ISID Institute for Studies in Industrial Development
An institution of Indian Council of Social Science Research (Ministry of Education)
Policy Research to Foster India's Industrial Transformation

257
WORKING PAPER

India's Unbalanced Industrial Development: Possible Explanations for Inter-State Variations

Shiladitya Chatterjee

December 2022

ISID Working Paper 257

India's Unbalanced Industrial Development:
Possible Explanations for Inter-State Variations

Shiladitya Chatterjee

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

December 2022

ISID Working Papers are meant to disseminate the tentative results and findings obtained from the ongoing research activities at the Institute and to attract comments and suggestions which may kindly be addressed to the author.

India's Unbalanced Industrial Development: Possible Explanations for Inter-State Variations

Shiladitya Chatterjee*

[***Abstract***: *Several theories have been advanced over the years about the causes of India's general industrial malaise. Amongst them are state level issues which if properly identified could provide solutions to spur overall industrial development in India. Indian states and union territories exhibit a very wide range of industrial attainments and this paper attempts to identify the state level problems which are holding some states behind despite considerable potential to grow industrially. These include infrastructure, human development and policy and institutional environment for industrial development. The paper suggests that the problems of the major subsectors of industry namely manufacturing and construction need to be looked at separately as well as industry by size classes with particular attention to MSMEs; that industrial policy on MSMEs be guided by better information collection through surveys; and that industrial development requires effort at both the state and central levels and better cooperation between them.*]

Keywords: *India, industry, development, manufacturing, construction, MSMEs*
JEL classification: *L5: Regulation and Industrial Policy; L6: Industrial Studies, Manufacturing; L7: Industrial Studies, Primary Products and Construction*

1. Introduction

Industrial development has been a matter of concern in India. Compared to China, India's share of industry in GDP is far lower. In 2019 for example, China's value added from industry and manufacturing were 39 percent and 27 percent respectively; while India's were 25 and 14 percent,[1] although both countries' industries employed similar proportions of total employment in that year (27 for China and 25 percent for India).[2] The latter data indicates further the low productivity of Indian industry.

Despite reforms of the early 1990s freeing up industry from the dirigiste controls that existed earlier, the performance of Indian industry has been sluggish and apart from

* Dr Shiladitya Chatterjee, Visiting Senior Fellow, ISID. Email. shilochatterjee@gmail.com

Acknowledgements: I am grateful for comments received on the paper from Nagesh Kumar, Sudipto Mundle, and K.V. Ramaswami at the Webinar organised by ISID on "Inter-State Disparities in Industrialisation in India" on 29 July 2022. I have tried to respond to the comments and suggestions made at the Webinar. Any errors that remain are entirely my own.

1 WDI website http://wdi.worldbank.org/table/4.2 downloaded 08 January 2022.

2 WDI website https://data.worldbank.org/indicator/SL.IND.EMPL.ZS down loaded 08 January 2022.

performing very poorly compared to China which could be considered an outlier, has also been performing much worse than other developing countries in a similar position.[3] Aggregate national level stagnation of industry in the post reform era seems to have been accompanied also by stagnation of shares and in rankings of states and districts of industrial output and employment.[4]

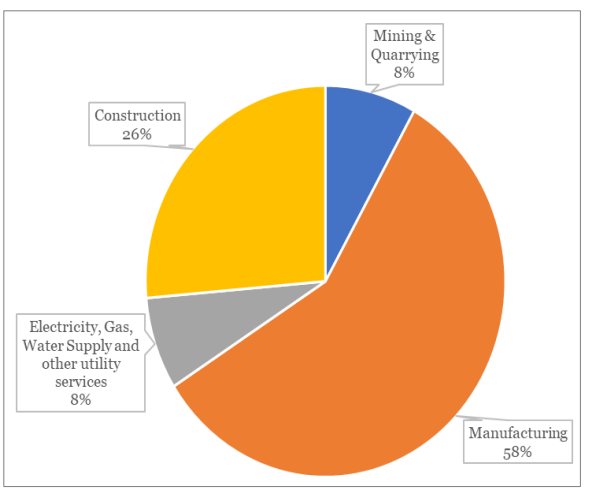
A plethora of theories have been advanced over the years about the causes of the general industrial malaise in India. Amongst them must be added state level issues responsible for the lack of growth in some states (such as the East and Northeast). If these issues could be identified then solutions may emerge which could spur industrial development all round and help India nationally overcome the industrial stagnation it has been experiencing.

This paper attempts to discover the causes of inter-state variation in industrial development using the latest data from 2004-2019. But first, it begins with a discussion (in the next section) of the basic characteristics of Indian industry which will help to understand better why some factors are more relevant than others.

2. India's Industrial Structure

The industry sector consists of four main segments: manufacturing, which contributed 58 percent to the overall industry sector's value added in 2019-20; construction (contributing 26 percent); and the two small segments of mining and quarrying; and electricity, water supply etc. which each contributed 8 percent (Figure 1). Each of these represent distinct activities: manufacturing producing products fashioned in factories and workshops large and small using rudimentary to sophisticated tools; construction producing durable public and private assets including housing using increasingly capital intensive methods particularly for infrastructure; mining and quarrying which is an activity that extracts ores, minerals and other valuable substances using a range of methods from

Figure 1. 2019-20 Gross Value Added in Industry Sector Segments at constant prices



Source: Author's calculations based on data from RBI Handbook of Statistics on Indian States.

[3] Kochar et al (2006) find that Indian industry was a significant negative outlier in 2000 when compared to other developing countries after controlling for level of income and geographical size.

[4] Judhajit Chakraborty and R Nagaraj (2017).

traditional to modern; and electricity and other utilities which are run using capital intensive production and distribution methods.

Despite manufacturing contributing over double the GVA compared to construction, in 2019-20 manufacturing employed only two thirds the number of workers (40 million compared to 61 million in construction). Further, employment in both these industry segments have seen decline in employment over the years according to CMIE data (Bhardwaj 2021).

Within the manufacturing sector, medium, small and micro enterprises (MSMEs) dominate. Categorization of MSMEs is based on investment in plant and machinery for manufacturing enterprises and till recently, microenterprises were defined as investing up to Rs 25 lakhs; small above Rs 25 lakhs to Rs 5 crores; and medium above Rs 5 crores up to Rs 10 crores. Large enterprises are those who invest beyond these limits. The definition has been changed in 2020[5] but the data presented here relates to the previous definition. The MSMEs are by and large all micro enterprises, with over 99 percent of the more than 63 million MSMSEs falling in the microenterprise category.[6]

Employment in MSMEs constituted around 70 percent of total manufacturing employment in 2015-16.[7] But MSMEs contributed a little over half of total value of added in manufacturing in that year[8] (Figures 2 and 3), indicating first, that MSMEs provide the bulk of employment and also contribute to a major part of the output of manufacturing; and second that MSMEs have much lower labour productivity than large enterprises.

---

[5] A micro enterprise is now defined as where the investment in Plant and Machinery does not exceed one crore rupees and turnover does not exceed five crore rupees; a small enterprise, where the investment in Plant and Machinery does not exceed ten crore rupees and turnover does not exceed fifty crore rupees; and a medium enterprise, where the investment in Plant and Machinery does not exceed fifty crore rupees and turnover does not exceed two hundred and fifty crore rupees.

