

Planning for balanced Industrial development in Vidarbha region, Maharashtra, India

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1. Abstract

Disparity in India has been persisting since independence causing many socioeconomic problems and its removal has become the most prime objective of the planned development in India. Hence, initial segment of the paper deals with district wise level of development in Vidarbha region based on socioeconomic factors and identifies the most affecting factor responsible for imbalance in development. As a result of this segment, "Industrial Sector" has been taken as the prime factor responsible for such disparity through Regression analyses. Now, In order to achieve balanced industrial development, the later segment attempts to study district wise prospects of development in terms of investment through Location quotient analyses and also identifies district wise high potential local industrial clusters. The policy guidelines aim at cluster theory for competitive microeconomic development. The proposals mainly focus on micro-economic (firm level) development which will help the poorer districts to grow faster.

2. Introduction

Regional disparity in the level of economic development has become the vital problem for developed and developing countries. Disparity in India has been persisting since independence due to provincialism and sub provincialism causing many socioeconomic problemsⁱ and its removal has become the most prime objective of the planned development in our country. So ideally the development should enhance the human capabilities, ensure the equitable distribution of benefits of the economic growth and give an equal chance to everyone to participate in the working society. Such disparities can be observed at various levels like national, state, and regional. One of such states with the interregional and intraregional disparity is Maharashtra. It has a reputation for progress and development in economic terms and is considered as the most developed state since the time of Independence due to higher percentage of urban population. But as per the Human Development Report (HDR) published in 2010 there are widespread inequalities in the distribution of resources which have led to regional disparities, acute poverty and high level

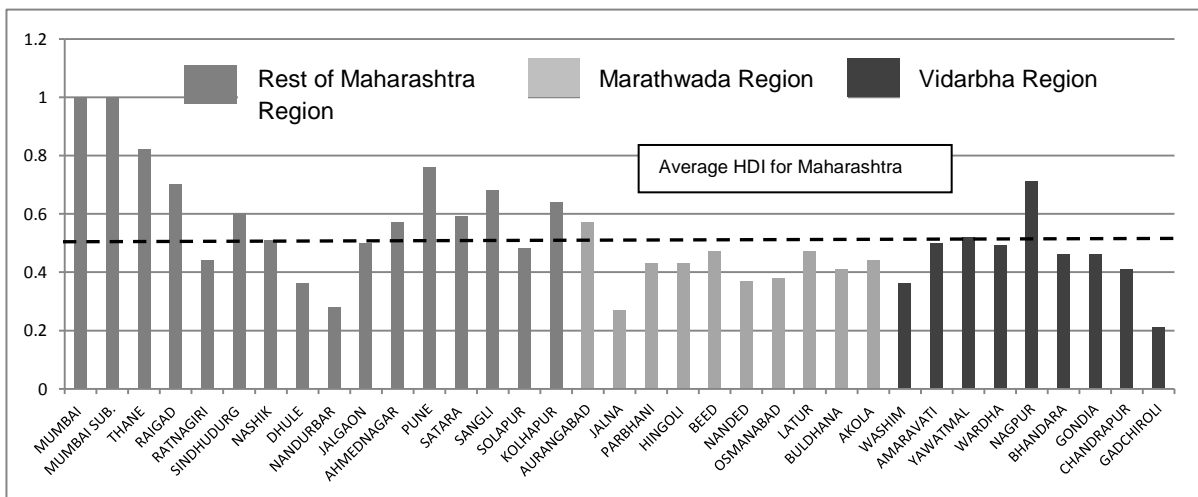


Figure.1 District wise HDI for Maharashtra state (Source- Human Development Report, 2010)

of unemployment. Maharashtra state comprises three regions namely, Marathwada, Vidarbha and Rest of Maharashtra. Vidarbha region comprises Nagpur and Amravati sub region. To work out the study at the regional level, Nagpur Sub region has been selected instead of Amravati Sub region because of the better data availability.

