 database.

**Figure 4: Intra-state Gini for Manufacturing Workers EC-3 (1990) & EC-6 (2013)**




*Source*: Constructed using EC-3 and E-6 database.

Himachal Pradesh, Uttarakhand, Haryana and Nagaland also have comparatively higher concentration with respect to workers (Figure 4). It is important to note that the states of Himachal Pradesh and Uttarakhand are found to have benefitted immensely from the special package of 2003. While in Himachal Pradesh the number of units had increased by 28%, workers increased by 33% between 2000 and 2014. In Uttarakhand, the figure is 130 and 490% respectively (PIB, 2014). All these states with the exception of Arunachal Pradesh and Madhya Pradesh which has seen a slight decline, have experienced an increase in Gini value between EC-3 and EC-6 (Table 2).

Taking all states into consideration, majority of the states show an increase in concentration with respect to both units and workers (Table 2). Within state divergence for both units and workers confirmed from β convergence for the states of Himachal Pradesh, Uttarakhand, Jharkhand, Rajasthan, Odisha, Sikkim, Punjab (units), Maharashtra (units),

Haryana (workers) and Puducherry (workers) (see Appendix Figures A1 and A2, and Table A1). Sigma also substantiates the divergence in these states as well in Gujarat, Tamil Nadu, and Karnataka. The last three showed comparatively higher Gini values (Table 2).

**Table 2: Intra-state Gini Coefficient EC-3 (1990) & EC-6 (2013)**

| *State/UT (Short)* | *Manufacturing Units* | | *Manufacturing Workers* | |
|---|---|---|---|---|
| | *EC-3* | *EC-6* | *EC--3* | *EC-6* |
| Andaman & Nicobar (AN) | 0.18 | 0.11 | 0.10 | 0.11 ↑ |
| Andhra Pradesh (AP) | 0.11 | 0.13 ↑ | 0.15 | 0.11 |
| Arunachal Pradesh (AR) | 0.31 | 0.22 | 0.31 | 0.26 |
| Assam (AS) | 0.10 | 0.07 | 0.27 | 0.11 |
| Bihar (BH) | 0.10 | 0.15 ↑ | 0.10 | 0.14 ↑ |
| Daman & Diu (DD) | 0.13 | 0.12 | 0.22 | 0.09 |
| Goa (GA) | 0.01 | 0.01 | 0.03 | 0.10 ↑ |
| Gujarat (GJ) | 0.26 | 0.32 ↑ | 0.30 | 0.33 ↑ |
| Haryana (HR) | 0.06 | 0.13 ↑ | 0.20 | 0.27 ↑ |
| Himachal Pradesh (HP) | 0.09 | 0.11 ↑ | 0.23 | 0.34 ↑ |
| Jharkhand (JH) | 0.18 | 0.33 ↑ | 0.24 | 0.28 ↑ |
| Karnataka (KN) | 0.13 | 0.29 ↑ | 0.15 | 0.21 ↑ |
| Kerala (KL) | 0.13 | 0.15 ↑ | 0.34 | 0.15 |
| Madhya Pradesh (MP) | 0.25 | 0.24 | 0.25 | 0.24 |
| Maharashtra (MH) | 0.11 | 0.18 ↑ | 0.15 | 0.18 ↑ |
| Manipur (MN) | 0.16 | 0.10 | 0.17 | 0.12 |
| Meghalaya (ML) | 0.12 | 0.09 | 0.07 | 0.14 ↑ |
| Mizoram (MZ) | 0.06 | 0.07 ↑ | 0.07 | 0.11 ↑ |
| Nagaland (NL) | 0.18 | 0.14 | 0.20 | 0.27 ↑ |
| Odisha (OD) | 0.20 | 0.22 ↑ | 0.17 | 0.20 ↑ |
| Puducherry (PY) | 0.08 | 0.05 | 0.10 | 0.08 |
| Punjab (PN) | 0.09 | 0.19 ↑ | 0.16 | 0.18 ↑ |
| Rajasthan (RJ) | 0.10 | 0.15 ↑ | 0.14 | 0.14 |
| Sikkim (SK) | 0.08 | 0.17 ↑ | 0.13 | 0.15 ↑ |
| Tamil Nadu (TN) | 0.22 | 0.34 ↑ | 0.20 | 0.25 ↑ |
| Telangana (TS) | 0.20 | 0.18 | 0.14 | 0.18 ↑ |
| Tripura (TR) | 0.06 | 0.03 | 0.06 | 0.01 |
| Uttar Pradesh (UP) | 0.16 | 0.21 ↑ | 0.19 | 0.20 ↑ |
| Uttarakhand (UK) | 0.11 | 0.04 | 0.17 | 0.27 ↑ |
| West Bengal (WB) | 0.18 | 0.21 ↑ | 0.14 | 0.16 ↑ |

*Note:* Upward arrow denotes increase in Gini.
*Source*: Computed using EC-3 and E-6 database.

As all types of manufacturing are not developed in all districts, within state concentration is exhibited in most of the states with respect to manufacturing groups. The intra-state inequality is above 0.4 in majority of the states in both 1990 and 2013 with respect to tobacco products, paper & paper products, basic metals, coke & refined petroleum products, chemicals & its products, pharmaceuticals, computer & electronic products, machinery & equipment, motor vehicles, and other transport equipment (see Appendix Tables A2 and A3 for 2-digit level Gini). This is true for both manufacturing units and

workers. With the exception of the first four, the others are high-medium technology type and hence the differences are inevitable (see Appendix Table A4) . In case of wearing apparel, the intra-state disparity has gone down considerably, indicating taking up of manufacturing by almost all districts across states.

While low technology based units and workers have, in general, intra- and inter-state disparity to be very small with gini values hovering below 0.1, in case of medium-low technology the differences rise with maximum Gini reaching between 0.3 to 0.4 (Tables 3 and 4). This is noticed in the states of Tamil Nadu, Uttar Pradesh, Gujarat, Haryana, Jharkhand, Karnataka, Telangana, Madhya Pradesh, Arunachal Pradesh, and Nagaland. The states of Manipur, Meghalaya, and Odisha also showed higher values for workers in EC-6. The former two have seen considerable jump in concentration.

In high-medium technology, gini values are nearly 0.4 or above in many of the states (Tables 3 and 4). The notable being Arunachal Pradesh, Himachal Pradesh, Karnataka, Madhya Pradesh, Uttar Pradesh, Tamil Nadu, Bihar, Odisha, and West Bengal. The states of Uttarkhand and Sikkim showed higher concentration in high-medium units but not in workers.

**Table 3: District-wise Gini Coefficient Manufacturing Units by Technology Type EC-3 (1990) & EC-6 (2013)**

| *State/UT* | *Low* | | *Medium Low* | | *High Medium* | |
|---|---|---|---|---|---|---|
| | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* |
| Andaman & Nicobar Island | 0.09 | 0.01 | 0.32 | 0.03 | 0.30 | 0.05 |
| Andhra Pradesh | 0.02 | 0.02 | 0.14 | 0.18 ↑ | 0.37 | 0.18 |
| Arunachal Pradesh | 0.04 | 0.04 | 0.34 | 0.32 | 0.68 | 0.48 |
| Assam | 0.04 | 0.02 | 0.18 | 0.16 | 0.26 | 0.31 ↑ |
| Bihar | 0.05 | 0.06 ↑ | 0.16 | 0.33 ↑ | 0.36 | 0.43 ↑ |
| Daman & Diu | 0.08 | 0.11 ↑ | 0.14 | 0.07 | 0.06 | 0.08 ↑ |
| Goa | 0.00 | 0.00 | 0.01 | 0.02 ↑ | 0.00 | 0.07 ↑ |
| Gujarat | 0.07 | 0.11 ↑ | 0.23 | 0.33 ↑ | 0.36 | 0.33 |
| Haryana | 0.05 | 0.07 ↑ | 0.14 | 0.31 ↑ | 0.12 | 0.27 ↑ |
| Himachal Pradesh | 0.04 | 0.03 | 0.29 | 0.17 | 0.44 | 0.58 ↑ |
| Jharkhand | 0.07 | 0.04 | 0.12 | 0.33 ↑ | 0.56 | 0.30 |
| Karnataka | 0.05 | 0.05 | 0.17 | 0.36 ↑ | 0.39 | 0.48 ↑ |
| Kerala | 0.04 | 0.02 | 0.16 | 0.21 ↑ | 0.18 | 0.25 ↑ |
| Madhya Pradesh | 0.08 | 0.06 | 0.31 | 0.31 | 0.48 | 0.46 |
| Maharashtra | 0.07 | 0.05 | 0.17 | 0.21 ↑ | 0.34 | 0.31 |
| Manipur | 0.01 | 0.01 | 0.20 | 0.19 | 0.20 | 0.35 ↑ |
| Meghalaya | 0.02 | 0.01 | 0.03 | 0.10 ↑ | 0.20 | 0.29 ↑ |
| Mizoram | 0.01 | 0.00 | 0.05 | 0.05 | 0.10 | 0.14 ↑ |
| Nagaland | 0.03 | 0.02 | 0.30 | 0.23 | 0.73 | 0.27 ↑ |
| Odisha | 0.05 | 0.03 | 0.16 | 0.29 ↑ | 0.34 | 0.45 ↑ |
| Puducherry | 0.01 | 0.02 ↑ | 0.03 | 0.08 ↑ | 0.07 | 0.05 |
| Punjab | 0.07 | 0.05 | 0.11 | 0.23 ↑ | 0.16 | 0.23 ↑ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rajasthan | 0.05 | 0.04 | 0.16 | 0.15 | 0.30 | 0.30 |
| Sikkim | 0.05 | 0.01 | 0.30 | 0.07 | 0.49 | 0.44 |
| Tamil Nadu | 0.07 | 0.05 | 0.34 | 0.36 ↑ | 0.54 | 0.39 |
| Telangana | 0.04 | 0.03 | 0.27 | 0.26 | 0.42 | 0.28 |
| Tripura | 0.01 | 0.01 | 0.06 | 0.08 ↑ | 0.21 | 0.11 |
| Uttar Pradesh | 0.06 | 0.06 | 0.27 | 0.40 ↑ | 0.38 | 0.41↑ |
| Uttarakhand | 0.04 | 0.04 | 0.21 | 0.14 | 0.43 | 0.37 |
| West Bengal | 0.06 | 0.03 | 0.24 | 0.27 ↑ | 0.56 | 0.36 |

*Note:* Upward arrow denotes increase in Gini.
*Source*: Computed using EC-3 and E-6 database.