[6] Ministry of Micro, Small and Medium Enterprises (2021). See Section 2.2. Key Results of NSS 73rd Round Survey (2015-16) on Micro, Small and Medium Enterprises.

[7] The NSS 73rd Round indicated that manufacturing MSMEs employed around 36 million workers in 2015-16; while CMI data quoted by Bhardwaj 2021 indicates that total manufacturing employment in 2016-17 was 51 million. This would indicate that MSMEs contributed roughly 70 percent to total manufacturing employment.

[8] This is a rough estimate given the paucity of data. Assuming that MSME manufacturing output is in proportion to employment among the various MSMEs segments including services, the share of MSME output would be 28 percent (using data in Table 3 of RBI 2019). Given that MSMEs contributed 28.7 to GDP in 2015-16, the share of manufacturing MSMEs comes to 8.03 percent of GDP. Combining this with contribution of total manufacturing to GDP in 2015-16 of 15.4 percent (World Development Indicators), the share of MSMEs in total manufacturing output in 2015-16 comes to 52 percent.

Figure 2. Share of MSMEs and large enterprises in total manufacturing employment in 2015-16 (%)

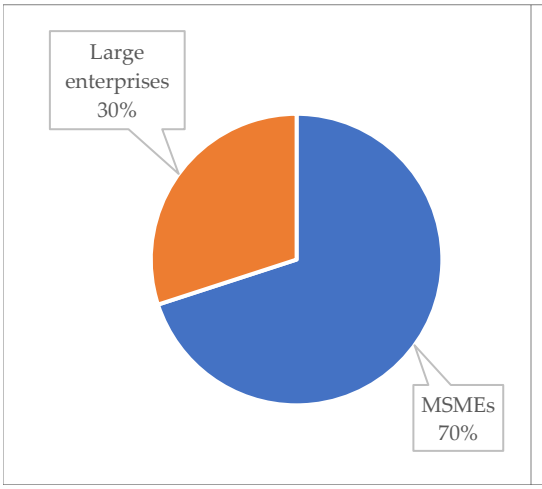
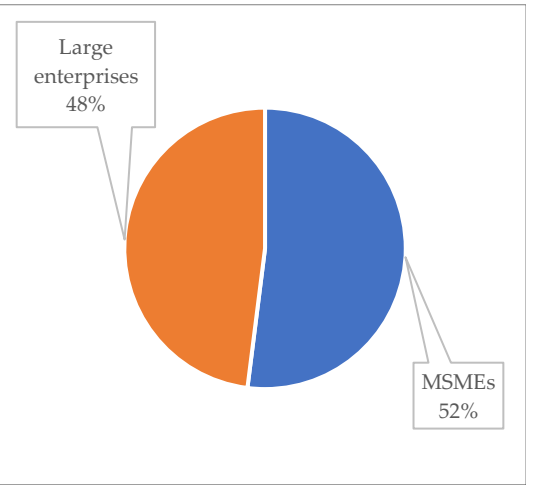


Figure 3. Share of MSMEs and large enterprises in total manufacturing GVA in 2015-16 (%)



Source: Author's estimates

The key to India's manufacturing growth therefore rests largely on MSMEs whose problems need speedy resolution. The MSMEs face major hurdles in their operations. The six most pressing problems according to them were (i) erratic demand; (ii) inability to recover financial dues from creditors; (iii) lack of access to finance or high cost of credit; (iv) erratic power supply; (v) shortage of raw material; and (vi) availability of labour including skilled labour.[9] While issues relating to demand for outputs and access to raw material and labour are basically enterprise level issues which they are supposed to tackle themselves as part of the entrepreneurial function, the other problems such as recovery of dues, access to credit, and availability of infrastructure may need state policy and other facilitation interventions. For example, as most MSMEs are unincorporated enterprises in the informal sector, they are unable to access the formal credit system. The Covid-19 pandemic has given another blow further weakening this sector. They also lacked sufficiently skilled entrepreneurs.

The factors that bedevil MSMEs also affect larger manufacturing enterprises to some extent and also other sub-sectors of industry such as construction. It appears likely that factors such as infrastructure including roads and power; availability of finance; education and human development; industrial environment; friendly ties between the Centre and states (double engine development in the current parlance); extent of urbanization etc., would all affect industrial growth and development.

One way to test the relevance of these factors would be to see if they play a role or not in explaining inter-state variations of industrial development and to what degree. As

[9] Ministry of Statistics and Programme Implementation (2018). Operational Characteristics of Unincorporated Non-Agricultural Enterprises (Excluding Construction) in India. NSS 73rd Round July 2015 to June 2016. National Sample Survey Office, New Delhi.

considerable data is available on the main components of industry and the explanatory factors mentioned above, this paper tries to make use of them to develop a narrative of why some Indian states have moved ahead of others on industrial development.

3. Inter-state variations in Industrial Development and its likely causes

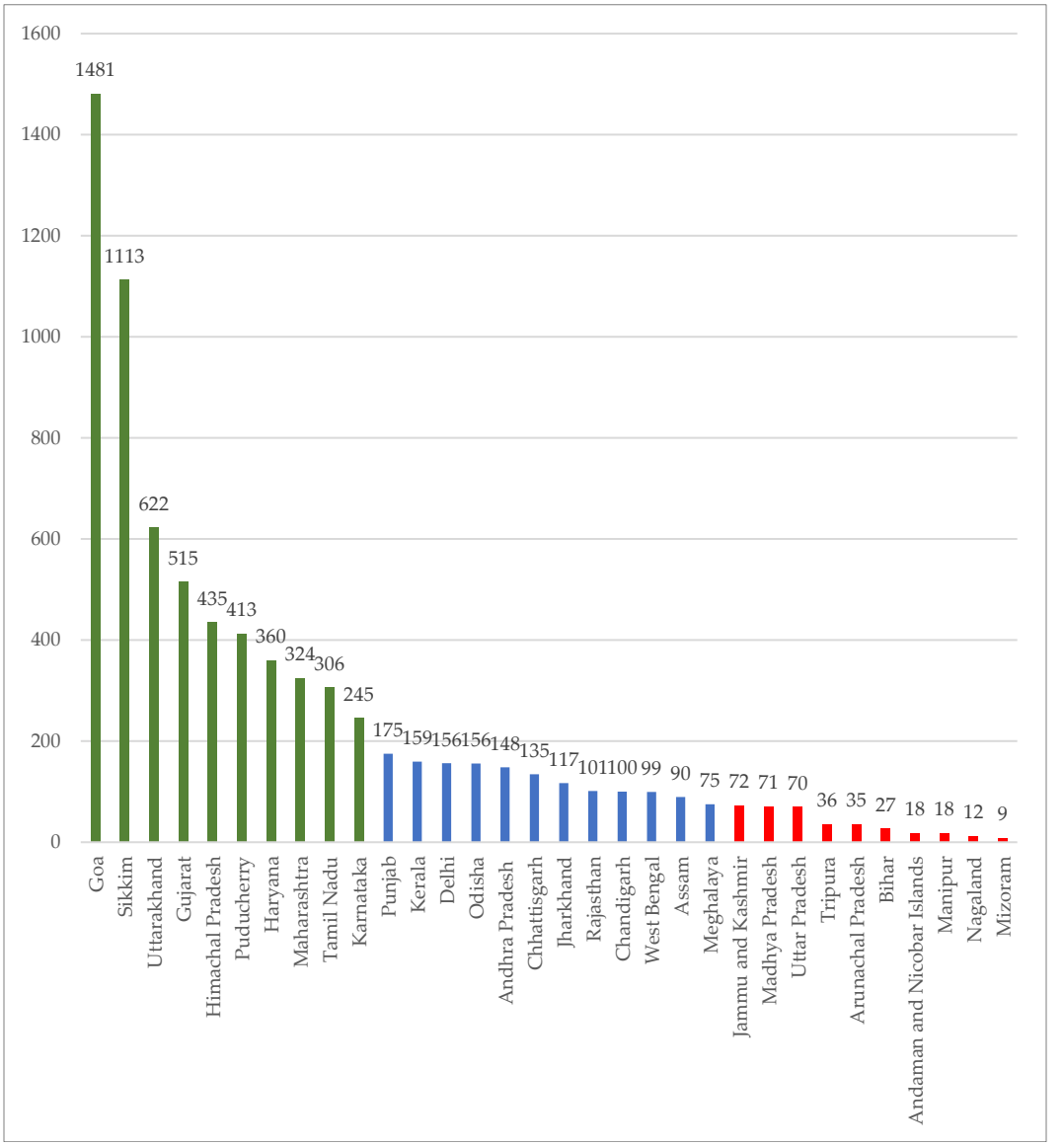
The wide variation in industrial development among Indian states and union territories (UTs) exists as is apparent from Figure 4 which shows their ranking on per capita manufacturing output. The 32 states and UTs whose data is available have been categorized into the top ten (shown in green) the bottom ten (shown in red) and the middle 12 (shown in blue). Goa's per capita average manufacturing output in the period 2014-19 is 165 times more than that of Mizoram. This is obviously due to the different conditions faced by manufacturing firms in Indian states and union territories, which differ widely in terms of development attainments that impact on manufacturing and industry in general.