Vidarbha region of Maharashtra state lags behind in the overall development. HDR (2010) showed that human development index (HDI) is the lowest for Nandurbar and Gadchiroli districts (0.21) and highest for Mumbai. The average HDI for the state of Maharashtra is 0.58 (Refer Figure 1). In Maharashtra, 19 districts showed HDI less than the state average. Out of those districts most of the districts are belonged to the Vidarbha region. This region is completely neglected, unlike the Western and some of the South-Western districts, which get the Lion's share of State funding and attention. Recently Farmer's suicide has become the major concern in Vidarbha region. From 1997 to 2006, the region has witnessed 36,428 cases of suicide among cotton farmers owing to debt. It indicates that disparity within the state of Maharashtra has risen sharply. Hence Paper attempts to assess the development in Vidarbha region on the basis of socioeconomic factors and identifies the most responsible factor for the development and therefore Disparity. Aim of the paper is *firstly*, to analyse the district wise level of development on the basis of socioeconomic indicators and to identify the most affecting factor responsible for development. *Secondly*, to propose suitable development strategy based on the identified factor. Objective of the study is to induce balanced regional development which the most prime objective of the planned development in India.

3. Literature study

3.1 Location Quotient (L.Q.)

Location Quotient is basically the percentage of local economy to the reference economy. It gives the base of the economy weather it is 'Basic' or 'Non basic'. It can be calculated with the following formula.

$$\text{LOCATION QUOTIENT} = \frac{\text{LOCAL ECONOMY}}{\text{REFERENCE ECONOMY}} = \frac{\text{EMP. IN INDUSTRY 'X' IN DIST. 'A' (A) / TOTAL EMP. IN DIST. 'A' (B)}}{\text{EMP. IN INDUSTRY 'X' IN VIDARBHA (C) / TOTAL EMP. IN VIDARBHA (D)}}$$

Figure 2 Location Quotient formula

Location Quotient is always greater than zero. It could be less than one, equal to one or greater than one. If it is less than one that means the percentage of local economy is less than Reference economy. Hence the Industry is not meeting the local Demand for that particular District. That Industry could not Export so the economy is non-basic and it has non basic sector of employment. If the L.Q. is equal to one indicates that the Local economy is almost equal to Reference economy. Hence the Local Employment is just sufficient to meet the local demand. So Industries do not export and has the non-basic sector employment. Third condition, if the Location Quotient is greater than one that means the Local employment is not only meeting the local demand but also exports. Hence Jobs which are over above are identified as Basic sector.

3.2 Cluster Development

This was first proposed by Michael porter in 1990. It stimulates the Urban and Regional economic growth. Industrial clusters have increasingly been recognized as an effective means of industrial development and promotion of small and medium-sized enterprises. With the sectoral and geographical concentration of enterprises in an industrial cluster, the enterprises can better improve their competitiveness. This is due to the presence of specialized suppliers of raw materials, parts and components, machinery, skills and technology as well as other supporting services. Moreover, cluster development approach could be adopted as a key strategy for enhancing the productivity and competitiveness as well as capacity building of Micro and Small Enterprises (MSEs) and their collectives in the country. Clustering of units also enables providers of various services to them, including banks and credit agencies, to provide their services more economically, thus reducing costs and improving the availability of services for these enterprises.

3.3 Regression Analyses

Regression analysis is a statistical tool for the investigation of relationships between variables. It is used to ascertain the causal effect of one variable upon another- the effect of increase in development for a particular sector of the district upon the overall development of the district. In regression, the R² coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An R² of 1 indicates that the regression line perfectly fits the data. Values of R² outside the range 0 to 1 can occur where it is used to measure the agreement between observed and modeled values and where the "modeled" values are not obtained by linear regression and depending on which formulation of R² is used. If the first formula above is used, values can never be greater than one. If the second expression is used, there are no constraints on the values obtainable.

4. Data and Methodology

First objective of the paper is to study the overall development of Vidarbha region on the basis of chosen socioeconomic indicators at district level. The socioeconomic indicators selected for this study are mentioned in figure. Vidarbha region is comprised of Amravati sub region and Nagpur sub region. In order to do analysis at regional level, the focus is on Nagpur Sub region because of the better data availability. It comprises 6 districts namely; Wardha, Nagpur, Gadchiroli, Gondia, Chandrapur, and Bhandara. In order district wise level of development related to particular sector socioeconomic Indicators have been selected (Refer Table 4). Secondly, based on those Indicators district wise Sectoral Development Indices (SDIs) have been calculated for each kind of indicator. Thirdly, Composite Development indices (CDIs) have been calculated which gave overall level of development of the Districts within Nagpur Sub Region. Finally, the Regression between each SDI and CDI has been performed to understand the most affecting factor in the overall development of the District. For this analysis particularly Demographic, Industrial, Transportation, Agriculture, Livestock and Health & Education Indicators have been chosen as per expert opinion and industrial report published by Directorate of Industries in Nagpur.