**Table 4: District wise Gini Coefficient Manufacturing Workers by Technology Type EC-3 (1990) & EC-6 (2013)**

| *State* | *Low* | | *Medium Low* | | *High Medium* | |
|---|---|---|---|---|---|---|
| | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* |
| Andaman & Nicobar Island | 0.12 | 0.01 | 0.13 | 0.01 | 0.21 | 0.03 |
| Andhra Pradesh | 0.05 | 0.03 | 0.36 | 0.17 | 0.36 | 0.25 |
| Arunachal Pradesh | 0.04 | 0.04 | 0.41 | 0.27 | 0.61 | 0.59 |
| Assam | 0.09 | 0.05 | 0.31 | 0.22 | 0.43 | 0.39 |
| Bihar | 0.09 | 0.08 | 0.18 | 0.37 ↑ | 0.48 | 0.48 |
| Daman & Diu | 0.07 | 0.03 | 0.05 | 0.01 | 0.06 | 0.01 |
| Goa | 0.00 | 0.01 | 0.02 | 0.04 ↑ | 0.01 | 0.06 ↑ |
| Gujarat | 0.13 | 0.23 ↑ | 0.37 | 0.38 ↑ | 0.45 | 0.50 ↑ |
| Haryana | 0.26 | 0.17 | 0.18 | 0.37 ↑ | 0.39 | 0.33 |
| Himachal Pradesh | 0.10 | 0.23 ↑ | 0.22 | 0.21 | 0.40 | 0.39 |
| Jharkhand | 0.32 | 0.07 | 0.13 | 0.34 ↑ | 0.35 | 0.31 |
| Karnataka | 0.10 | 0.07 | 0.35 | 0.21 | 0.52 | 0.41 |
| Kerala | 0.08 | 0.06 | 0.21 | 0.22 ↑ | 0.32 | 0.41 ↑ |
| Madhya Pradesh | 0.12 | 0.10 | 0.30 | 0.28 | 0.58 | 0.50 |
| Maharashtra | 0.13 | 0.13 | 0.13 | 0.19 ↑ | 0.31 | 0.34 ↑ |
| Manipur | 0.01 | 0.02 | 0.03 | 0.26 ↑ | 0.25 | 0.33 ↑ |
| Meghalaya | 0.03 | 0.15 ↑ | 0.06 | 0.37 ↑ | 0.15 | 0.31 ↑ |
| Mizoram | 0.02 | 0.01 | 0.06 | 0.03 | 0.12 | 0.10 |
| Nagaland | 0.16 | 0.05 | 0.36 | 0.42 ↑ | 0.86 | 0.28 |
| Odisha | 0.09 | 0.07 | 0.19 | 0.33 ↑ | 0.42 | 0.41 |
| Puducherry | 0.03 | 0.07 ↑ | 0.10 | 0.07 | 0.05 | 0.05 |
| Punjab | 0.10 | 0.11 ↑ | 0.17 | 0.20 ↑ | 0.16 | 0.32 ↑ |
| Rajasthan | 0.11 | 0.11 | 0.20 | 0.19 | 0.41 | 0.35 |
| Sikkim | 0.03 | 0.20 ↑ | 0.28 | 0.08 | 0.26 | 0.15 |
| Tamil Nadu | 0.13 | 0.11 | 0.36 | 0.31 | 0.55 | 0.51 |
| Telangana | 0.13 | 0.15 ↑ | 0.34 | 0.36 ↑ | 0.68 | 0.42 |
| Tripura | 0.03 | 0.02 | 0.16 | 0.06 | 0.30 | 0.12 |
| Uttar Pradesh | 0.12 | 0.14 ↑ | 0.29 | 0.41 ↑ | 0.47 | 0.57 ↑ |
| Uttarakhand | 0.07 | 0.22 ↑ | 0.17 | 0.13 | 0.26 | 0.19 |
| West Bengal | 0.10 | 0.05 | 0.22 | 0.24 ↑ | 0.48 | 0.33 |

*Note:* Upward arrow denotes increase in Gini.
*Source*: Computed using EC-3 and E-6 database.

Between 1990 and 2013, the values of gini are stable with low technology manufacturing (Tables 3 and 4). The increase, wherever noticed, is quite imperceptible. In medium-low technology, intra-state differences have grown in many of the states. With respect to high-medium, many states witneseed an increase in disparity with respect to units. It is limited to few states with respect to workers. The increase in unit level disparity is noticeable with respect to Himachal Pradesh and Karnataka. Bihar and Odisha also experienced an increase. Decline on the other hand is noticeable in Tamil Nadu, Telangana, Jharkhand, and Arunachal Pradesh.

The Gini values thus indicate that some districts are more specialised than the others. The analysis of specialisation with respect to overall manufacturing, as well as manufacturing by NIC 2-digit and by technology type is carried out using LQ.

In overall manufacturing, almost all districts are covered in very low to low and moderate levels of specialisation (Figures 5 and 6). The location is also roughly the same except that between 1990 and 2013, in case of units the districts around Chhattisgarh and in Himachal Pradesh have downgraded while those in Karnataka have upgraded to moderate level of specialisation. In the case of workers, they have downgraded from moderate to very low to low level, as is observed in general.

Converting spatial information in numerical form, around 300 districts of the total 444 exhibit very low to low level of specialisation (Tables 5 and 6). Between 1990 and 2013 with respect to units, the districts in lower level of specialisation have declined to 296 from 307 (Table 5), while in the case of workers it has increased to 327 from 300 (Table 6).[9] Concomitantly, the number in moderately high level has increased for units and decreased for workers. In the case of workers, the degree of specialisation in high category has increased to 14 districts from four districts. While Madhya Pradesh has two districts in this category, Uttar Pradesh and Tamil Nadu have added one more district each. One district each has emerged in Gujarat, Haryana, Jharkhand, Odisha, West Bengal, Himachal Pradesh, Uttarakhand, and Nagaland. In West Bengal, two districts have emerged in high category of specialisation as well. Interestingly, these are the states that show Gini higher than 0.4 overall as well in high medium technology. In Daman & Diu and Dadra & Nagar Haveli one district each feature in very high level of specialisation in 2013 with respect to workers. This may have happened as the UTs are meeting around 28 percent of the plastic need of the country and a contributing immensely to yarn production. As per the information 80 percent of polyster yarn is manufactured in these UTs (Invest India, from website).

[9] There is significantly positive correlation of% change in the number of districts in say units and its counterpart in say workers (or vice versa) in each of the specialisation type except in very high level of specialisation. The correlations from lower order to very high order are 0.897 ($p < 1$), 0.990 ($p < 1$), 0.493 ($p < 5$) and 0.133 respectively.

**Figure 5 District-wise Specialisation Manufacturing Units EC-3 (1990) & EC-6 (2013)**

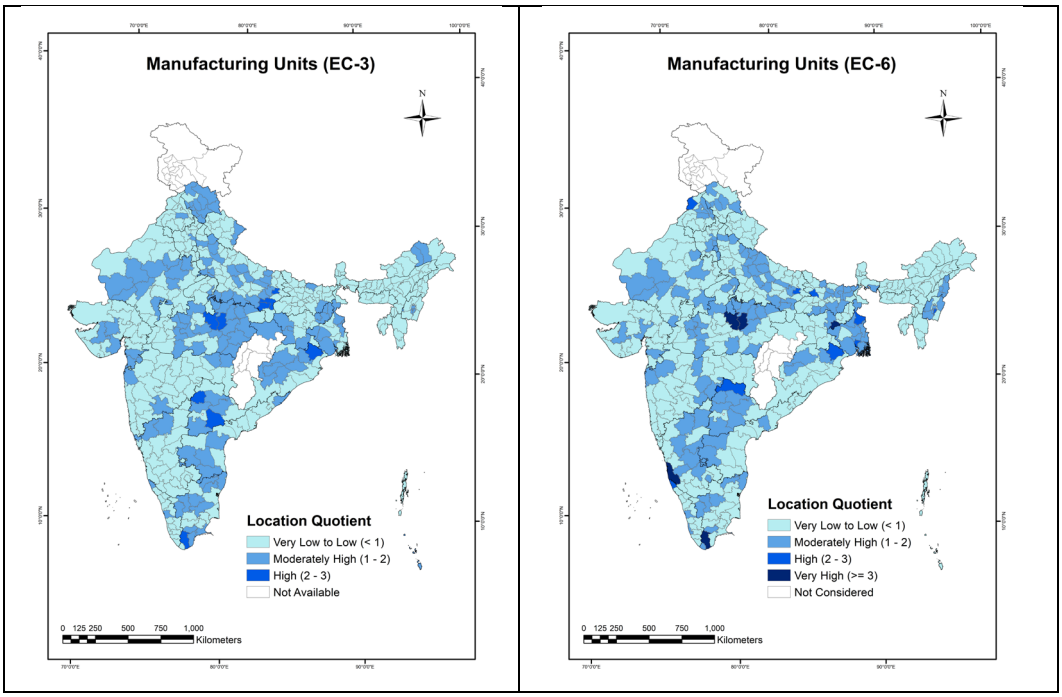
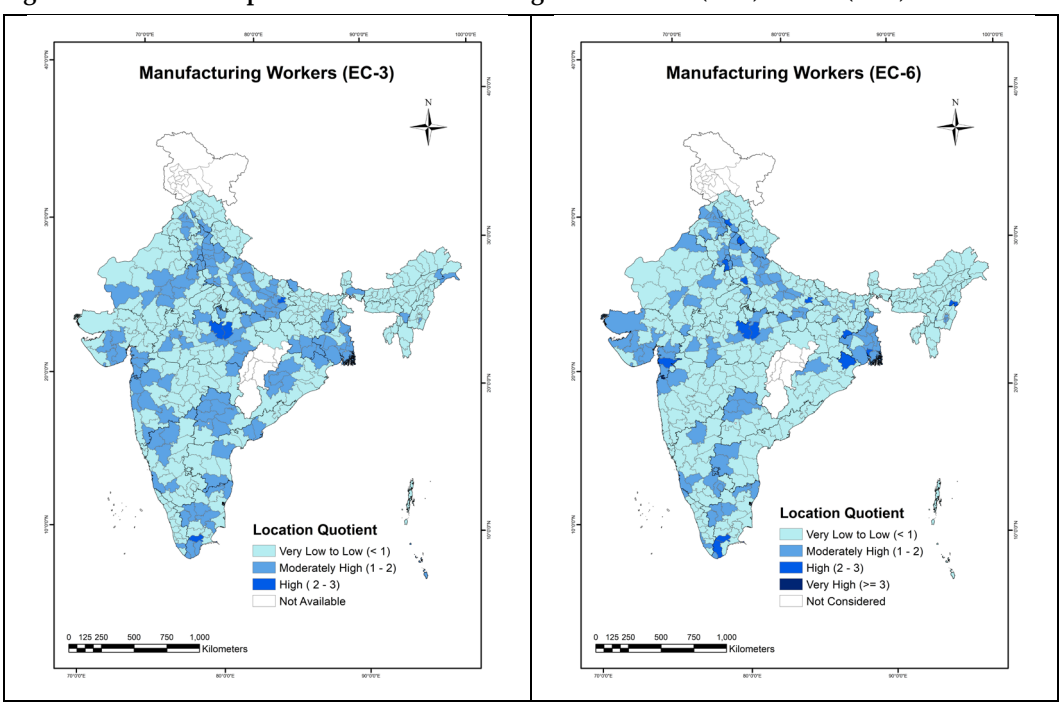