Some of the major factors that are likely to impact on industrial development including its two main sub-components of manufacturing and construction have been identified in this paper and discussed below. For purposes of classification of "industry," manufacturing," and "construction" the Ministry of Statistics and Programme Implementation (MOSPI) definitions have been used.[10]

Infrastructure. Infrastructure is absolutely essential for industries to operate smoothly. Uninterrupted power supply from the grid, for example, is needed for proper functioning of industrial units. While captive generating sets are used where power supply is erratic, such power is costly and can render products uncompetitive. Similarly, good road connectivity helps in quicker sourcing of raw material, timely marketing of products and regular worker attendance.

[10] Ministry of Statistics and Programme Implementation (2019) definitions of industry, manufacturing and construction have been adopted in this paper. All industry is classified into (a) Primary (b) Manufacturing (c) Electricity, Gas & Water Supply (d) Construction and (e) Trade. Manufacturing has been defined as: an activity that leads to physical or chemical transformation of materials, substances or components into new products. Maintenance and repair activity of industrial, commercial and similar machinery and equipment, which are in general classified in the same class of manufacturing were also included. Thus, all activities covered by NIC – 2008 divisions 10 to 33 of NIC- 2008 are considered as 'manufacturing' for the purpose of the economic census. Construction is defined as: activities such as construction of building, road, railways, utility and civil engineering projects, demolition, electrical & plumbing installation activities etc. for the purpose of the economic census. Thus, all activities covered by NIC–2008 divisions 41 to 43 are considered as 'construction' activities.

Figure 4. Ranking of Indian states and Union Territories by gross value added in manufacturing (average per capita 2014-19)



Source: Author's calculations based on data from RBI Handbook of Statistics on Indian States.

One of the major requirements for industry is availability of land – this is particularly critical for larger industrial enterprises. However, the role of this factor was found hard to estimate due to lack of adequate data across states. Nevertheless, land is a major infrastructure requirement and has been identified as a major issue in several states such as West Bengal (Chatterjee 2022).

Human development. Running of machinery is requiring higher levels of learning than before as industrial processes become more sophisticated. The entrepreneurial function too is demanding better educated entrepreneurs and companies need more skilled managers. Hence states with literate, better skilled and educated workers are at a distinct advantage over those that have poorer human development achievements.

Credit. Insufficient access to credit and its high cost are major bottlenecks for industry especially for most MSMEs who operate informally and do not possess adequate collateral to secure loans from the formal financial system. Surveys of MSMEs indicate that this is a major issue. But credit for non-MSME enterprises too is a problem and "getting credit" is an important criterion in determining the ease of doing business.

Industrial relations. Good industrial relations principally between employers and employees is essential for smooth working of industrial enterprises. Nothing could be more discouraging for industrial development than frequent work stoppages leading to loss of work days owing to strikes, lockouts and similar industrial action by labour and management. Hence the status of industrial relations is a critical factor in a state's industrial progress.

Urbanization: Higher proportions of urban areas tend to create better conditions for industry by providing easier access to infrastructure such as power and roads which cities and towns possess more than rural areas; by providing advantages of agglomeration which industrial clusters in urban areas can bring about and therefore raise productivity of industries; and by making available better access to factors of production such as availability of labour pools and financial services etc.

State's support for development: Different states use their available financial resources differently. Those with stronger development orientation spend more on support to development including support for industrial development by setting up industrial parks, providing critical needed infrastructure; facilitating credit and providing various incentives. States which spend more of their GDP on development are therefore likely to provide a greater spurt to industrial development than those who do not.

*Centre-state relations***:** Unfriendly relations between the Central and state governments can hurt industrial development in several ways. It is an unfortunate political reality that more Central investments of its public sector units and more allocations for national level infrastructure development are likely to take place where the same political party is in power. For example, location of public sector industrial units (such as locomotive workshops) or vital national level infrastructure such as national highways, railway freight corridors, port development, airport development etc., which have a major bearing on improving the infrastructure for industry are more likely to be allocated to states where similar political parties are in power than in states where rival parties have formed governments.

4. Testing the factors explaining inter-state variation in industrial development

In order to investigate the importance of the factors explaining variation in industrial development between states, the relationship if any between these major factors discussed above with industrial output and its main constituents namely manufacturing and construction outputs was sought to be discovered.

Time series data obtained from official sites was pooled with cross-section data for 20 of the largest Indian states. Only the larger states were considered in this analysis as smaller states and the union territories have certain specific features in the Indian context (such as differences in geographical features – being remote, hilly or islands etc. or with very small geographical size) which tending to be outliers could unduly influence the econometric analyses and detract from discovering the prominent explanatory factors.

Three dependent variables were sought to be explained: per capita industrial output; per capita manufacturing output; and per capita construction output. The independent or explanatory variables chosen were all those discussed in the previous section. In order to smoothen the data and avoid unusual variations, and also as some explanatory factors were available only in discrete 5-year or so intervals (such as NFHS data) the time series data was averaged into three 5-year period averages: 2004-09, 2009-14, and 2014-19. This yielded 60 observations. The data set in placed in Appendix Table 1.