Indicators	Sub Indicators
Demographic Indictors	I. Density II. Literacy Rate III. % Of Urban Population

	IV. % Of Women Literates V. % Of SC-ST Population
Industrial Indicator	I. No. Of Industries II. Investment In Plant And Machinery III. Employment
Transportation	I. Road Length Per100 Sq.km. Of Geographical Area II. Railway Route Length Per100 Sq.km. Of Geographical Area
Agriculture	I. % Of Net Area Sown II. % Of Area Irrigated More Than Once III. Average Yield Per Hectare Of Cereals IV. Average Yield Per Hectare Of Pulses V. Average Yield Per Hectare Of Cotton VI. Per Capita Food Grain Production
Livestock	I. No. Of Cows & Buffaloes In Milk Per 1000 Population II. No. Of Livestock Per 100 Population III. Livestock per Sq.km. Of Total Geographical Area
Health & Education	I. No. Of Hospital Per Lakh Of Population II. No. Of Beds In Public Aided Medical III. Institutions Per Lakh Population

Figure 4 Selected Socioeconomic indicators and sub indicators for Objective one.

As a result of the Objective one the factor responsible for the disparity in Vidarbha region is imbalanced industrial development. Hence the further study aims to achieve balanced Industrial development. In order to achieve this firstly, the district wise investment potential has been studied for Vidarbha region through location quotient theory and district wise surprising areas of economic strength have been found out. Secondly, high potential 'Star' industries have been found out with the help of "Location Quotient – Employment Growth Matrix". The 'Star' Industries could be developed as a cluster. Consequently, the Cluster mapping is proposed for the districts of Vidarbha region.

5. Results and Interpretations of Socioeconomic assessment

Human development report published in 2010 has already revealed Vidarbha region of Maharashtra state lags behind in the overall development. Within Vidarbha region only Nagpur district has shown HDI more than states average and rest of district lie below state's average with Gadchiroli district at lowest level. Now to have an exact idea of district wise level of development related to particular sector, the SDIs have been calculated. For example, to calculate SDIs for Industrialization; initially the sub indicators (Refer Figure 6) have been multiplied by the weightages as per expert opinion and factor analysis. Summations of such resultant products give the SDI for Industrial Development. Once the SDIs have been calculated; CDI for a particular district could be calculated by adding all the weighted SDIs. ⁱⁱCDIs for each district give the idea of the overall development of the districts.

Indicators	Calculation of Sectoral & Composite Development Index
Demographic Indictors	$(1 \cdot G_1) + (0.337 \cdot G_2) + (0.602 \cdot G_3) + (0.72 \cdot G_4) + (0.649 \cdot G_5)$
Industrial Indicator	$(0.99 \cdot I_1) + (0.992 \cdot I_3) + (1 \cdot I_3)$
Transportation	$(1 \cdot T_1) + (0.1 \cdot T_2)$
Agriculture	$(0.503 \cdot A_1) + (0.447 \cdot A_2) + (0.995 \cdot A_3) + (0.995 \cdot A_4) + (0.545 \cdot A_5) + (0.915 \cdot A_6)$
Livestock	$(0.94 \cdot L_1) + (0.996 \cdot L_2) + (0.148 \cdot L_3)$
Health & Education	$(0.115 \cdot E_1) + (1 \cdot E_2) + (0.1 \cdot E_3)$
Composite Development Index	$(0.87 \cdot G) + (0.9 \cdot I) + (0.964 \cdot T) + (0.72 \cdot A) + (0.87 \cdot L) + (0.99 \cdot E)$

Figure 5 Calculations of the S.D.I. and C.D.I.