**Figure 6 District-wise Specialisation Manufacturing Workers EC-3 (1990) & EC-6 (2013)**




*Source:* Constructed using EC-3 & EC-6 Database

**Table 5: District-wise Location Quotient of Manufacturing Units EC-3 (1990) & EC-6 (2013)**

| *State* | *No. of Districts* | *Location Quotient* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *Very Low to Low (<1)* | | *Moderately High (1 – 2)* | | *High (2 – 3)* | | *Very High (>=3)* | |
| | | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* |
| Uttar Pradesh | 54 | 31 | 33 ↑ | 20 | 20 | 3 | 1 | | |
| Madhya Pradesh | 38 | 16 | 20 | 20 | 16 | 2 | | | 2 |
| Maharashtra | 30 | 26 | 23 | 4 | 7 ↑ | | | | |
| Bihar | 29 | 27 | 16 | 2 | 12 ↑ | | 1 | | |
| Rajasthan | 27 | 17 | 18 ↑ | 10 | 9 | | | | |
| Assam | 23 | 23 | 23 | | | | | | |
| Tamil Nadu | 21 | 10 | 13 ↑ | 10 | 7 | 1 | | | 1 |
| Karnataka | 20 | 18 | 11 | 2 | 8 ↑ | | | | 1 |
| Gujarat | 19 | 13 | 16 ↑ | 6 | 3 | | | | |
| West Bengal | 17 | 10 | 4 | 7 | 11 ↑ | | 2 | | |
| Haryana | 16 | 5 | 12 ↑ | 1 | 4 ↑ | | | | |
| Kerala | 14 | 12 | 11 | 2 | 2 | | 1 | | |
| Andhra Pradesh | 13 | 8 | 10 ↑ | 5 | 3 | | | | |
| Jharkhand | 13 | 5 | 11 ↑ | 8 | 1 | | | | 1 |
| Odisha | 13 | 6 | 9 ↑ | 6 | 3 | 1 | 1 | | |
| Himachal Pradesh | 12 | 1 | 6 ↑ | 11 | 6 | | | | |
| Punjab | 12 | 11 | 7 | 1 | 4 ↑ | | 1 | | |
| Arunachal Pradesh | 11 | 9 | 11 ↑ | 2 | | | | | |
| Telangana | 9 | 3 | 2 | 4 | 6 ↑ | 2 | 1 | | |
| Uttarakhand | 9 | 8 | 9 ↑ | 1 | | | | | |
| Manipur | 8 | 5 | 2 | 3 | 5 ↑ | | 1 | | |
| Nagaland | 7 | 7 | 3 | | 4 | | | | |
| Meghalaya | 5 | 5 | 5 | | | | | | |
| Pondicherry | 4 | 4 | 4 | | | | | | |
| Sikkim | 4 | 4 | 4 | | | | | | |
| Mizoram | 3 | 3 | 3 | | | | | | |
| Tripura | 3 | 3 | 3 | | | | | | |
| Andaman & Nicobar | 2 | 1 | 2 ↑ | 1 | | | | | |
| Daman & Diu | 2 | 2 | 1 | | 1 | | | | |
| Goa | 2 | 1 | 2 ↑ | 1 | | | | | |
| Chandigarh | 1 | 1 | 1 | | | | | | |
| Chhattisgarh | 1 | | 1 | 1 | | | | | |
| Dadar & Nagar Haveli | 1 | 1 | | | 1 | | | | |
| Delhi | 1 | 1 | | | 1 | | | | |
| **Total** | **444** | **307** | **296** | **128** | **134 ↑** | **9** | **9** | | **5** |

*Note:* Upward arrow denotes increase in the number of districts.
*Source:* Based on Figure 5.

**Table 6: District-wise Location Quotient Manufacturing Workers EC-3 (1990) & EC-6 (2013)**

| *State* | *Total Districts* | *Location Quotient* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *Very Low to Low (<1)* | | *Moderately High (1 – 2)* | | *High (2 -3)* | | *Very High (>=3)* | |
| | | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* |
| Uttar Pradesh | 54 | 23 | 34 ↑ | 30 | 18 | 1 | 2 ↑ | | |
| Madhya Pradesh | 38 | 24 | 28 ↑ | 12 | 8 | 2 | 2 | | |
| Maharashtra | 30 | 22 | 27 ↑ | 8 | 3 | | | | |
| Bihar | 29 | 27 | 26 | 2 | 3 | | | | |
| Rajasthan | 27 | 19 | 22 ↑ | 8 | 5 | | | | |
| Assam | 23 | 21 | 23 ↑ | 2 | | | | | |
| Tamil Nadu | 21 | 10 | 13 ↑ | 10 | 6 | 1 | 2 ↑ | | |
| Karnataka | 20 | 14 | 14 | 6 | 6 | | | | |
| Gujarat | 19 | 12 | 9 | 7 | 9 ↑ | | 1 | | |
| West Bengal | 17 | 7 | 5 | 10 | 11 ↑ | | 1 | | |
| Haryana | 16 | 9 | 9 | 7 | 6 | | 1 | | |
| Kerala | 14 | 13 | 11 | 1 | 3 ↑ | | | | |
| Andhra Pradesh | 13 | 9 | 11 ↑ | 4 | 2 | | | | |
| Jharkhand | 13 | 6 | 12 ↑ | 7 | | | 1 | | |
| Odisha | 13 | 8 | 11 ↑ | 5 | 1 | | 1 | | |
| Himachal Pradesh | 12 | 9 | 9 | 3 | 2 | | 1 | | |
| Punjab | 12 | 8 | 4 | 4 | 8 ↑ | | | | |
| Arunachal Pradesh | 11 | 10 | 11 ↑ | 1 | | | | | |
| Telangana | 9 | 2 | 5 ↑ | 7 | 4 | | | | |
| Uttarakhand | 9 | 9 | 7 | | 1 | | 1 | | |
| Manipur | 8 | 7 | 5 | 1 | 3 ↑ | | | | |
| Nagaland | 7 | 7 | 6 | | | | 1 | | |
| Meghalaya | 5 | 5 | 5 | | | | | | |
| Pondicherry | 4 | 3 | 3 | 1 | 1 | | | | |
| Sikkim | 4 | 4 | 4 | | | | | | |
| Mizoram | 3 | 3 | 3 | | | | | | |
| Tripura | 3 | 3 | 3 | | | | | | |
| Andaman & Nicobar | 2 | 1 | 2 ↑ | 1 | | | | | |
| Daman & Diu | 2 | 1 | 1 | 1 | | | | | 1 |
| Goa | 2 | 2 | 2 | | | | | | |
| Chandigarh | 1 | 1 | 1 | | | | | | |
| Chhattisgarh | 1 | 1 | 1 | | | | | | |
| Dadar & Nagar Haveli | 1 | | | 1 | | | | | 1 |
| Delhi | 1 | | | 1 | 1 | | | | |
| **Total** | **444** | **300** | **327 ↑** | **140** | **101** | **4** | **14 ↑** | | **2** |

*Note:* Upward arrow denotes increase in the number of districts.
*Source:* Based on Figure 6.

Turning on to NIC 2-digit of manufacturing, the interesting feature that stands out is that in 1990 there were many districts that were not manufacturing particular items, the number of which

reduced considerably by 2013 (Tables 7 and 8). This is observed with respect to motor vehicles, computers, pharmaceuticals, coke and refined petroleum, and wearing apparel. In the case of wearing apparel, the number has gone down to three from 90 and in coke & refined petroleum to 33 from 194. There are also goods for which the scenario remains the same as in case of machinery & equipment, and tobacco. There were around 70 districts in the former which were not manufacturing; the scenario is the same in 2013. Another observation from Tables 7 and 8 (column – not manufacturing), is that in the 1990 as well in 2013, food product is the good that is manufactured in each district; the same is true for wood, furniture, textiles, and fabricated metal, in general. These are low technology items; so, their universal manufacturing is imminent. The observation is same whether we take manufacturing units or workers.

As in aggregate manufacturing, at NIC 2-digit level also, majority of the districts across manufacturing groups have low level of specialisation (Tables 7 and 8). This is with respect to both units and workers. Food products is the only exception where specialisation is equally distributed between low and moderate levels (40% districts in each).

Between 1990 and 2013, there is clear upward movement in the case of wearing apparel, and coke & refined petroleum. Both the manufacturing types have seen a spike in the number of districts in moderate level of specialisation.

There is an increase in number of districts in high to very high level of specialisation in many of the manufacturing groups, but the total number of these districts is low. The high to very high specialisation is attained in over 15% of the districts, roughly reaching up to 20% in items such as food products, wood 7 wood products, furniture, and other non-metallic minerals. In all others it is below 10%, in general.

Where are these specialised districts located? The location of specialised districts with each type of manufacturing is given in the location quotient maps attached in the Appendix (Figures A3 to A26). Although across all manufacturing groups, districts with high to very high specialisation can be seen scattered across the country, some specific areas of high to very high specialisation with some reordering can also be seen. The kind of input used seems to be an important factor, especially in items which are natural resource based. In case of food products, for example, the ganga belt appears as an area of higher order specialisation; the northeastern part of Maharashtra that comprises districts such as Akola, Jalna, Parbhani, Buldhana, and Beed also emerged in 2013. The same is the case with other agro based manufacturing such as beverages, tobacco, or livestock based as leather, or forest based wood and its products, or furniture making, or extraction based basic metal and non-metallic minerals, or coke & refined petroleum.

Market factor also seems to be important as the Delhi NCR region, the highly populated region in the country, features in manufacturing types such as paper, pharma, rubber & plastic, computer, electrical, and motor vehicles. As per World Urbanisation Prospects, NCT Delhi and contiguous cities and towns in the neighbourhood accommodates 29 million inhabitants, second only to Tokyo (UN, 2019).

