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## **INDUSTRY CLUSTER BASED DEVELOPMENT: A PARADIGM WITH PARTIAL UNDERSTANDING, THE CASE OF INDIA**

### **ABSTRACT**

City-based industry clusters represent the nodes of economic productions as well as lays the ground for policy experimentation. The popularity of clusters as a concept is attributed to the positive effects of contiguity it offers to all the constituting firms. Despite this notable fact, in India, city-based industrial clusters have failed to achieve attention for policy per se. By and large, the policy thinking has primarily remained focused either to the industry classification or to the geographical state boundaries or by the nature/size of the firms. This article organizes the discussion in the context of the key theme of cluster-based schemes and policy implementation in India. In order to ascertain the doctrine of a distinct policy aimed at clusters, Kendall's Tau test was conducted on a sample of 126 firms belonging to four industry clusters. The result of the study suggests that in India, there exists sufficient scope for local city-based industry cluster policy. The article concludes by suggesting a few recommendations.

*Keywords: Industry Clusters, Policy, India, Kendall's Tau, Local economy*

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## INTRODUCTION

The contention of city-based industry clusters takes the prominent thought when it comes to the role industries play in a local economy. Since 2012, the World Economic Forum has acknowledged the role of cities in national competitiveness, wherein industry clusters have been identified as one among the six megatrends in city competitiveness. Clusters are a geographical agglomeration of firms operating in the same industry (Giuliani, Pietrobelli and Rabelotti, 2005). An industry cluster serves as a magnet of talent, capital, specialized services, and knowledge flow. In many cases, these clusters have been instrumental in creating a unique global identity for the regions/cities they are located in. Few of the notable examples are Silicon Valley Cluster (Saxenien, 1994), Bangalore Information Technology Cluster (Basant, 2008) and Sialkot Surgical Cluster (Nadvi, 1999). The importance of clusters can be attributed to the fact that it has been strongly pursued by the trinity i.e. the businesses, governments, and academia. Since 1990, Michael Porter has been an effective proponent of industrial clusters and cluster-based policies in the modern economic development process.

Porter (1998) postulated that clusters lead to competitiveness of the firms based in it by enhancing productivity, catalyzing innovation and paving the way for new business creation. Campaigners of the geographical agglomeration have enlisted numerous benefits like clustering of industrial activity. This helps in generating investments that the distant rivals would have failed to match. Under the backdrop of various benefits, nurturing city-based industry clusters is a strategic attempt to make local industrial circumstances favorable. Therefore, clustering should be an obvious preferred approach over isolation. City-based industry clusters thus provide rationalization over local policy interventions. Hence, it becomes essential for practitioners and policymakers to understand the ways through which the existing clusters can be supported. Porter (2007) strongly supports the idea of cluster policy by arguing that under the spontaneous economic processes responding to market signals, clusters cannot be left alone to develop naturally. Since clusters involve externalities across firms in a location and associated public goods, there exists a rationale for public policy.

This paper attempts to understand how industry clusters in India can be shaped through policy interventions. This research fills in this gap by answering an important question, “To what extent can policy interventions be done in the context of India?” Thus, a specific case of cluster policies in India has been discussed to mature the understanding of the topic with policy implementation per se. It is noteworthy that the literature has

ample studies from the global north, but studies from India are few and far apart. Hence, it may be stated that there is a dearth of research on identifying policies which help in fostering local clusters. In addition, the efficacy of present schemes, city-based industry clusters remain uninvestigated. Further, a pertinent question is: “Can there be a scope of core cluster-based policy, besides the bouquet of categories like state boundaries, firm sizes, as well as Micro Small and Medium Enterprises (MSME) policy, or industrial category such as textile, automobiles?” remains unanswered.

In order to ascertain the doctrine of a separate cluster-based policy, a field survey was conducted in four clusters. Perception of 126 firms belonging to four industry clusters was gathered. The questionnaire to conduct this was borrowed and adapted from a framework developed by Bhawsar and Chattopadhyay (2015). For elucidating the responses, this paper uses a five-point Likert scale. Kendall’s Tau test was conducted in order to figure out the differences in perception of firms. Subsequently, the paper builds insights on industry cluster policies borrowed from academic literature and from policy-making bodies at various regional and local levels. The contention in building this paper is to elevate the concept of agglomeration and the policies supporting only agglomerations into dynamic clusters in its true sense.

The paper is organized into seven sections. The section following the introduction covers the review of previous studies on clusters. Section three covers cluster schemes operational in India. Section four provides the description of sample, methodology and statistical analysis. The next section builds the discussion on the results obtained from the analysis. Section six covers various policy actions reviewed from the literature to strengthen clusters. The last and the seventh section make the conclusion of the study.