The analysis involved correlations and multiple regressions. It is well known that correlations do not necessarily indicate causation. The justification for direction of causation assumed has been addressed in Section 4.1. A major problem with using multiple regression is the high multicollinearity between explanatory variables as demonstrated by the correlations. This makes the significance of regression coefficients unreliable and can also change signs of coefficients. This problem is addressed in Section 4.2.

4.1. Analysis using correlations.

Before delving into the analysis of correlations, it must be recognised that it is being assumed that direction of causation is from the explanatory variables to the dependent variables. This is reasonable as industrial development is likely more to be influenced by development of infrastructure, availability of credit, extent of public development expenditure, human development, supportive Centre-state relations and favourable industrial climate – than the other way round. There could be some possibility that urbanization and industrialization can work both ways but the chances are slim (as the proportion of industrial towns in a state are likely to be low). Hence *a priori* theorization would support strongly the direction of causation that has been assumed in this paper. Hence there was no attempt to go into further Granger and other types of causality tests except for urbanization. Since the case of urbanization is a little ambiguous, a Granger test for causality to rule out the possibility of reverse direction of causality from

industrialization to urbanization, taking advantage of the time series data that was available was run.[11]

The simple correlations between the three dependent variables and their explanatory variables are summarized in Table 1 and Figure 5. As can be seen from the table and figure, public development expenditure, power availability and education (years of schooling as well as higher education) show up as most important in terms of higher positive correlations with all three industry dependent variables – industry as a whole as well as manufacturing and construction. In the case of construction, the education indicators show up as more critical than for manufacturing and this may be due to the increasingly sophisticated skills needed for modern construction. Public spending understandably is more important for construction than for manufacturing industry as the state continues to play a major role particularly in infrastructure providing greater impetus to construction industry. Availability of power seems to be more important for manufacturing, however, as it is perhaps more intensive in power use than construction.

Table 1: Dependent variables with correlation coefficients with their explanatory variables and their t-values

	Correlation Coefficients			*t-values*		
Explanatory variables	*Industry*	*Manufacturing*	*Construction*	*Industry*	*Manufacturing*	*Construction*
Public Development Expenditure	0.75	0.64	0.74	8.54	6.30	8.47
Power	0.62	0.65	0.56	6.02	6.43	5.09
Schooling	0.59	0.50	0.73	5.58	4.39	8.05
Higher Education	0.56	0.58	0.74	4.19	4.38	6.79
Credit	0.42	0.48	0.30	3.57	4.16	2.40
Road	0.42	0.47	0.45	3.50	4.01	3.85
Urbanization	0.31	0.36	0.42	2.51	2.94	3.56
Mandays Lost	-0.17	-0.14	-0.16	-1.28	-1.06	-1.21
Centre-State Politically Opposed	-0.16	-0.14	-0.11	-1.20	-1.04	-0.85

Source: Author's calculations based on data from RBI Handbook of Statistics on Indian States.

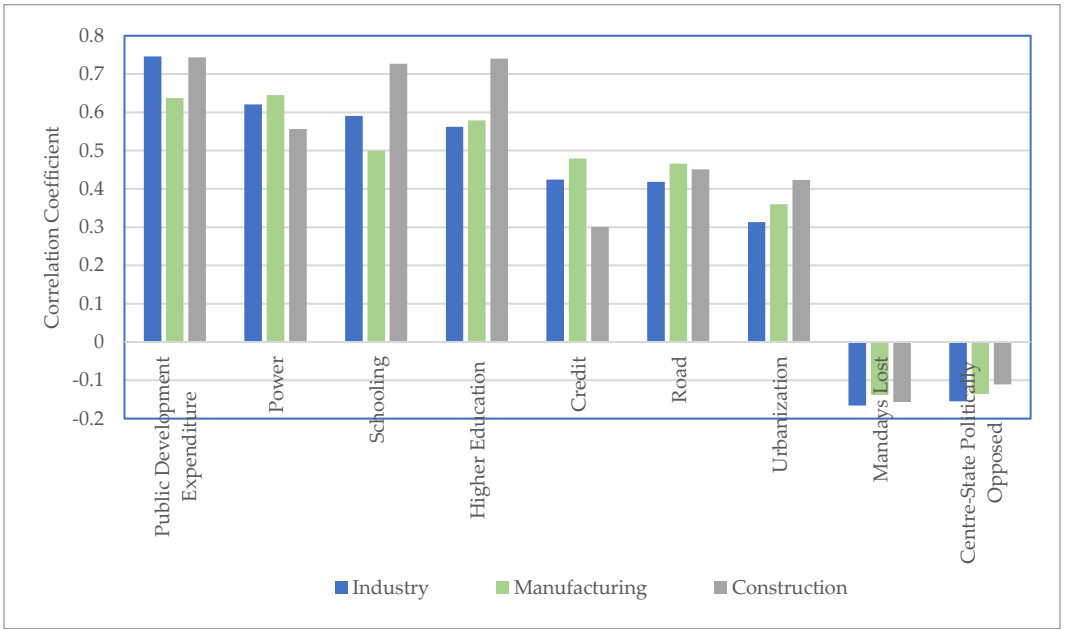
Note: (i) Correlation coefficients for higher education are based on 40 observations as earlier period data not available. (ii) Coefficients above 0.5 in value are shaded in yellow. The t-values that indicate significance at the 95% level of confidence are shaded in dark green; those significant at 90% level in light green and those that not significant are unshaded.

[11] However, even the Granger test does not clearly establish causality. See Granger causality test in Maddala (2001) page 379. Nevertheless, the test was carried out to investigate causality even in the restricted Granger case. The following regression was used:

$$U_t = \alpha 1 U_{t-1} + \alpha 2 U_{t-2} + \beta 1 I_{t-1} + \beta 2 I_{t-2} + u_t$$

where, Ut represents urbanization in period t (2014-19); Ut-1 and Ut-2 are lagged urbanization values from 2009-14 and 2004-09; It-1 and It-2 are the corresponding lagged per capita gross value added in industry values; and αi and βi are the coefficients of lagged urbanization and industrialization values respectively. The test requires that the lagged coefficients of the explanatory variable (industrialization) are zero to establish that it fails to "Granger-cause" the explained variable (urbanization). The regression run does indeed yield t-values of the lagged industrialization variables that are not significant. This appears to rule out a reverse causality from industrialization to urbanization in the Granger sense.

Figure 5. Comparison of correlation coefficients of Industry, Manufacturing and Construction with factors that influence them



Source: Author's calculations based on data from RBI Handbook of Statistics on Indian States.

On the other hand, availability of credit, adequacy of road infrastructure, and degree of urbanization of a state are also positively correlated with all three industry outcome indicators but not as strongly as the factors discussed in the last paragraph. Amongst these, credit, as intuitively obvious, is more strongly correlated with manufacturing (with highly significant t-value) than with construction or industry as a whole. As also to be expected, urbanization is more strongly correlated with construction than industry owing perhaps to the rapid increase of urban infrastructure construction resulting from urbanization.

The factors man-days lost and absence of political alliance between state and Centre show negative correlation as would be expected but such correlation is only weakly significant.