**Table 7: District-wise Location Quotient by 2-digit of Manufacturing Units EC-3 (1990) & EC-6 (2013)**

| *Code* | *Description* | *Not Manufacturing* | | *Location Quotient* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *Very Low to Low (< 1)* | | *Moderately High (1 - 2)* | | *High (2-3)* | | *Very High (>= 3)* | |
| | | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* |
| 10 | Food Products | 0 | 0 | 149 | 146 | 217 | 219 | 63 | 66 | 15 | 13 |
| 11 | Beverages | 35 | 22 | 361 | 362 | 19 | 24 | 11 | 13 | 18 | 23 |
| 12 | Tobacco Products | 70 | 71 | 328 | 336 | 27 | 14 | 4 | 5 | 15 | 18 |
| 13 | Textiles | 0 | 3 | 341 | 332 | 66 | 59 | 29 | 26 | 8 | 24 |
| 14 | Wearing Apparel | 90 | 3 | 320 | 198 | 8 | *224* | 10 | 18 | 16 | 1 |
| 15 | Leather and Related Products | 31 | 16 | 271 | 313 | 72 | 73 | 30 | 26 | 40 | 16 |
| 16 | Wood & Wood, Cork Products, except Furniture | 1 | 0 | 254 | 238 | 145 | 137 | 42 | 45 | 2 | 24 |
| 17 | Paper and Paper Products | 58 | 42 | 289 | 323 | 59 | 50 | 18 | 14 | 20 | 15 |
| 18 | Printing and Reproduction of Recorded Media | 12 | 9 | 300 | 278 | 90 | 118 | 22 | 27 | 20 | 12 |
| 19 | Coke and Refined Petroleum Products | 194 | 33 | 191 | 268 | 30 | *101* | 8 | 27 | 21 | 15 |
| 20 | Chemicals and Chemical Products | 32 | 31 | 342 | 322 | 40 | 52 | 16 | 19 | 14 | 20 |
| 21 | Pharmaceuticals, Medicinal Chemical, and Botanical Products | 107 | 55 | 231 | 312 | 45 | 35 | 18 | 12 | 43 | 30 |
| 22 | Rubber & Plastic Products | 42 | 27 | 302 | 315 | 55 | 59 | 16 | 17 | 29 | 26 |
| 23 | Other Non-metallic Mineral Products | 19 | 17 | 199 | 232 | 161 | 135 | 58 | 37 | 7 | 23 |
| 24 | Basic Metals | 43 | 20 | 288 | 288 | 47 | 63 | 24 | 23 | 42 | 50 |
| 25 | Fabricated Metal Products, except Machinery and Equipment | 3 | 1 | 218 | 237 | 181 | 161 | 29 | 39 | 13 | 6 |
| 26 | Computer, Electronic and Optical Products | 114 | 41 | 279 | 306 | 25 | 39 | 7 | 17 | 19 | 41 |
| 27 | Electrical Equipment | 50 | 27 | 280 | 271 | 56 | 76 | 31 | 34 | 27 | 36 |
| 28 | Machinery and Equipment n.e.c | 69 | 70 | 298 | 282 | 32 | 36 | 14 | 25 | 31 | 31 |
| 29 | Motor Vehicles, Trailers, and Semi-trailers | 147 | 50 | 208 | 293 | 42 | 53 | 21 | 15 | 26 | 33 |
| 30 | Other Transport Equipment | 94 | 75 | 273 | 283 | 44 | 43 | 16 | 17 | 17 | 26 |
| 31 | Furniture | 4 | 4 | 243 | 196 | 118 | 161 | 34 | 59 | 45 | 24 |
| 32 | Other Manufacturing | 9 | 4 | 278 | 244 | 126 | 150 | 18 | 34 | 13 | 12 |
| 33 | Repair and Installation of Machinery and Equipment | 17 | 8 | 257 | 263 | 93 | 81 | 33 | 51 | 44 | 41 |

*Note:* Total Number of Districts in each census are 444 to be counted manufacturing group wise.

**Table 8: District-wise Location Quotient by 2-digit of Manufacturing Workers EC-3 (1990) & EC-6 (2013)**

| *Code* | *Description* | *Not Manufacturing* | | *Location Quotient* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *Very Low to Low (< 1)* | | *Moderately High (1 - 2)* | | *High (2 - 3)* | | *Very High (>= 3)* | |
| | | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* | *EC-3* | *EC-6* |
| 10 | Food Products | 0 | 0 | 172 | 149 | 172 | 197 | 65 | 68 | 35 | 30 |
| 11 | Beverages | 35 | 22 | 327 | 319 | 45 | 50 | 12 | 18 | 25 | 35 |
| 12 | Tobacco Products | 70 | 71 | 317 | 324 | 20 | 20 | 10 | 5 | 27 | 24 |
| 13 | Textiles | 0 | 3 | 327 | 328 | 87 | 71 | 22 | 21 | 8 | 21 |
| 14 | Wearing Apparel | 90 | 3 | 332 | 221 | 11 | 197 | 3 | 22 | 8 | 1 |
| 15 | Leather and Related Products | 31 | 16 | 301 | 345 | 60 | 57 | 25 | 14 | 27 | 12 |
| 16 | Wood & Wood, Cork Products, except Furniture | 1 | 0 | 190 | 208 | 132 | 137 | 63 | 51 | 58 | 48 |
| 17 | Paper and Paper Products | 58 | 42 | 292 | 315 | 54 | 53 | 16 | 13 | 24 | 21 |
| 18 | Printing and Reproduction of Recorded Media | 12 | 9 | 354 | 321 | 45 | 84 | 20 | 23 | 13 | 7 |
| 19 | Coke and Refined Petroleum Products | 194 | 33 | 209 | 317 | 18 | 53 | 7 | 21 | 16 | 20 |
| 20 | Chemicals and Chemical Products | 32 | 31 | 335 | 325 | 48 | 52 | 14 | 19 | 15 | 17 |
| 21 | Pharmaceuticals, Medicinal Chemical, and Botanical Products | 107 | 55 | 254 | 307 | 39 | 35 | 19 | 12 | 25 | 35 |
| 22 | Rubber & Plastic Products | 42 | 27 | 320 | 342 | 44 | 47 | 15 | 14 | 23 | 14 |
| 23 | Other Non-metallic Mineral Products | 19 | 17 | 180 | 233 | 151 | 122 | 70 | 36 | 24 | 36 |
| 24 | Basic Metals | 43 | 20 | 318 | 302 | 38 | 57 | 19 | 31 | 26 | 34 |
| 25 | Fabricated Metal Products, except Machinery and Equipment | 3 | 1 | 275 | 306 | 131 | 109 | 23 | 19 | 12 | 9 |
| 26 | Computer, Electronic and Optical Products | 114 | 41 | 280 | 329 | 23 | 39 | 6 | 12 | 21 | 23 |
| 27 | Electrical Equipment | 50 | 27 | 329 | 319 | 31 | 55 | 15 | 19 | 19 | 24 |
| 28 | Machinery and Equipment n.e.c | 69 | 70 | 310 | 310 | 28 | 24 | 11 | 16 | 26 | 24 |
| 29 | Motor Vehicles, Trailers, and Semi-trailers | 147 | 50 | 266 | 341 | 10 | 24 | 8 | 11 | 13 | 18 |
| 30 | Other Transport Equipment | 94 | 75 | 308 | 337 | 18 | 12 | 7 | 3 | 17 | 17 |
| 31 | Furniture | 4 | 4 | 215 | 186 | 121 | 149 | 47 | 65 | 57 | 40 |
| 32 | Other Manufacturing | 9 | 4 | 371 | 274 | 40 | 120 | 13 | 27 | 11 | 19 |
| 33 | Repair and Installation of Machinery and Equipment | 17 | 8 | 242 | 267 | 102 | 89 | 38 | 41 | 45 | 39 |

*Note:* Total Number of Districts in each census are 444 to be counted manufacturing group wise.

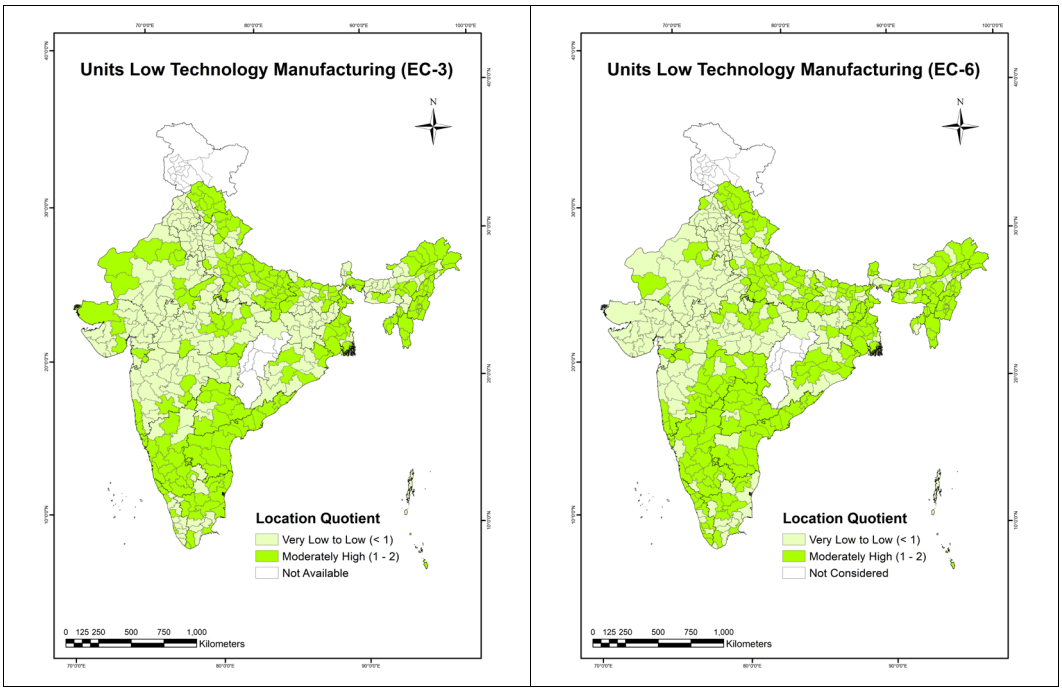
In NIC 2-digits (Appendix Figures A3 to A26) Punjab also appears important with respect to paper, printing, rubber & plastic, electricals, machinery & equipment, motor vehicles, and also repair and installation of industrial machinery. Traditional factors are also important as in the case of Maharashtra, which features in almost all the manufacturing types. Similarly, textile manufacturing is dominant in Tamil Nadu and Andhra Pradesh, which though declined by 2013. Apparel manufacturing has been taken up by many districts that reduced specialisation as seen in 1990 in Gujarat. Gujarat features with respect to all manufacturing groups.

What is the position of states when manufacturing is aggregated by technology type? Can the difference in states manufacturing be ascertained in terms of technology? At the level of technology type, in low technology, none of the districts figure in high to very high level of specialisation (Figures 7 and 8). Between EC-3 and EC-6, there appears upgradation of some districts from low technology to moderate level of specialisation, seen clearly in Maharashtra. The figures translated into numbers confirm this change (Tables 9 and 10). However, the upgradation in number is more in the case of workers. Southern region and northern belt from Himachal to Northeastern states depict concentration of districts with moderate level of specialisation.

With respect to medium-low, the western part of the country shows concentration of districts ranging from moderately high to very high specialisation (Figures 9 and 10). Though between 1990 and 2013, the number of districts in moderate high to high specialisation has declined.

In high-medium technology, the moderately high to very high specialisations are noticed in north western and western parts of the country in 1990 (Figure 11 and 12). Specifically, Punjab, Delhi NCR, parts of Gujarat, and Maharashtra. By 2013, dispersed distribution is noticed with respect to units, for workers the pattern remains roughly the same as in 1990. In terms of number, there is upgradation of districts in moderate and high level of specialisation with respect to units, which is not there with respect to workers.

**Figure 7: Location Quotient – Units Low Technology EC-3 (1990) & EC-6 (2013)**




*Source:* Constructing using computation based on EC-3 & EC-6 database. Same for Figure 7 to 12.