The composite development index shows that Nagpur (CDI- 14905.74) is developed in almost all the aspects. Chandrapur and Bhandara are moderately developed whereas Wardha and Gondia are proved to be less moderately developed. Gadchiroli has shown least values for almost all indicators. The regression performed between all SDIs and CDIs ascertain that CDIs have shown strong correlation with indices of Industrial Development ($R^2 = 0.998$) & Education and Health ($R^2 = 0.57$). It implies that higher CDIs of the developed regions are mainly due to the development in the Industries and advancement in Education & Health. Moreover, Most of the Industries are concentrated in and around the metropolis Mumbai (western Maharashtra), leaving rest of the regions mainly Vidarbha (eastern Maharashtra) backward in terms of industrial development. Though the state's Industrial policy offers several incentives for new Industries, those incentives are not area specific and do not really attract industries in the backward areas. This concentration of industries in western Maharashtra state has resulted in 'Backwash Effect' (Myrdal) which is forcing people from the adjoining backward districts to migrate to Mumbai and surrounding areas in search of opportunities putting additional burden on city's infrastructure. This results in regional imbalance. Hence it is proved that balanced development in Industrial sector plays an important role to minimize the regional disparity in Maharashtra.

6. District wise investment potential

The location quotient calculated for districts; Bhandara, Chandrapur, Nagpur, Wardha, Gadchiroli, Gondia, gives the level of development and surprising areas of economic interest. In figure 6 on horizontal axis the Location quotients are placed and on vertical axis the industries are placed. Industries from no. 15 to 36 are Manufacturing Industries and the rests are Service Industries. The names of the industries are mentioned in figure 11. All the districts are arranged as per their location quotients. Say for Industry no. 15 (manufacturing food products) only Bhandara and Chandrapur districts have shown L.Q. greater than one. Which means only these districts are able to export manufacturing food products and hence high investment should be done in that sector. Likewise all the districts are arranged. Industry no, 27, 28, 35 etc. show blank space which means none of the district from Vidarbha region produces that kind of product. For Industrial products like Metal, transport equipment, Computer based activities Vidarbha region totally depend upon surrounding regions