4.2. Analysis using multiple regressions

As noted earlier, a major problem with multiple regression analysis that is bound to arise with the type of explanatory variables being used is the likely presence of multicollinearity between them. To understand the extent of multicollinearity between the main explanatory variables, correlograms are therefore useful. The correlograms for per capita industrial output, per capita manufacturing output and per capita construction output and their explanators is placed in Table 2 below.

Table 2. Correlogram of explanatory variables

	MDL/WORKER	*ALLIANCES*	*PC POWER*	*ROAD*	*SCHOOL*	*URBAN*	*CREDIT*	*DEV Percapita*
MDL/WORKER	1.000							
ALLIANCES	0.251	1.000						
PC POWER	-0.204	-0.230	1.000					
ROAD	-0.062	0.006	0.249	1.000				
SCHOOL	-0.156	-0.177	0.570	0.483	1.000			
URBAN	0.013	-0.084	0.526	0.637	0.473	1.000		
CREDIT	-0.075	-0.170	0.580	0.582	0.431	0.669	1.000	
DEV Percapita	-0.221	-0.249	0.583	0.082	0.647	0.140	0.214	1.000

Source: Author's calculations. Note: Correlations above 0.5 are shaded in green.

There is very close relationship between several of the explanatory variables as shown in Table 2. The correlations exceeding 0.5 in value can be considered high and have been shaded in green. Power is the variable having the largest number of other explanatory variables highly correlated with it (4); followed by urbanization and credit (3) each; and road, urbanization and development spending (2) each. Any multiple regression with such strong interrelationships between the variables will yield wrong results. This is shown in Table 3 which regresses per capita industrial output using all the explanatory variables discussed.

Table 3. Regression of per capita industrial output on all explanatory variables

	DEV. SPEND	*CREDIT*	*URBAN.*	*SCHOOL*	*ROAD*	*POWER*	*ALLIANCE*	*MDL*	*CONST*
Coeff.	20.40	4.83	-2.55	-13.58	21.30	0.11	10.44	1.37	-129.76
t-values	5.89	0.36	-1.48	-1.24	4.06	2.36	0.39	0.56	-2.67
	R^2= 0.73 *N*=51								

As evident from Table 3, it is very likely that presence of multicollinearity has affected the significance and even the signs of some of these explanatory variables. Apart from per capita development spending, access to roads, and availability of power, all others are either not significant or have what appear to be wrong signs (such as urbanization, years of schooling, man-days lost and conflicting Centre-state alliances).

One remedy for multicollinearity is to drop the variables that are most correlated with others. If we drop availability of credit and urbanization then extent of association between the explanatory variables drops significantly. Also as a significant part of development spending of states is on education, these two are highly correlated – resulting in a correlation coefficient of 0.65 as seen from Table 2. Hence schooling and development spending cannot be used together. Dropping credit availability and urbanization and alternating development spending with years of schooling yield the two regressions results shown in Table 4.

In both regressions, the infrastructure variables, power and road availability, are significant. Development spending and years of schooling when used alternately become significant too. In the first regression conflicting alliances between Centre and state; and man-days lost due to strikes, lockouts etc., show the correct negative signs although not significant and therefore may not be too relevant for overall industrial development. In the second regression too these two variables are not significant.

Table 4. Regression of per capita industrial output with selected explanatory variables

Variables	*Road*	*Power*	*School*	*Alliances*	*MDL*	*Const.*
Coeff.	8.86	0.16	23.09	-2.67	-0.82	-131.71
t-values	1.70	3.52	1.94	-0.08	-0.26	-2.27
	$R2^{-}$ 0.50 N = 54					
Variables	*Road*	*Power*	*Dev*	*Alliances*	*MDL*	*Const*
Coeff.	15.03	0.07	18.90	12.61	0.68	-178.76
t-values	4.20	2.02	6.75	0.47	0.28	-4.36
	$R2^{-}$ 0.71	N = 54				

Roughly the same results are repeated if we consider these variables as explanators of per-capita manufacturing output which is the most important constituent of industrial output. Development spending, and the infrastructure variables of road and power, as well as years of schooling. One difference is that availability of credit turns out to be significant in one of the regressions (significant at the 90% level of confidence).

This can be seen from the regressions presented in Table 5 below. Beginning with all variables we are considering, due to multicollinearity, some variables are dropped alternatively. The variables appearing significantly are shaded in green. Conflicting political alliances show the correct negative signs in two regressions although are not significant in any.

The finding of significance of credit availability squares with the partial correlations presented in Figure 5 where manufacturing is seen to have a higher correlation with credit availability than industry as a whole. The criticality of credit for turning the wheels of manufacturing is borne out by these results.

Finally, to identify the factors most influencing construction industry - which is the second most important constituent after manufacturing within the industry sector as a whole, the regressions summarized in Table 6 below were run. Beginning with all relevant factors identified *a priori*, some explanatory variables were dropped in turn to avoid the problem of multicollinearity.

Table 5: Regressions of per capita manufacturing output on explanatory factors

Variables	*Dev. Spend*	*Credit*	*Urban*	*School*	*Road*	*Power*	*Alliance*	*Mdl*	*Const.*
Coeff.	11.54	3.69	-1.86	-18.48	17.38	0.11	6.21	1.34	-87.78
t=value	4.68	0.38	-1.52	-2.37	4.66	3.44	0.33	0.77	-2.54
	R2 = 0.70	N = 51							
Variables	*Dev. Spend*	*Credit*			*Road*	*Power*	*Alliance*	*Mdl*	*Const.*
Coeff.	9.00	0.86			10.91	0.08	8.53	0.76	-136.13
t=value	4.22	0.09			3.37	2.47	0.42	0.42	-4.20
	R2 = 0.64	N = 53							
Variables		*Credit*		*School*	*Road*		*Alliance*	*Mdl*	*Const.*
Coeff.		18.77		18.01	5.71		-6.97	-1.17	-54.64
t=value		1.70		2.27	1.27		-0.26	-0.49	-1.23
	R2 = 0.36	N = 54							
Variables		*Credit*		*School*	*Road*	*Power*	*Alliance*	*Mdl*	*Const.*
Coeff.		-11.44		22.09	11.19	0.18	-5.71	-0.62	-143.60
t=value		-0.66		1.83	1.77	3.33	-0.16	-0.19	-2.35
	R2 = 0.50	N = 53							

Table 6. Regressions of per capita construction output on explanatory factors

Variables	*Dev. Spend*	*Credit*	*Urban*	*School*	*Road*	*Power*	*Alliance*	*Mdl*	*Const.*
Coeff.	3.62	-6.16	0.49	2.73	3.21	0.01	3.91	0.05	-39.75
t-value	5.59	-2.44	1.52	1.33	3.27	0.97	0.78	0.10	-4.37
	R^2 = 0.76	N = 51							
Variables	*Dev. Spend*		*Urban*	*School*	*Road*		*Alliance*	*Mdl*	*Const.*
Coeff.	3.73		0.30	3.06	2.35		5.50	0.00	-32.11
t-value	6.08		1.07	1.45	2.52		1.07	0.01	-3.63
	R^2 = 0.73	N = 53							
Variables			*Urban*	*School*	*Road*	*Power*	*Alliance*	*Mdl*	*Const.*
Coeff.			-0.19	9.75	1.57	0.02	2.73	-0.13	-24.91
t-value			-0.47	4.45	1.33	1.96	0.42	-0.22	-2.26
	R^2 = 0.58	N = 53							
Variables				*School*	*Road*	*Power*		*Mdl*	*Const.*
Coeff.				9.69	1.29	0.02		-0.13	-24.57
t-value				4.50	1.37	1.95		-0.24	-2.49
	R^2 = 0.57	N = 55							

It is seen from these regressions that some explanatory factors turn out as significant. The factors development spending, road availability, power availability, and years of schooling turn out significant in at least two of the four regressions, while urbanization is significant in one. Credit availability, Centre-state alliances and man years lost are not significant in any regression.