**Figure 8: Location Quotient – Workers Low Technology EC-3 (1990) & EC-6 (2013)**

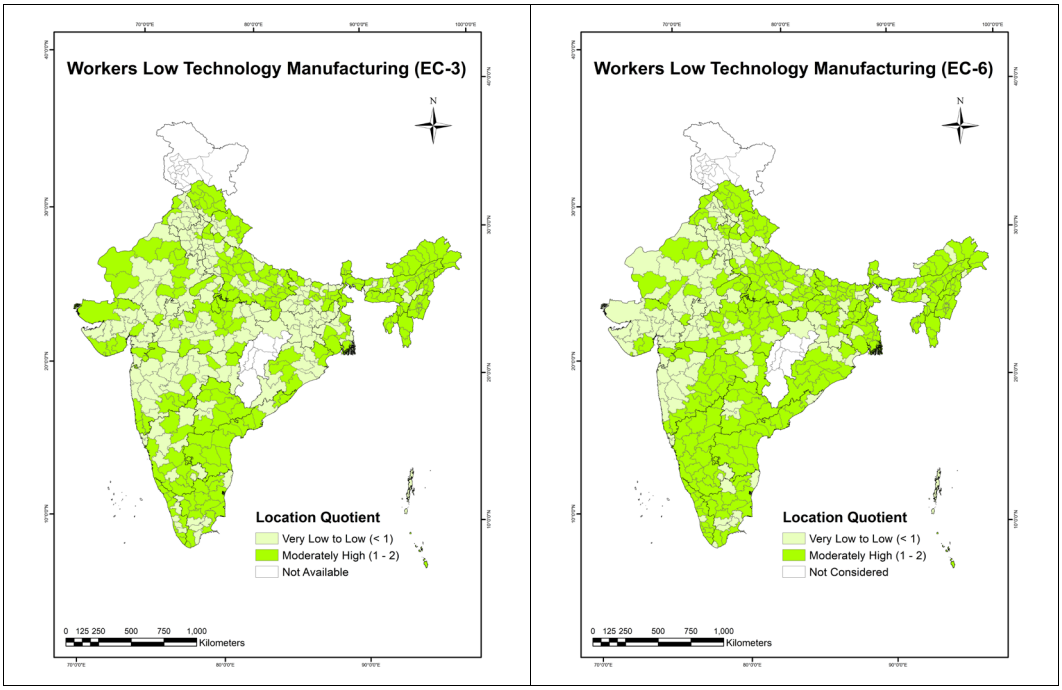


**Figure 9: Location Quotient – Units Medium Low Technology EC-3 (1990) & EC-6 (2013)**

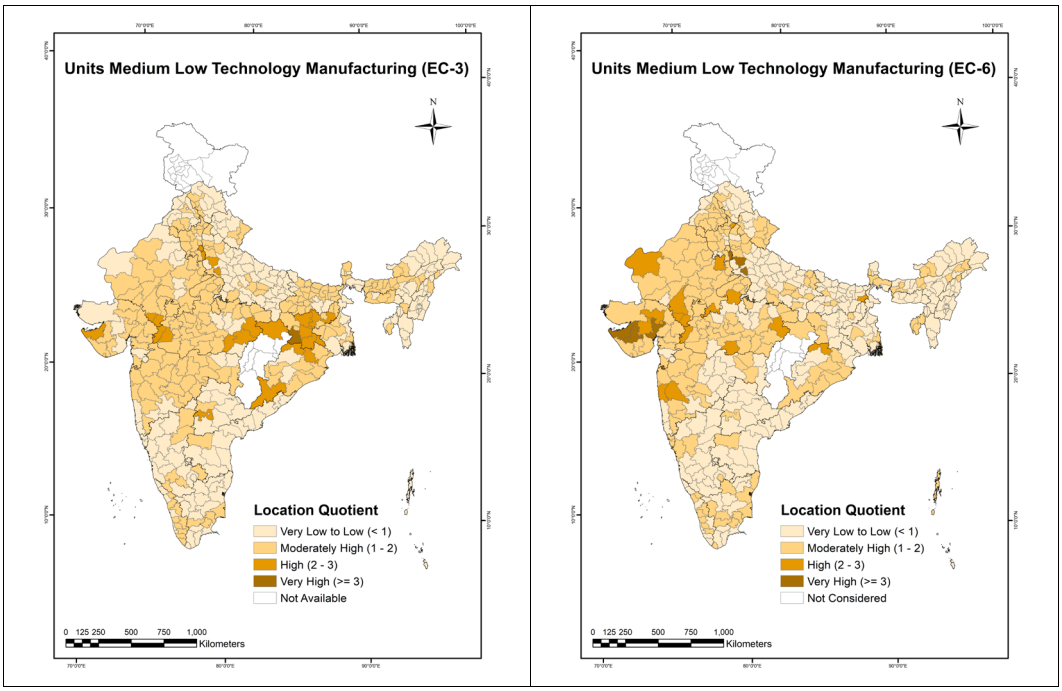



**Figure 10: Location Quotient – Workers Medium Low Technology EC-3 (1990) & EC-6 (2013)**

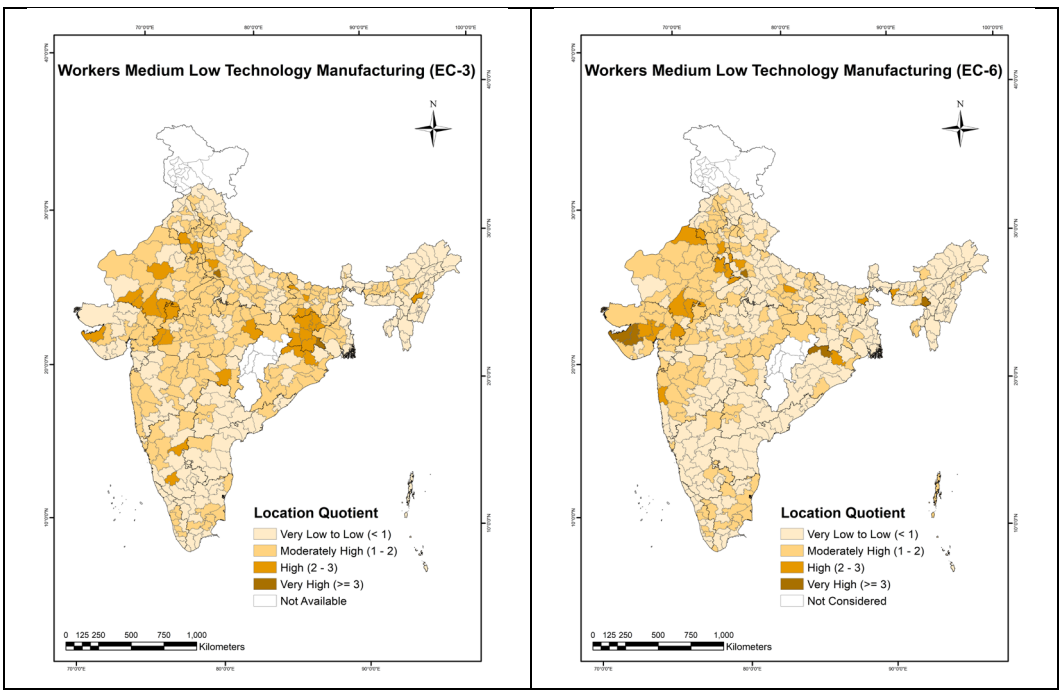


**Figure 11: Location Quotient – Units High Medium Technology EC-3 (1990) & EC-6 (2013)**

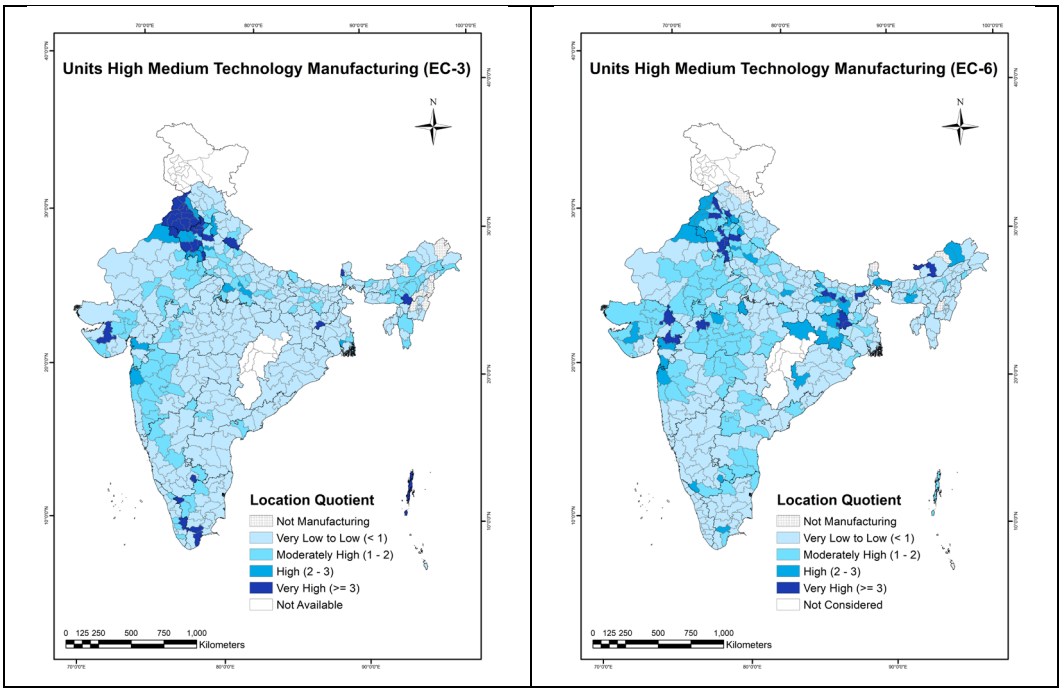



**Figure 12: Location Quotient – Workers High Medium Technology EC-3 (1990) & EC-6 (2013)**

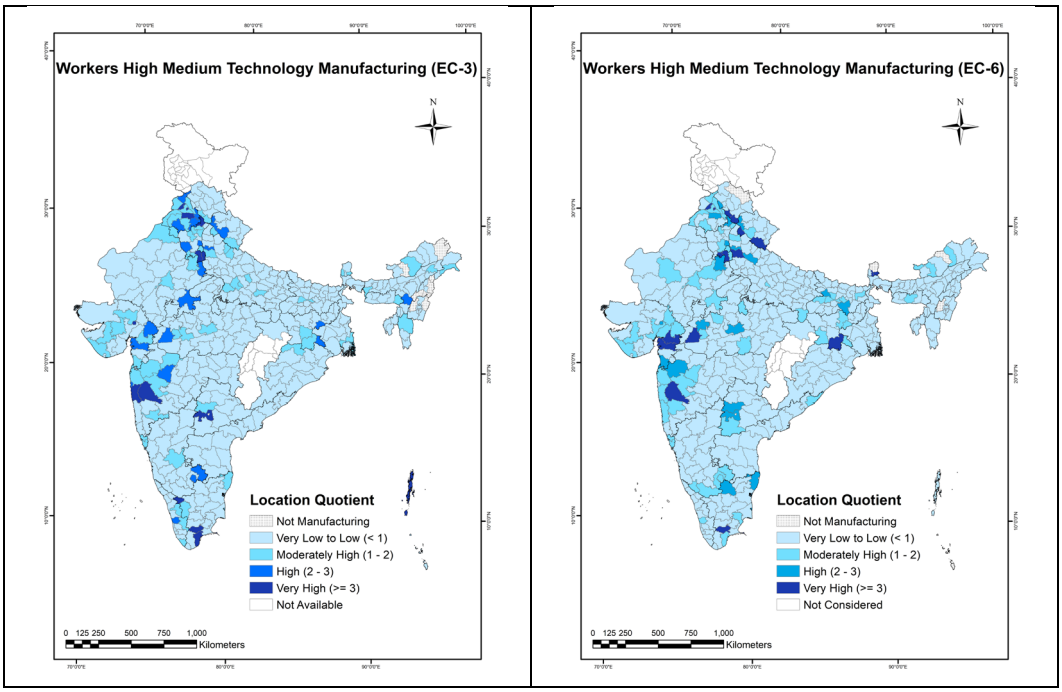


**Table 9: District-wise Location Quotient by Technology Type of Manufacturing Units EC-3 (1990) & EC-6 (2013)**

| *Type* | *EC* | *Not Manufacturing* | *Location Quotient* | | | | *Total Districts* |
|---|---|---|---|---|---|---|---|
| | | | *Very Low to Low (< 1)* | *Moderately High (1 - 2)* | *High (2 - 3)* | *Very High (>= 3)* | |
| LT | Third | 0 | 233 | 211 | 0 | 0 | 444 |
| | Sixth | 0 | 204 | 240 | 0 | 0 | 444 |
| | **% Change** | **-** | **-12.45** | **13.74** | **-** | **-** | **-** |
| MLT | Third | 0 | 203 | 215 | 25 | 1 | 444 |
| | Sixth | 0 | 236 | 182 | 18 | 8 | 444 |
| | **% Change** | **-** | **16.26** | **-15.35** | **-28.00** | **700** | **-** |
| HMT | Third | 8 | 291 | 89 | 24 | 32 | 444 |
| | Sixth | 5 | 259 | 120 | 38 | 22 | 444 |
| | **% Change** | **-37.5** | **-11.00** | **34.83** | **58.33** | **-31.25** | **-** |

*Source:* Based on Figure 7, 9 & 11

**Table 10: District-wise Location Quotient by Technology Type of Manufacturing Workers EC-3 (1990) & EC-6 (2013)**

| *Type* | *EC* | *Not Manufacturing* | *Location Quotient* | | | | *Total Districts* |
|---|---|---|---|---|---|---|---|
| | | | *Very Low to Low (< 1)* | *Moderately High (1 - 2)* | *High (2 - 3)* | *Very High (>= 3)* | |
| LT | Third | 0 | 201 | 243 | 0 | 0 | 444 |
| | Sixth | 0 | 145 | 299 | 0 | 0 | 444 |
| | **% Change** | **-** | **-27.86** | **23.05** | **-** | **-** | **-** |
| MLT | Third | 0 | 214 | 197 | 31 | 2 | 444 |
| | Sixth | 0 | 275 | 144 | 20 | 5 | 444 |
| | **% Change** | - | **28.50** | **-26.90** | **-35.48** | **150.00** | **-** |
| HMT | Third | 8 | 329 | 70 | 23 | 14 | 444 |
| | Sixth | 5 | 339 | 62 | 22 | 16 | 444 |
| | **% Change** | **-37.50** | **3.04** | **-11.43** | **-4.35** | **14.29** | **-** |

*Source:* Based on Figure 8, 10 & 12

## 5. Districts as Manufacturing Clusters

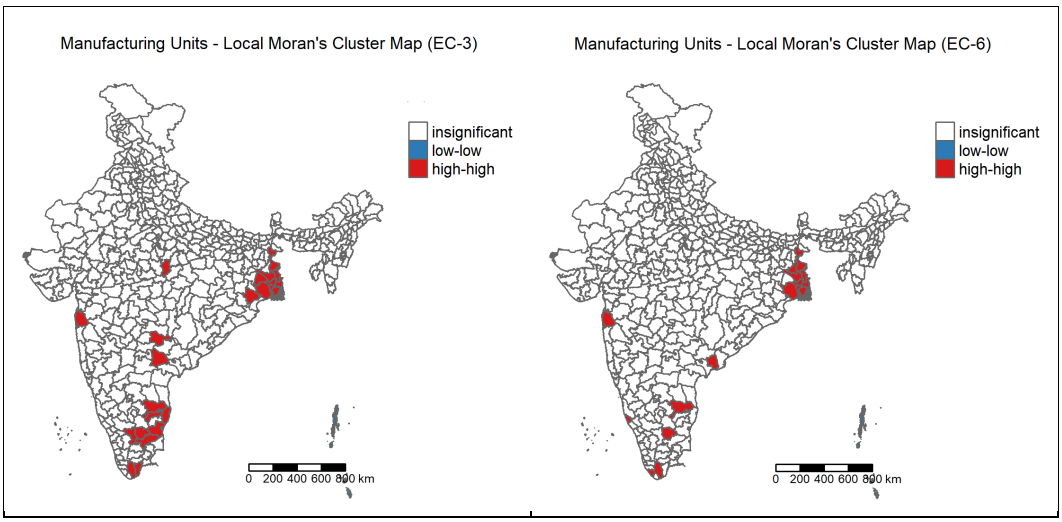
From the preceding analysis, the question that arises is whether change in concentration or the number of districts in different levels of specialisation is due to the emergence of any new pattern of clusters. The location quotient maps do indicate some clustering but as LQ is based on value of individual district, the value of a district is detached from its surrounding districts. Local Moran's I which captures spatial auto correlation or spatial dependence has therefore been used. Local Moran's I is computed based on contiguity matrix with surrounding district given value of 1 if contiguous and 0 otherwise.[10] The results for aggregate manufacturing are