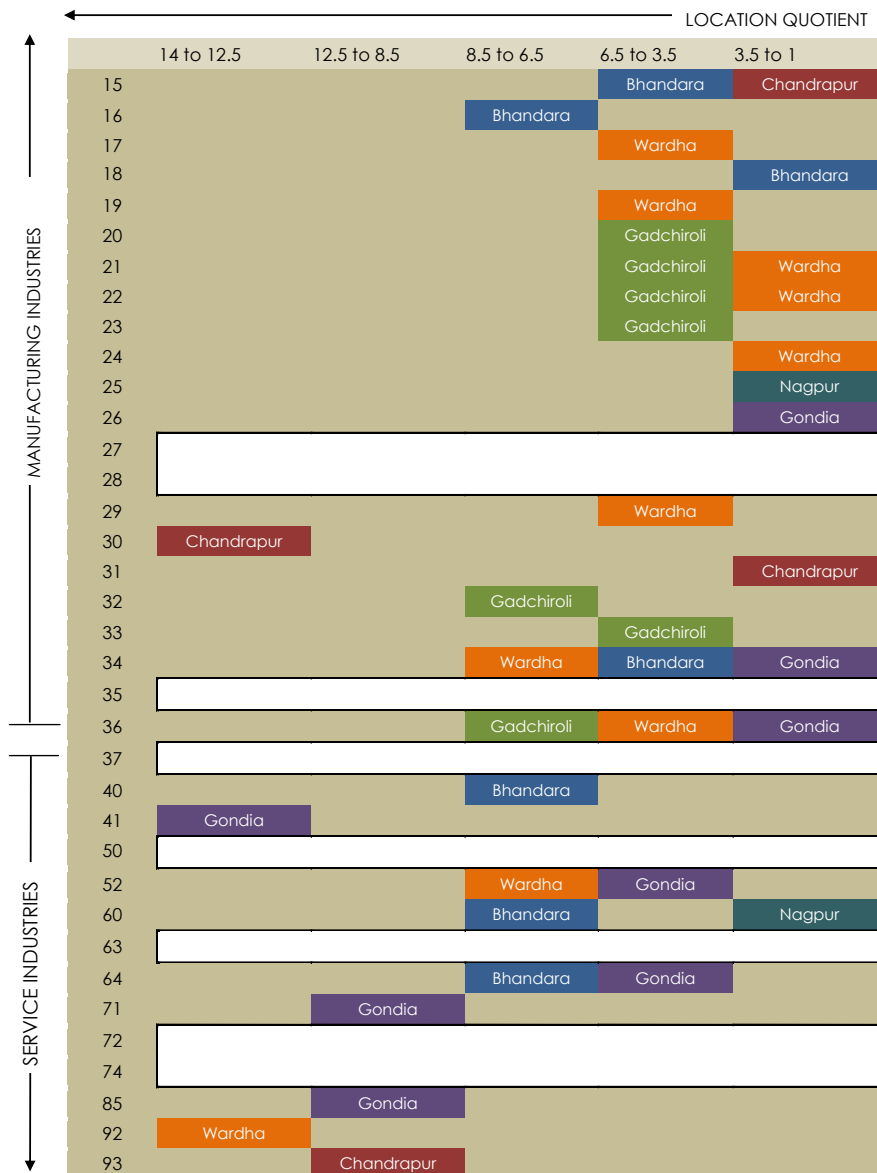


Figure 6 Location Quotient for all districts

Special attention should be given to those industries. In case of industry no. 31 only Chandrapur district is producing the Electrical and machinery apparatus. For that particular product whole Vidarbha Region has to depend on Chandrapur. Hence that Industry is the Surprising area of the economic. Similarly from figure 5 we can identify the surprising areas of economic strength for all districts. (Refer figure 7).

Districts	Surprising areas of Economic strength
Bhandara	Wearing Apparel, Dressing & Dyeing Fur , Electricity, Gas, Steam & Hot Water Supply , Tobacco products
Chandrapur	Food products & Beverages, Publishing & Printing, Electrical Material.
Gadchiroli	Wood, Products of Wood, cork, art
Gondia	Renting OF Transport Equipment (71), Other non-metallic mineral (26),
Nagpur	Rubber & Plastic Products (25), Land Transport (60)
Wardha	Tanning & Dressing of Leather; Manufacture of L, Recreation, Cultural & Sporting activities, Textile

Figure 7 surprising areas of economic strength

7. Cluster development approach

Since the best way to rise the productivity and innovative capacity is through local cluster development. For each district the high potential clusters have been identified with the help of 'Location quotient- Employment growth' matrix. It classifies industries into 'Stars', 'High potential', 'Low potential', and 'Threat'. Industries which come into star category have been selected as clusters for that particular district. (Refer Figure 8)

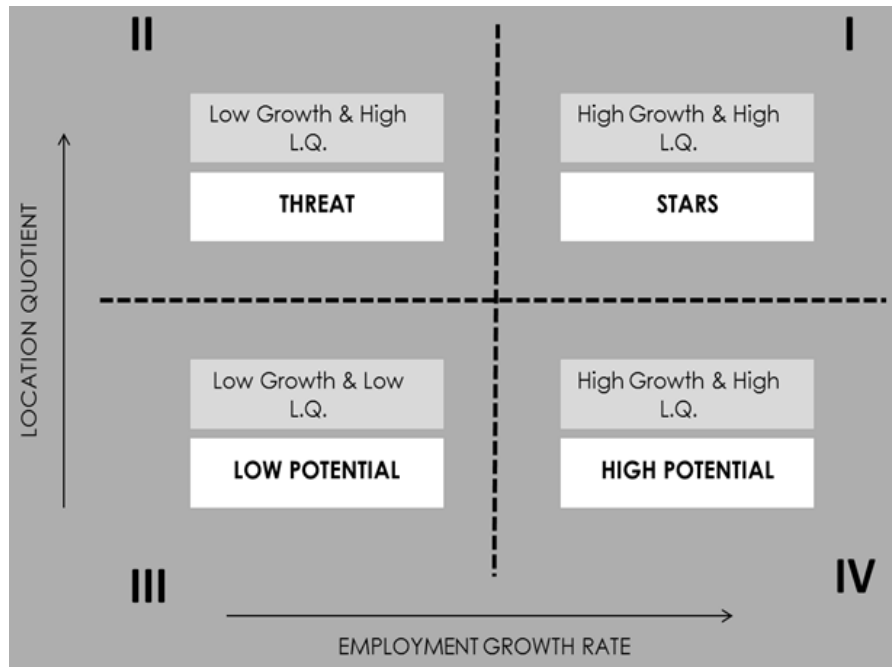


Figure 8 L.Q.- Growth Matrix (Source: USAID, Mahendra & Rashi Grover, Economic growth of the Mumbai Metropolitan region)