4.3. Discussion of results

Using both the simple correlations and the results of the multiple regressions discussed in the previous two subsections, it is clear that (i) development spending; (ii) power availability; (iii) education given by years of schooling as well as enrolment in higher education are critically relevant for industry in general as well as its subcomponents of manufacturing and construction. It is apparent that for construction, schooling - both basic education given by median years of schooling, as well as proportion of students enrolled in higher education - are more critical than they are for manufacturing, as simple correlation coefficients are much higher; and regression coefficients turn out to be more significant. The explanation for this probably is that construction work which is getting increasingly sophisticated requires more specialized skills than manufacturing where micro-enterprises predominate, using mainly general labour.

In the case of manufacturing, credit availability and adequate access to roads also appear to be important. This is quite intuitive as credit is obviously particularly critical for manufacturing enterprises which are predominantly in the private sector and is needed for purchase of inputs and for working capital. That credit appears more critical for manufacturing than construction may be due to the greater share of public works in construction (such as infrastructure and public housing programs) where public funds are employed. Similarly, roads are critical for manufacturing enterprises as well as construction as inputs and outputs need to be moved by manufacturing industry which needs proper access to roads; and it is difficult to undertake construction when roads are unavailable.

In the correlation analyses, urbanization does not appear to be very critical for either manufacturing or industry in general, but it does show up with higher positive correlation coefficient in case of construction. Also, urbanization has appeared with weak significance in the multiple regression of construction when all variables are used as explanators. These results are perhaps due to (i) a significant share of rural enterprises in the manufacturing industry sector and (ii) the lack of space for industry in urban areas causing a shift to peri-urban and rural areas; while (iii) for construction urbanization is still important given the large infrastructure and housing construction needs of urban areas.

That industrial peace and harmonious industrial relations are pre-requisites for development of industry, particularly manufacturing appears logical and obvious and was therefore tested in this paper using the variable man-days lost per industrial worker. However, although the simple correlation coefficients show the correct negative signs and

similarly nearly half of the regressions also do, the regression coefficients are not significant indicating that this was not an important factor in the period 2004-2019. This could be due to the decline of authority of trade unions in this period with growing use of temporary contract labour in industry and also better appreciation by workers, union leaders and managers of the need for creating harmony in worker-management relations for long-term mutual benefit.

Similarly, although much has been talked of about the need for improved Centre-state relations for better development of a state, the absence of political alliance between the state and Centre did not come up as a factor in industrial development in this period. Apart from the correct negative sign in the simple correlation coefficients, this variable did not even show up negative signs in most regressions. Even when it did, the significance was weak or non-existent. Again, this could be due to (i) less importance of the Centre's policy decisions affecting states after deregulation of industrial policy and abandonment of industrial licensing in the early 1990s; (ii) with the growing importance of the private sector in the share of industrial output, the Centre's public sector location policies, or procurement policies began to matter less while the state's own policy environment mattered more.

Table 7 below summarizes the factors that are important (shaded in green) for industry as a whole and for manufacturing and construction.

Table 7. Factors relevant for industrial development in Indian states

Explanatory factors	*Industry Sector*	*Manufacturing*	*Construction*
Development spending	ü	ü	ü
Power availability	ü	ü	ü
Years of schooling	ü	ü	ü
Gross enrolment in higher education	ü	ü	ü
Credit availability	X	ü	X
Road availability	✓	ü	✓
Urbanization	X	X	✓
Centre-state politically aligned	X	X	X
Man-days lost in industrial action	X	X	X

5. Conclusions

This paper has attempted to make use of readily available data to draw some lessons on factors important for industrial development in India. More research however may be necessary to arrive at a fuller picture. For example, there is a large data gap on the MSME sector. While more regular surveys are necessary, these are not being undertaken. Privately supported sample surveys may be able to throw more light and may be necessary. The role

of research institutions working on the development of the industrial sector is therefore a crucial.

Given the wide variation in industrial development across the country, this paper has tried to establish that overall industrial development in the country cannot be furthered without removing the constraints at the state and UT level. If such constraints can be removed a large number of lagging states can catch up with the leading states in industrialization and the overall impact of this will be to accelerate industrial growth in the country as a whole. West Bengal, for example, had led the industry scene till the mid- 1960s but has stagnated since (Chatterjee, 2022) and now ranks in the middle order among states.

As discussed in this paper, there are several factors that can be identified as responsible for this malaise. Both the Central Government as well as the states themselves have major roles to play as most enabling factors fall in the concurrent list. There is need for states to play a leading role but given the wide disparities prevailing, the Centre needs to ensure that those areas in the country falling behind in industrial development are supported by means such as infrastructure; education, skills and entrepreneurship development; credit etc.

Since MSMEs play a dominant role in industrial development, focus on removing constraints in this sector needs to be prioritized. This involves the needs of industrial units and entrepreneurs – and also importantly – needs of workers who tend to be neglected. A large number of workers are migrants and their needs need special attention including housing, medical attention and social insurance, the lack of which was highlighted during Covid-19.

Reference

Bhardwaj, Ankur (2021). *Manufacturing employment nearly half of what it was five years ago.* Business Standard, 7 May 2021. Available at https://www.business-standard.com/article/economy-policy/ceda-cmie-bulletin-manufacturing-employment-halves-in-five-years-121050601086_1.html

Chatterjee, Shiladitya (2022). *West Bengal's Economic Legacy Since Independence and Future Prospects.* Arthaniti: Journal of Economic Theory and Practice 1–34 . Department of Economics, University of Calcutta, 2022. Accessible through https://journals.sagepub.com/doi/abs/10.1177/09767479211050983?journalCode=atha

Ministry of Micro, Small and Medium Enterprises (2021). *Annual Report of the Ministry of Micro, Small and Medium Enterprises 2020-21.* Udyog Bhavan, New Delhi 110011.

Judhajit Chakraborty and R. Nagaraj (2020). *Has India Deindustrialised Prematurely? A Disaggregated Analysis*, Economic & Political Weekly, 5 December 2020**.**

Kalpana Kochhar, Utsav Kumar, Raghuram Rajan, Arvind Subramanian, and Ioannis Tokatlidis (2006): *India's Pattern of Development: What Happened, What Follows?* International Monetary Fund Working Paper WP/06/22. IMF, Washington D.C., January 2006.

Maddala, G.S. (2001). Introduction to Econometrics, Third Edition. John Wiley and Sons, Chichester, England.