[10] Local Moran's I based on distance matrix was also computed but as both based on contiguity and distance are yielding similar clusters the contiguity based clusters are shown.

given in Figures 13 and 14. It is important to note that as district is the unit of analysis, the clusters within the districts would not come up as clusters. Only when level of measurement is reduced to below district one may see clusters as existing within a district. With district as a unit of analysis, the small, micro, handloom and handicraft clusters which are localised in a district may not show up in all India analysis. It is also possible that as 1990 districts formed the basis of current analysis some reordering in clusters that may have happened due to formation of new districts would not show up in the cluster maps in the paper.

From the figures it is clear that there are few clusters in the country whether one takes manufacturing units or workers. The position of the clusters roughly remains the same, i.e., in West Bengal, near Greater Mumbai (Thane and Pune basically), Tamil Nadu (in general districts like Coimbatore[11], Salem, Chengalpattu MGR/Kancheepuram[12] (Tirunelveli), Andhra Pradesh (Chittoor important) and Delhi NCR.[13] Delhi NCR shows clustering with respect to workers, which has intensified between 1990 and 2013 (Figure 14). The change is noticed in southern cluster with respect to units (Figure 13). Few of the districts such as Karimnagar, and Nalgonda (in now Telangana) do not appear in units cluster in 2013. Same is the case with Tamil Nadu wherein districts like North Arcot, South Arcot, Dharamapuri, Periyar (Erode) among others do not appear. As far as addition in unit clusters is concerned it is West Godavari in Andhra Pradesh and Kasargod and Thiruvanathapuram in Kerala.

**Figure 13: Clustering – Manufacturing Units EC-3 (1990) & EC-6 (2013)**

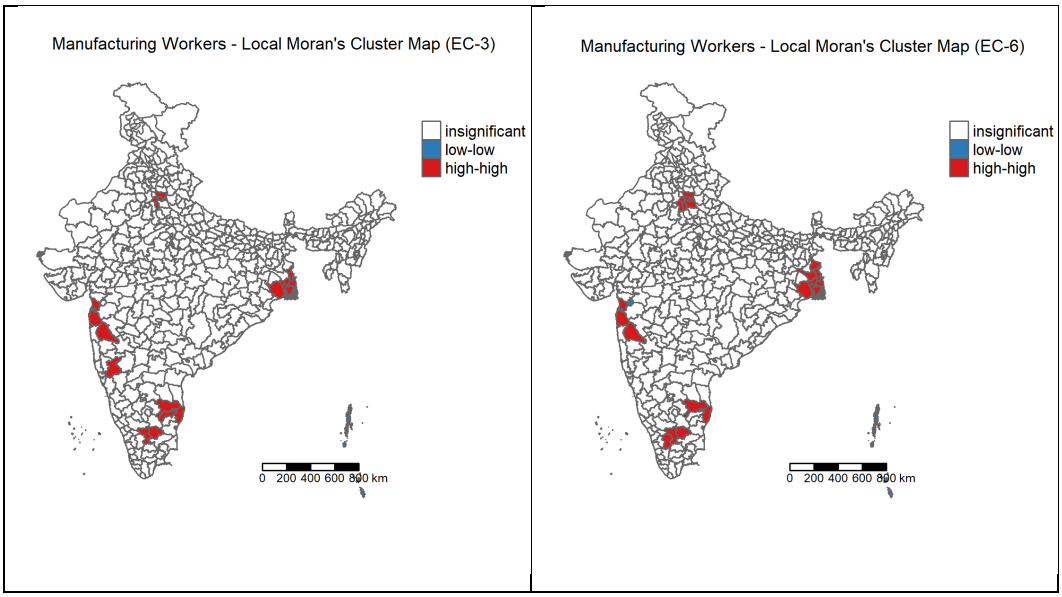



[11] In present district set up we may also consider Tiruppur. The district was carved out from Erode and Coimbatore in 2009.

[12] In present districts we may also consider Tiruvallur as it was carved out from Chengalpattu MGR/ Kancheepuram in 1997. After carving out of Tiruvallur District from Chengalpattu MGR, the district was renamed as Kancheepuram.

[13] The districts mentioned are those that exist in Census 1991 as census map 1991 is used as base to compare EC-3 and EC-6. Refer to the section on methodology.

**Figure 14: Clustering – Manufacturing Workers EC-3 (1990) & EC-6 (2013)**




*Source:* Constructed on R using EC-3 & EC-6 Database

The aggregate picture of manufacturing clusters with some variation is noticed with respect to NIC 2-digits as well. West Bengal, and the region around greater Mumbai (Thane and Pune districts) appear generally in each of the manufacturing type (See Appendix Figure A27 to A50). Gujarat seems to be important for pharmaceuticals, chemicals, basic metal, fabricated metal, and other manufacturing that comprises jewellery, musical instruments, sports goods, and medical and dental instruments among others. The region around Delhi NCR is an important cluster for furniture making, rubber & plastic, and engineering items, particularly computer, and electricals which has expanded by 2013 as well as in machinery & equipment, and motor vehicles.