It gives the potential clusters for each district. As shown in the following Figure 8, L.Q. has been placed on the vertical axis and employment growth rate on the horizontal axis. The Industries which come under the right upper quadrant are termed as the "Star" industries. They have high location quotient and employment growth rate as well. These will be chosen for the cluster development. The industries which are coming under the second quadrant they are termed as "Threat" sectors. Although they have shown high L.Q. but the employment rate is declining hence further investment in those industries should be done carefully. In the third quadrant the industries are termed as Low potential Sectors as they have low LQ and low growth rates and therefore have low future potential. Sectors coming in the fourth quadrant have low location quotient but high employment growth rate. Although the L.Q. is low their employment growth rate is inclining. Hence these industries have investment potential. So they are termed as "High Potential" sectors and special attention should be given to them. In this manner from the L.Q –employment growth matrix potential industrial clusters have been proposed. The L.Q. - Growth matrix for each district have been worked out as shown in figure 8. Industries which are under first quadrant are chosen for cluster development.

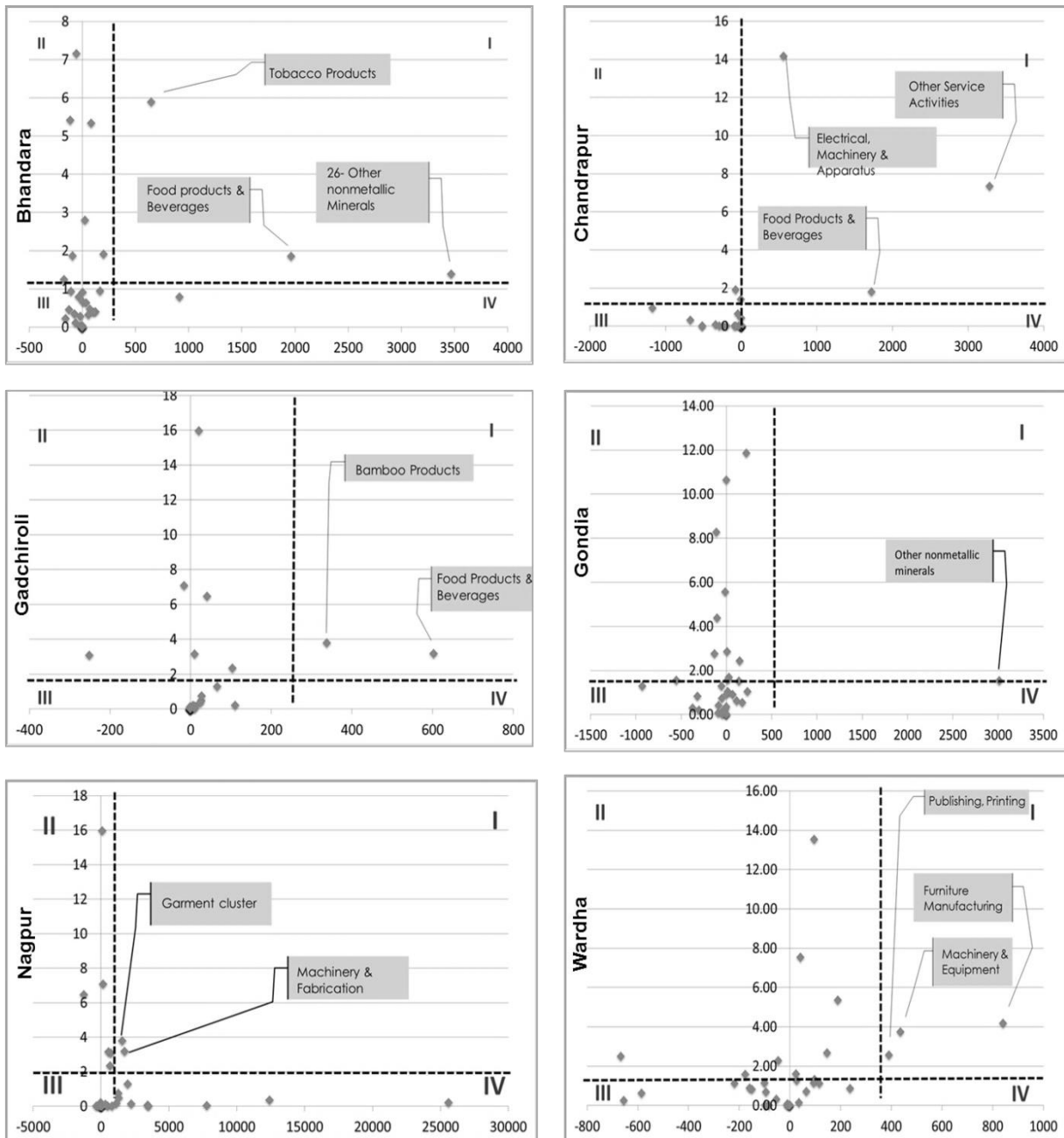


Figure 9 L.Q- Growth Matrixes for Bhandara, Chandrapur, Gadchiroli, Gondia, Nagpur and Wardha