Ministry of Statistics and Programme Implementation (2018). *Operational Characteristics of Unincorporated Non-Agricultural Enterprises (Excluding Construction) in India. NSS 73rd Round July 2015 to June 2016.* National Sample Survey Office, New Delhi.

Ministry of Statistics and Programme Implementation (2019). Seventh Economic Census 2019 Schedule, Concepts, Definition and FAQs. MOSPI, New Delhi, 2019. Available at https://mospi.gov.in/documents/213904/0/Concepts+%26+Definitions.pdf/8e4d09cf-66ee-9948-c899-902e3d1baca8?t=1593440406316

Reserve Bank of India (2019). *Report of the Expert Committee on Micro, Small and Medium Enterprises.* 25 June 2019.

Reserve Bank of India (various years). Handbook of Statistics on Indian States

Appendix

Appendix Table 1. Industry, manufacturing and construction with their explanators

Period	*States*	*Industry*	*Manuf.*	*Constr.*	*Mdl*	*Alliances*	*Power*	*Road*	*School*	*Urban*	*Credit*	*Dev. Percap.*
Averages 2004-09	Andhra Pradesh	42.86	22.64	15.06	1.25	0.00	758.10	5.33	2.90	30.40	1.08	6.29
	Assam	46.53	19.07	13.93	1.00	0.00	152.50	7.36	4.10	13.49	0.12	3.62
	Bihar	13.69	5.98	9.56	1.84	1.00	92.00	7.89	1.25	10.88	0.03	2.51
	Chhattisgarh	102.60	58.91	23.63	0.22	1.00	625.40	4.03	2.10	21.67	0.39	5.18
	Gujarat	168.81	139.52	34.52	0.16	1.00	1096.10	11.10	4.70	39.97	1.50	5.76
	Haryana	145.22	112.83	50.84	0.65	0.00	1112.30	9.11	4.65	31.86	1.23	7.55
	Himachal Pradesh	165.23	56.75	93.20	0.32	0.00	830.10	5.69	6.30	9.92	0.69	10.56
	Jammu& Kashmir	69.51	20.77	50.23	0.12	0.00	790.70	0.55	4.10	26.01	0.31	10.31
	Jharkhand	89.46	64.10	17.01	0.14	1.00	156.90	4.63	2.00	23.15	0.27	4.78
	Karnataka	103.07	72.13	35.41	0.38	0.00	710.70	11.97	4.60	36.28	1.39	6.35
	Kerala	95.07	36.71	54.10	3.13	1.00	450.20	14.42	7.75	36.84	0.38	4.11
	Madhya Pradesh	51.53	27.39	19.06	0.30	1.00	547.10	4.43	2.20	27.05	0.30	3.71
	Maharashtra	145.13	121.56	33.92	0.59	0.00	917.40	12.21	5.55	43.83	3.60	5.73
	Orissa	79.30	35.69	25.55	0.64	1.00	458.60	4.87	2.95	15.84	0.34	3.65
	Punjab	115.40	82.00	34.65	0.26	0.00	1427.30	5.93	5.25	35.71	1.41	4.87
	Rajasthan	69.23	36.36	32.40	4.64	1.00	582.40	4.83	2.15	24.14	0.52	4.21
	Tamil Nadu	117.12	86.99	39.88	0.63	0.00	929.50	9.89	5.40	46.25	1.69	5.55
	Uttar Pradesh	37.06	25.27	14.70	0.71	0.00	288.30	6.06	2.15	21.53	0.20	3.21
	Uttaranchal	108.33	76.65	42.24	0.34	0.00	699.40	6.24	5.40	28.11	0.44	7.45
	West Bengal	54.81	32.22	20.92	38.70	1.00	327.90	5.19	3.40	29.93	0.76	3.18
Averages 2009-14	Andhra Pradesh	56.17	28.69	17.39	0.62	0.00	999.80	6.04	5.05	33.49	2.31	9.02
	Assam	57.41	19.69	20.98	0.70	0.00	193.80	7.87	5.20	14.08	0.20	5.59
	Bihar	26.65	6.81	17.94	1.36	1.00	124.70	8.86	2.75	11.30	0.07	3.77
	Chhattisgarh	141.29	50.42	42.05	0.37	1.00	595.50	5.62	5.30	23.24	0.80	8.62
	Gujarat	262.66	176.21	51.24	0.12	1.00	1381.30	11.30	6.10	42.58	3.03	9.15
	Haryana	200.20	129.09	58.84	0.44	0.00	1534.20	9.24	6.45	34.79	2.34	10.91
	Himachal Pradesh	245.12	104.62	91.96	0.16	1.00	1215.70	5.72	7.75	10.04	0.73	15.60
	Jammu& Kashmir	82.58	24.75	41.13	0.00	0.00	948.50	0.73	6.20	27.21	0.41	14.01
	Jharkhand	112.56	53.32	21.56	0.86	1.00	204.70	5.10	4.05	24.05	0.39	5.26
	Karnataka	132.98	78.72	42.77	0.26	1.00	888.80	13.31	6.20	38.57	2.30	9.88
	Kerala	129.12	45.91	73.35	1.28	0.00	584.50	15.05	8.85	47.72	0.86	7.89
	Madhya Pradesh	76.79	32.21	27.06	0.64	1.00	616.00	5.07	4.80	27.63	0.49	6.86
	Maharashtra	207.37	142.57	48.40	0.26	0.00	1073.60	13.00	7.10	45.23	6.59	8.72
	Orissa	103.35	42.31	31.87	0.32	1.00	577.10	5.11	5.05	16.68	0.59	6.66
	Punjab	166.39	111.26	39.40	0.11	1.00	1655.70	6.02	7.15	37.49	2.40	6.61