Telangana appears as an important cluster with respect to pharmaceuticals and related items (workers). The important point to be noted here is that the pharma city, that is going to be the world's largest integrated pharma hub of 19000 acre size, is being planned in Ranga Reddy district as the state already has an advantage (Invest Telangana website). Telangana is the pharma manufacturing hub in the country and as per information, in the pharmaceutical sector, Telangana contributes nearly 1/3 to production and 1/5 to exports; Some other observations that can be noted are: 1) There is only one cluster in case of Beverages, comprising districts of Telangana and Andhra Pradesh, that expanded in 2013; 2) In textiles, the clusters in Tamil Nadu and Andhra Pradesh appears to have weakened as some of the districts that were part of the cluster in 1990 do not figure in, in 2013. The cluster around Varanasi has disappeared in 2013; 3) In wearing apparel, many clusters have appeared in Kerala, Tamil Nadu, Andhra Pradesh, Telangana and Delhi NCR. More so with respect to units; 4) In leather, the cluster of manufacturing units in Rajasthan and near Delhi disappeared in 2013; 5) Manufacturing of

wood & its products had a strong clustering in the belt from Andhra Pradesh to West Bengal and Maharashtra. However, it has weakened over time.

Is there any relation in the location and the technology type of cluster? While West Bengal and the area around Greater Mumbai figures in all the clusters, some changes are also noticed. In the case of low technology, West Bengal is an important cluster (Figures 15 and 16). Between 1990 and 2013, clustering seems to be weakened in previously existing clusters of Andhra Pradesh, Telangana, and Tamil Nadu as some of the districts that were there in 1990 do not appear in cluster in 2013. Delhi NCR cluster on the other side expanded with respect to workers.

In medium low technology, Gujarat (Jamnagar, Rajkot, Bhavnagar, and Ahmadabad districts) appears in 2013 (Figures 17 and 18). Delhi NCR is another important cluster in this technology type. West Bengal and adjoining Odisha on the other side has seen a decline in the number of districts that were part of cluster in 1990

In high-medium technology there is increased clustering in West Bengal, Greater Mumbai, and Delhi NCR with respect to units (Figure 19). Interestingly, the cluster of units in Punjab has weakened by 2013 as districts of Faridkot, Patiala and Sangrur do not emerge in cluster in 2013. In southern states on the other hand, Chittoor district of Andhra Pradesh cluster together with Chengalpattu MGR/Kancheepuram of Tamil Nadu. In the case of workers, other than the area around Greater Mumbai and Delhi NCR which saw an expansion, Gujarat (Vadodara, Bharuch, Valsad), and Bangalore (Karnataka) appear as clusters (Figure 20). The cluster in West Bengal (Howrah and North 24 Parganas) on the other side has disappeared. The deep south cluster of Tamil Nadu that in general comprised of Chidambaranar (Thoothukudi), Kamarajar (Virudhunagar), and Tirunelveli existing with respect to both units and workers disappeared by 2013.

**Figure 15: Clustering – Units Low Technology EC-3 (1990) & EC-6 (2013)**

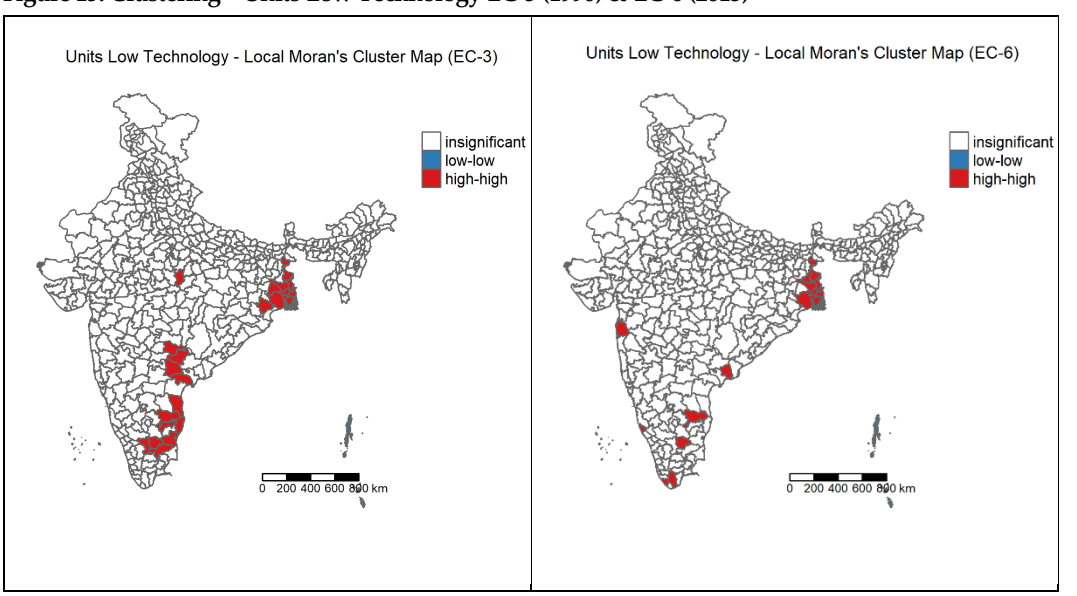
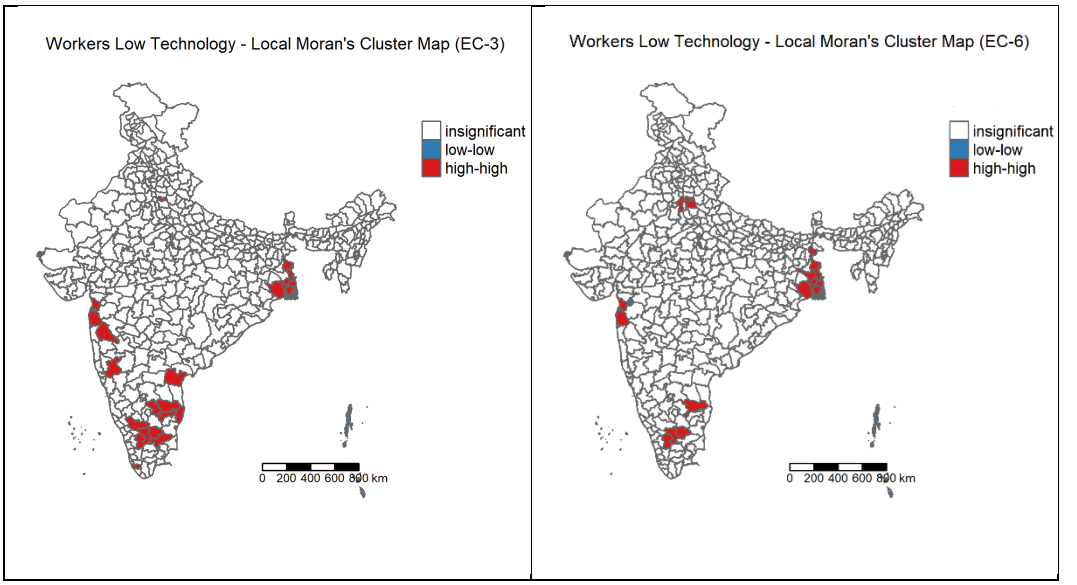
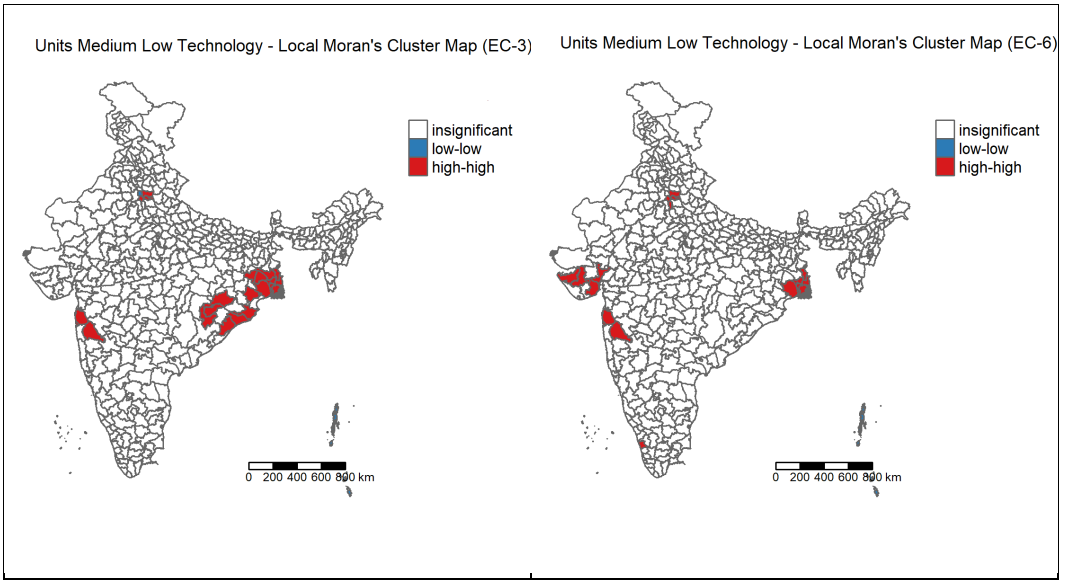