Proposed cluster mapping

The probable clusters are proposed as per the L.Q. - Growth Pole Matrix (Refer Figure 8). The coloured symbol shows *Taluk*ⁱⁱⁱ boundary which could be developed as a cluster. It can be seen from Figure 9 that Nagpur district has a strong potential for Garment cluster and Dal cluster especially in Chikhali, Bagadganj and Kalmana district. Gadchiroli and Chandrapur have strong potential for Bamboo cluster. Non-Metallic clusters could be developed in Bhandara, Gondia and Chandrapur districts. *Taluk* wise clusters have been mentioned in the cluster map as shown in figure 10.

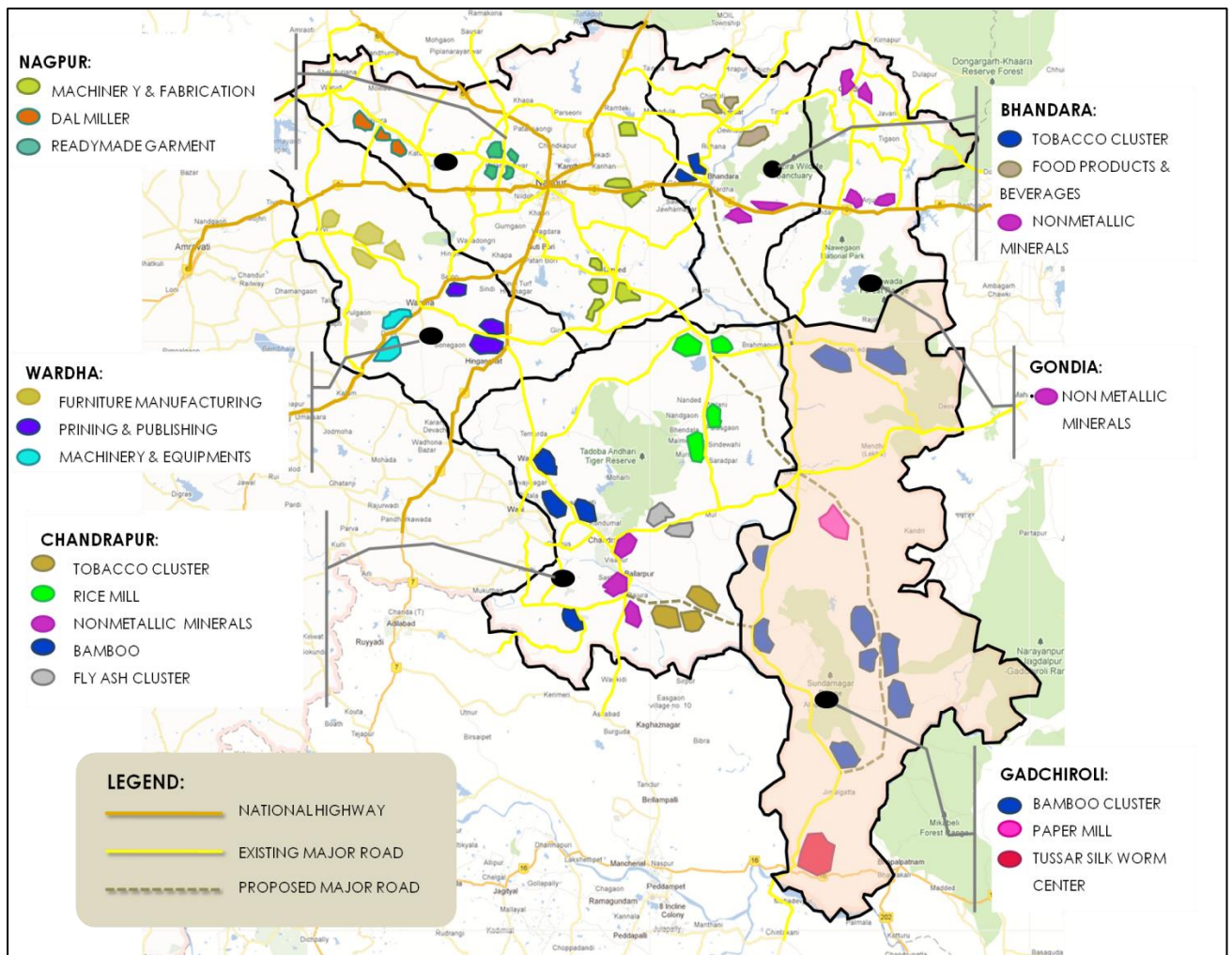


Figure 10 Proposed cluster Map for Vidarbha region (Nagpur sub region)

8. Conclusion

The empirical study in the paper ascertains that the developed regions are developed due to advancement in Industrial sector. This, however, is the prime reason for migration of adept class of society to developed region leaving rest of the region poorer. This puts extra burden on the developed city's infrastructure. Hence Backwash (Myrdal) effect could be seen in developed Nagpur district of Vidarbha region primarily due to Industrial development policies. Although Industrial policies give incentives they are not area specific and don't really attract industries in the Backward Region. The advancement in the Industrial sector which is the reason for development in developed districts and hence regional imbalance is the only solution for balanced development in Maharashtra state as well as in Vidarbha region. Hence it is important to find out high potential industries district wise and to propose the local industrial clusters to make the industries more sustainable since the best way to raise the productivity and innovative capacity is through local cluster development. In order to induce balanced industrial development aim of the proposal is to help poorer districts of the poorer region to grow faster. So that there will be less migration from poorer regions or districts. This will help to keep equal population density. Moreover due to the district wise Industrial development there will be same level of economic activity in each region or district.

Ultimately there will be equality of opportunity in each region which will help to minimize the inequality and will induce the balance development.