Period	*States*	*Industry*	*Manuf.*	*Constr.*	*Mdl*	*Alliances*	*Power*	*Road*	*School*	*Urban*	*Credit*	*Dev. Percap.*
	Rajasthan	105.15	51.05	31.85	0.68	0.00	781.50	5.14	4.00	24.89	0.98	6.67
	Tamil Nadu	178.73	118.58	53.84	0.80	1.00	1137.80	11.93	7.30	48.45	3.16	9.09
	Uttar Pradesh	48.17	27.63	16.60	0.43	0.00	380.30	6.32	4.55	22.28	0.45	4.49
	Uttaranchal	224.23	163.01	49.07	7.21	1.00	1055.20	10.16	6.30	30.55	0.67	10.54
	West Bengal	69.90	37.72	22.44	17.32	1.00	440.30	7.84	5.15	31.89	1.72	4.96
Averages 2014-19	Andhra Pradesh	157.88	115.61	82.92	2.13	0.00	1145.70	7.36	4.90	32.63	1.32	18.69
	Assam	235.40	84.34	50.34	0.33	0.00	275.10	8.09	8.20	14.77	0.26	12.03
	Bihar	61.96	24.40	26.43	0.35	0.00	238.90	9.58	3.90	11.76	0.13	7.90
	Chhattisgarh	356.34	124.81	69.35	0.24	0.00	956.50	5.66	6.58	25.04	0.92	17.53
	Gujarat	714.58	477.75	82.28	0.07	0.00	1755.40	11.52	6.60	45.46	3.92	14.61
	Haryana	517.24	332.62	117.20	0.14	0.00	1950.10	10.10	7.17	38.23	2.73	20.57
	Himachal Pradesh	661.06	416.83	114.34	0.72	1.00	1319.30	6.89	8.30	10.16	0.65	26.96
	Jammu& Kashmir	207.19	70.42	59.73	0.00	0.00	1151.80	1.23	7.80	28.88	0.68	25.79
	Jharkhand	225.60	107.96	45.26	0.00	0.00	237.00	4.99	4.87	25.04	0.37	11.61
	Karnataka	379.20	233.34	88.72	0.06	1.00	1069.30	13.69	6.70	41.30	2.86	18.60
	Kerala	370.43	153.86	179.83	2.11	1.00	715.30	15.81	9.00	60.72	1.14	14.92
	Madhya Pradesh	164.15	65.09	49.20	0.40	0.00	900.30	5.59	5.84	28.27	0.66	13.57
	Maharashtra	493.18	307.04	77.54	0.08	0.00	1283.90	16.13	7.80	46.75	7.37	14.06
	Orissa	320.04	148.54	53.06	0.03	0.00	667.00	5.85	5.89	17.66	0.74	15.17
	Punjab	295.24	166.96	74.59	0.03	0.00	1884.20	7.68	7.91	39.47	2.09	14.35
	Rajasthan	265.69	93.60	63.34	0.22	0.00	1020.60	6.42	4.74	25.68	0.78	16.11
	Tamil Nadu	479.61	296.10	151.02	0.04	0.00	1411.00	13.19	8.06	50.81	3.36	16.26
	Uttar Pradesh	141.70	64.97	47.92	0.17	1.00	521.30	6.62	5.51	23.09	0.39	9.00
	Uttaranchal	826.57	583.57	112.33	0.10	0.00	1283.30	13.08	6.66	32.84	1.08	18.38
	West Bengal	183.06	95.44	58.05	0.07	1.00	535.30	7.30	5.70	34.11	1.68	10.26

Sources: Author's calculations based on data from Reserve Bank of India: Handbook of Statistics for Indian States for Industrial GVA, Manufacturing GVA, Construction GVA, Power Consumption, Road density. Data for Median years of schooling from NFHS-3, 4 and 5 (data missing in NFHS-5 for a few states computed by forecasting). Data on Mandays lost from Labour Bureau publications on Industrial Disputes, various years. Data on alliances computed based on Election Commission and news releases.

Note: The abbreviated variables stand for the following: Industry – Per Capita Industry GVA (Rs Lakhs);
Manuf. – Per Capita Manufacturing GVA per capita; MDL - Mandays Lost per Worker;
Alliances - State Allied to Centre Dummy (Allied = 0, Not allied = 1); Power – Per Capita Power Consumption (KwH);
Road - Road density, National and State Highways (kms per 100 sq km);
School - Median Years of Schooling for population above 6 years; Urban - Proportion of urban population to total;
Credit - Credit outstanding to industry (Rs crores) by commercial banks per 1000 population;
Dev - Development Expenditure (Rs'000) Per Capita

List of ISID Working Papers

256 Status and Scope of Industrial Development in Aspirational Districts of India, *Surya Tewari,* November 2022

255 Growth Slowdown in the Automobile Industry in India: Dwindling Middle Class Demand or Changing Consumption Pattern? *Satyaki Roy,* November 2022

254 Examining Regional Disparities among States of India through Sectoral Compositions, *Sangeeta Ghosh*, October 2022

253 India's Trade in Manufactures: The Role of Intra Industry Trade, *Manmohan Agarwal & Neha Betai*, September 2022

252 The Survival of Outward Investments from India and China: Is there a North-South Divide? *Suma Athreye, Abubakr Saeed, Muhammad Saad Baloch*, September 2022

251 Manufacturing Units and Employment in India: A District Level Analysis Using Economic Census, *Surya Tewari*, August 2022

250 India in the Global Vaccine Market Prior To and During COVID-19: Some Structural Issues, *Shailender Hooda*, August 2022

249 Unlocking India's Potential in Industrial Revolution 4.0: National Innovation System, Demography, and Inclusive Development, *Nagesh Kumar*, July 2022

248 India's Trade in Pharmaceutical Products: A Method for the Classification of Pharmaceutical Products and Recent Trends, *Reji K. Joseph & Dinesh Kumar*, July 2022

247 Exports and Growth in Indian Manufacturing: An Econometric Analysis, *Bishwanath Goldar*, June 2022

246 State-wise Distribution of Manufacturing Units and Employment in India: An Exploration from the Economic Census, *Surya Tewari*, June 2022

245 Product Market Concentration with Ownership Characteristics: An Exploration into the Consolidation Activities of Business Groups, *Beena Saraswathy*, March 2022

244 Indian Economy@75: Achievements, Gaps, and Aspirations for the Indian Centenary, *Nagesh Kumar*, March 2022

243 Understanding the Impact of Covid-19 on MSMEs in India: Lessons for Resilient and Sustained Growth of Small Firms, *Akhilesh Kumar Sharma & Sushil K Rai*, February 2022

242 Related party Trade and Transfers to Tax Havens: A Study of Select Manufacturing Foreign Subsidiaries in India, *Swati Verma*, January 2022

241 Industry 4:0: Some Conjectures on Employment and Technology Diffusion, *Satyaki Roy*, January 2022

240 Two Phases of NPAs in India's Banks, *Santosh Kumar Das*, December 2021

* ISID Working Papers can be downloaded at https://isid.org.in/

The **Institute for Studies in Industrial Development** (ISID) is a public-funded, non-profit, autonomous institution dedicated to conducting policy research, advocacy, capacity-building, and outreach activities to foster the industrial transformation of India.

Registered on October 7, 1986, under the Indian Societies Registration Act 1860, ISID in 1988, became one of the institutions that are supported by the Indian Council of Social Science Research (ICSSR), (Government of India), through grants-in-aid. Since 2006, the Institute operates from its own well-appointed campus located in the Vasant Kunj Institutional Area in South Delhi.

The research themes and key projects are classified under following broad thematic areas:

- Industrial Structure, Performance, and Polices
- Corporate Governance and Industrial Financing
- Leveraging MSMEs and Start-ups for Industrial Transformation
- Globalization, FDI, and Trade
- Technology, Innovation and Industry 4.0
- Green Industrialization Strategy
- Employment and Labour Markets
- Spatial Dimensions of Industrial Development and Industrial Infrastructure
- Sectoral Studies on Competitiveness of Indian Manufacturing

ISID is recognized as a Scientific and Industrial Research Organization (SIRO) by the Government of India. It is also listed on DARPAN portal of NITI Aayog (India's Planning Agency) as a recognized think-tank. It is also a member of the Asia-Pacific Research Network on Trade (ARTNet) and the South Asia Network on SDGs (SANS) of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). ISID's Databases and e-resources are accessed by the academic community across the country through the Information and Library Network (INFLIBNET) Centre of the University Grant Commission (UGC).

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
Phone: +91 11 2689 1111 | E-mail: info@isid.org.in | Website: https://isid.org.in