**Figure 16: Clustering – Workers Low Technology EC-3 (1990) & EC-6 (2013)**



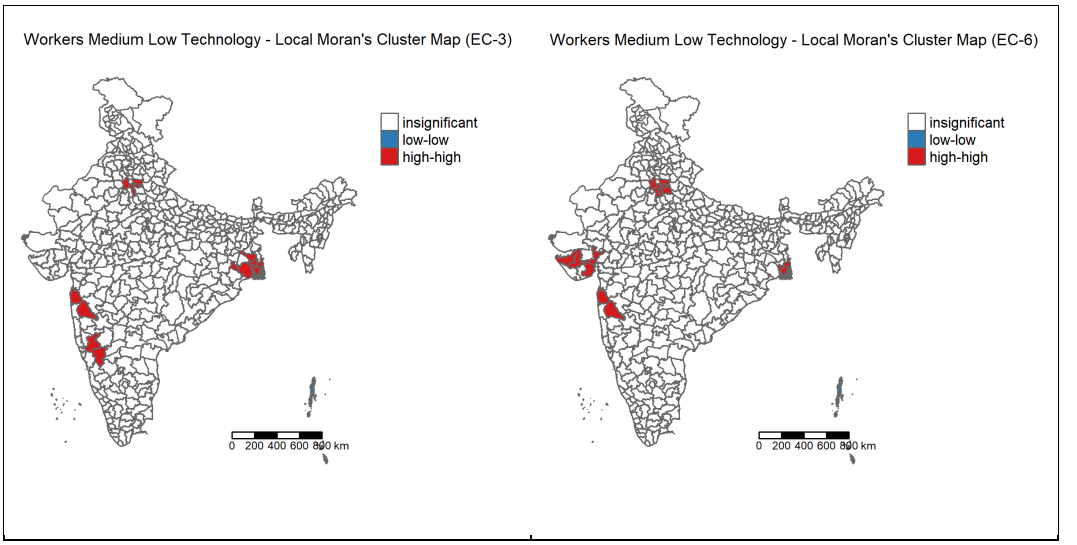

*Source:* Constructed on R using EC-3 & EC-6 Database

**Figure 17: Clustering – Units Medium Low Technology EC-3 (1990) & EC-6 (2013)**



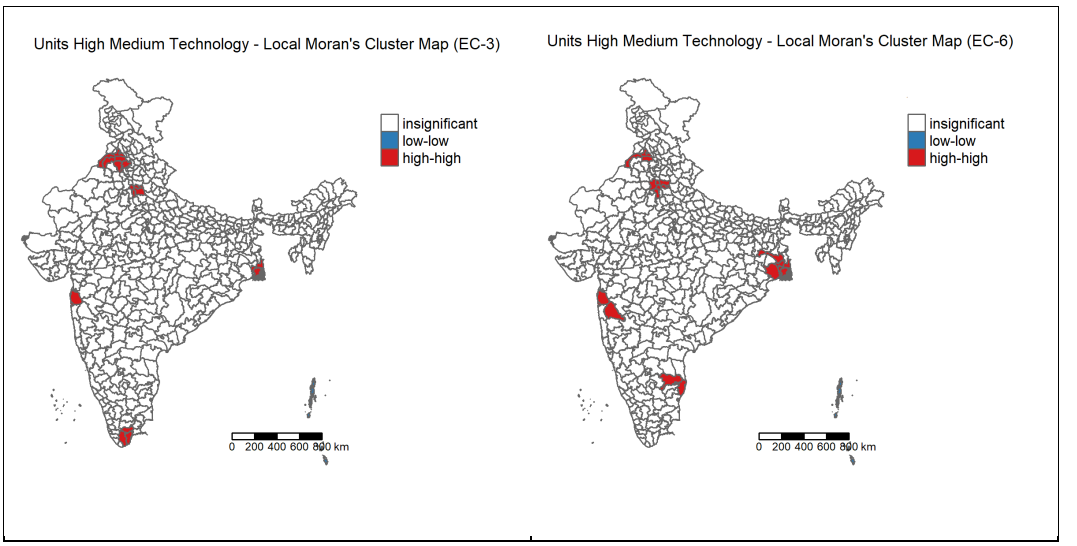

*Source:* Constructed on R using EC-3 & EC-6 Database

**Figure 18: Clustering – Workers Medium Low Technology EC-3 (1990) & EC-6 (2013)**



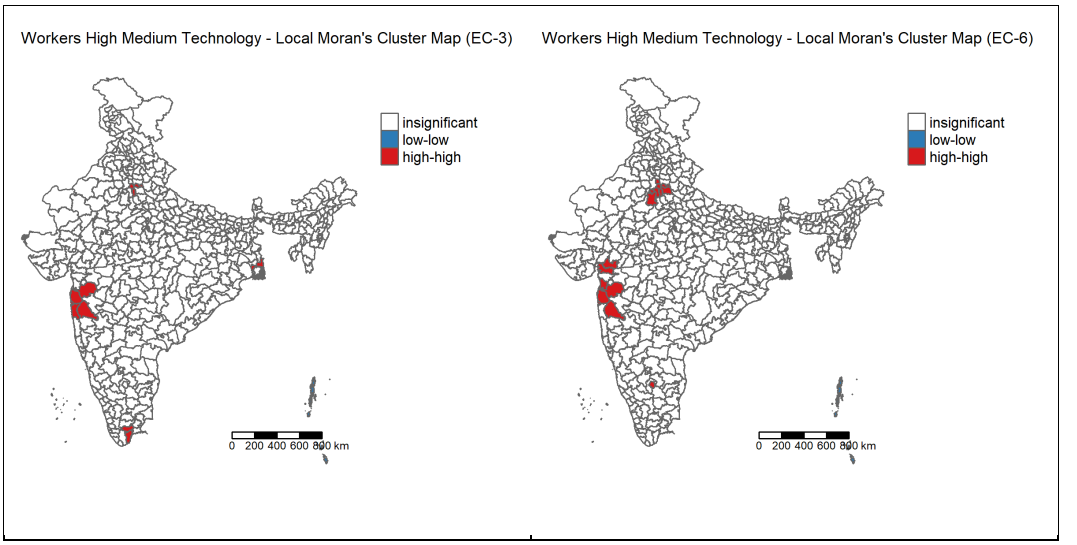

*Source:* Constructed on R using EC-3 & EC-6 Database

**Figure 19: Clustering – Units High Medium Technology EC-3 (1990) & EC-6 (2013)**




*Source:* Constructed on R using EC-3 & EC-6 Database

**Figure 20: Clustering – Workers High Medium Technology EC-3 (1990) & EC-6 (2013)**




*Source:* Constructed on R using EC-3 & EC-6 Database

## 6. Summing Up

Districts are at the heart of efficient and effective regional planning. The focus of planning at district level has always been on reducing poverty, and raising income and employment opportunities. The concomitant impact on accentuation of social inequalities was considered co-terminus. The question is, can manufacturing be a vehicle to bring socioeconomic changes? The recent focus of the government on promoting *One District One Product* through identifying manufactured/export good may give promotion to manufacturing activities in the district. Balanced regional development across all districts is what is envisioned through the scheme. Some of the states are also actively associating. Only time will tell the kind of regional development ensured through the scheme. The period post-independence was of focus on regional development but nothing much has been gained (GOI 1980; GOI 1981; Sekhar 1983). As one sees now, States are largely required for bringing regional development across their districts. With the devolution of 42% funds to states and end of block grant[14] with the dissolution of planning commission states efforts are important to tackle inter and intra state disparities.

The paper tries to elucidate where each state stands with respect to manufacturing units and employment at the level of its districts. Also, how much spatial reorganisation has happened within the states between 1990 and 2013. At all India level, one sees a decline in the growth of manufacturing workers in 118 districts of the total 444. The decline is relatively large in districts of Jharkhand, Madhya Pradesh, Karnataka, and Arunachal

[14] Normal Central Assistance (NCA), Additional Central Assistance (ACA), One Time Additional Central Assistance, Special Central Assistance and Special Plan Assistance

Pradesh. With respect to units, the decline is limited to 44 districts, mainly in Jharkhand and Madhya Pradesh.

The state of Jharkhand shows higher and increasing intra-state concentration for both units and workers. The other that show higher concentration are districts of Gujarat, Tamil Nadu, Madhya Pradesh, and Arunachal Pradesh. Uttarakhand, Himachal Pradesh, Haryana, and Nagaland also show higher concentration with respect to workers. With the exception of Arunachal Pradesh and Madhya Pradesh (slight decline), all others show an increasing concentration between 1990 and 2013. Taking other states also into consideration, majority show increasing concentration over time.

The robustness check of Gini using $\beta$ and $\sigma$ tests substantiate the divergence in the states of Gujarat, Tamil Nadu, Jharkhand, Uttarakhand, and Himachal Pradesh. Some other states also show divergence in these tests such as Rajasthan, Odisha, Karnataka, Punjab, and Haryana among others.

The district wise concentration is more explicit when one considers the type of manufacturing carried out. Simply for the reason that not all activities can be carried out in all the districts, some districts are better placed than others with respect to particular manufacturing types. In both 1990 and 2013, in chemicals, pharmaceuticals, and engineering goods such as computer, machinery and equipment, motor vehicles, and other transport equipment there is higher level of intra-state concentration. These are high-medium technology items. The Gini values are higher than 0.4 in majority of the states. The others in this category of are basic metals, coke & refined petroleum, paper & tobacco products. While the former two belong to medium-low technology, the last two belong to low technology. In the case of wearing apparel, a low technology manufacturing, there was high level of intra-district concentration in 1990 which came down drastically in 2013 across all states.

Low technology manufacturing is found to be widespread in the country. This is the reason why intra-state concentration is below 0.1 in almost all states. In medium-low, intra-state differences are found rising to 0.3 and 0.4, which further rose above 0.4 in the case of high-medium.

When it comes to the level of specialisation attained, majority of the districts have very low to low level of specialisation in aggregate manufacturing. Of the 444 districts, around 300 report lower level of specialisation and around 130 moderately high.

A notable feature at NIC 2-digit level is the fact that many districts that were not manufacturing a particular manufacturing item in 1990, joined the manufacturing activity by 2013. The observation is with respect to motor vehicles, computers, pharmaceuticals, coke & refined petroleum, and wearing apparel. In case of wearing apparel, the number has gone down to three from 90, and in coke & refined petroleum to 33 from 194. Moreover, districts are graduating towards higher level of specialisation, but the overall number of the districts is low. At NIC 2-digit level, the level of specialisation attained shows the

impact of inputs used; for example, in case of natural resource based items such as food products, beverages, tobacco, wood and furniture, coke, and metals, the areas of these resources shows higher level of specialisation. The impact of the market is also seen as in the case of Delhi NCR. Traditionally important state of Maharashtra features with respect to each of the manufacturing group. Gujarat also appears in almost all the manufacturing types.

Specialisation by technology shows that none of the districts figure in high to very high level of specialisation in low technology. However, there is upgradation of some districts from low to moderate level of specialisation between 1990 and 2013. Southern states and northern belt from Himachal to north-eastern states depict concentration of districts with moderate level of specialisation. With respect to medium-low, the western part of the country shows concentration of districts ranging from moderately high to very high specialisation. Though between 1990 and 2013, the number of districts in moderate high and high specialisation has declined. In high-medium technology, in general the moderate high and higher order specialisations are noticed in north-western and western parts of the country. The number of districts in these specialisations have also increased with respect to units.

The question arises whether or not the change in concentration levels or number of districts in different levels of specialisation be associated with changing pattern of clustering. From all India district level analysis, one finds clusters that have traditionally been there (established clusters) and that too few in number. This is true whether one takes manufacturing units or workers. The clusters are established clusters in the sense that their position roughly remains the same, i.e., in West Bengal, near Greater Mumbai (Thane and Pune basically), Tamil Nadu (districts like Coimbatore, Salem, Chengalpatttu MGR/Kancheepuram, and Tirunelveli), Andhra Pradesh (Chittoor important), and Delhi NCR. Delhi NCR shows clustering with respect to workers, which has intensified between 1990 and 2013. The southern cluster appears to have weakened during this time with respect to manufacturing units as some of the districts that showed up as cluster in 1990 do not figure in in 2013. The aggregate picture of manufacturing clusters with some variation is noticed with respect to NIC 2-digits as well. By technology type, West Bengal is an important cluster in low technology. Between 1990 and 2013, clustering has expanded in Delhi NCR with respect to workers. In medium low technology, Gujarat (Jamnagar, Bhavnagar, Rajkot, and Ahmedabad) appears in 2013. Delhi NCR is another important cluster in this technology type. In high-medium technology there is increased clustering in West Bengal, Greater Mumbai, Delhi NCR, and Andhra Pradesh with respect to units. In the case of workers other than in areas around Greater Mumbai and Delhi NCR which have seen an expansion, Gujarat and Bangalore (Karnataka) appear as clusters. The cluster in West Bengal (Howrah and North 24 Parganas) on the other side has disappeared.

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ISID Institute for Studies in Industrial Development
An institution of Indian Council of Social Science Research (Ministry of Education)
4 Vasant Kunj Institutional Area, New Delhi - 110070, India
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