9. Annexure

Name of Industries

No.	Name of Industry	No.	Name of Industry
15	Manufacture of Food products and Beverages	33	Equipment of Medical, Precision & Optical
16	Manufacture of Tobacco products	34	Manufacture of Motor Vehicles, Trailers
17	Manufacture of Textile	35	Manufacture of Other Transport Equipment
18	Mfg. of Wearing Apparel, Dressing & Dyeing Fur	36	Manufacture of Furniture; Manufacturing
19	Tanning & Dressing of Leather; Manufacture of L	37	Recycling
20	Manufacture of Wood, Products of Wood, cork, art	40	Electricity, Gas, Steam & Hot Water Supply
21	Manufacture of Paper and Paper Products	41	Collection, Purification & Distribution of Wate
22	Publishing, Printing & Reproduction of Recorded	50	Maintenance & Repair of Motor Vehicle
23	Manufacture of Coke, Refined Petroleum Products	52	Maintenance & Repair of personal & household
24	Manufacture of Chemicals & Chemical Products	60	Land Transport (NIC Codes 1998 : 60211)
25	Manufacture of Rubber & Plastic Products	63	Supporting & Auxiliary Transport Activities
26	Manufacture of Other Non-Metallic Mineral	64	Post & Telecommunications
27	Manufacture of Basic Metals	71	Renting OF Transport Equipment
28	Manufacture of Fabricated Metal Products	72	Computer & related activities
29	Manufacture of Machinery & Equipment	74	Other business activities
30	Manufacture of Office, Accounting & Computing	85	Health & Social work
31	Manufacture of Electrical, Machinery & Apparatus	92	Recreation, Cultural & Sporting activities
32	Mfg. of Radio, Television & Communication	93	Other Service activities

Figure 11 Name of the Industries (Source: Directorate of Industries, Nagpur)

10. References

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ⁱ (2002). *Human development Report*.

ⁱⁱ Let's say for calculating Sectoral Development Index for Industrial Development formula of **(0.99*11) + (0.992*12) + (1*13)** has been used where I1 (NO. OF INDUSTRIES), I2 (INVESTMENT IN PLANT AND MACINERY), I3 (EMPLOYMENT) are sub indicators. I1,I2 & I3 have been given the weightages of 0.99, 0.992 & 1 respectively as per the Factor Analysis.

ⁱⁱⁱ *Taluk* is a Head quarter for around 50 villages. District is comprised of many *Taluks* ranging from 5 to 20.