## **REVIEW OF PREVIOUS STUDIES ON INDUSTRY CLUSTERS**

Alfred Marshall has given birth to the concept of “industrial districts” in 1890, in his book “Principles of Economics”. Unlike specialization at the national level, Marshall (1890) stressed specialization at the local geographic level. Marshall’s “industrial district” concept traversed a long journey and was reinvented as “new industrial districts” (Piore and Sabel, 1984), “new economic geography” (Fujita, Krugman and Venables, 1999), “regional clusters” (Enright, 1996) and as “industry clusters” (Porter, 1998). Few of the benefits clusters offer are availability of labor (Marshall, 1890), knowledge spillover (Marshall, 1890; Maskell and Malmberg, 1999; Tallman, Jenkins, Henry and Pinch, 2004), availability of

specialized suppliers (Marshall, 1980), economies of scale in association with clustering of production activities (Krugman, 1991), bolstering innovation (Porter, 1990; Saxenian, 1994), transaction cost benefits (Barkley and Henry, 2001), foundation for high degree of trust and learning due to reduced proximity (Niu, Miles and Chinen, 2012) and enhancement in productivity (Porter, 1990; Ketels, 2006).

According to Porter (2000), clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions (e.g. universities, standard agencies, trade associations) in particular fields that compete and also cooperate. Porter's theory of cluster gained widespread popularity because it was comprehensive in explaining the congenial effects of clusters. Porter was successful in promoting clusters as a policy tool. It is evident by the fact that the governments in most countries, specifically in Europe and North America, launched cluster development programs and policies (Ketels et al., 2006). Not only the governments but many international bodies like the World Bank, the Organization for Economic Cooperation and Development, European Union, Asian Development Bank, etc. have also embraced the concept of clusters.

Despite its huge popularity, it needs to be recognized that Porter's theory of clusters suffers from certain limitations. Motoyama (2008) highlights the weaknesses of the theory. It is thought that the theory is descriptive and static in nature, and it fails in providing a quantitative measure of interconnectedness within a cluster element. Moon, Park, Yim, and Yin (2013) solidifies missing elements in Porter's theory by incorporating the importance of outsourcing and the path of evolution of clusters from regional to global linkages. These authors stress the role of clusters in enhancing performability. Unlike Porter, the contribution by Moon et al. (2012) address the context of developing and less developed countries and is apt to real-world business situations. Chaminade and Vang (2006) state that clusters in developing countries differ from those in developed ones in various aspects. Ketels (2015) highlights this difference, stating that the Western Model of cluster development is market driven while the Asian Model is government driven and is focused on target specific industries.

The long-standing literature on industry clusters presents abundant case studies of specific regions. There are compiled books (e.g., Kuchiki and Tsuji, 2004; Karlsson, 2008; Yusuf, Nabeshima, and Yamashita, 2008; Ganne and Lecler, 2009; Karlsson, 2010, Sonobe and Otsuka, 2011; Eriksson, 2013; De Marchi, Do Maria, and Gereffi, 2017) that present edited collection of research in the form of evocative case studies on clusters/cluster

policies. Ketels (2013) writes that “much of the initial research on clusters was driven by case studies. Over the last decade, however, the development of comprehensive datasets on the presence of clusters through the so-called “cluster mapping” has opened the door to a new phase of research. The resulting cluster mapping datasets for North America and Europe have made it possible to systematically test many of the hypotheses derived from case observations.” However, unlike Europe and North America, the datasets specific to clusters to test for any policy implications are yet to be developed in India. It is noteworthy that the studies pertaining to industry clusters in India are sparse. A few studies notably Ranawat and Tiwari (1999); Das (2008); Pillai (2000); Caniels and Romjin (2003); Okada and Siddharthan (2007); Basant (2008); Dasanayaka and Sardana (2010); Majumdar and Choi (2011) and Narayana (2014), meet this need. The present study joins the stream by exploring the potential for having a dedicated cluster policy in India.

### **INDUSTRY CLUSTER RELEVANT SCHEME IN INDIA**

In literature, clusters have been identified according to geographical boundaries or according to economic activities. There exist a few bodies at the international and national level like United Nations Industrial Development Organization (UNIDO) and Ministry of Micro, Small and Medium Enterprises (MSME) of Government of India, etc. which are involved in the identification and promotion of clusters. This paper follows the identification provided by Cluster Observatory India, according to which industrial clusters should have at least 100 enterprises and a minimum turnover of INR 100 million<sup>1</sup> approx. USD 14.5 million the units should work from factory premises, employ hired workers and such a cluster can have a mix of micro, small, medium to a few large units. Another category of clusters in India is micro-enterprise clusters that operate from household and employ home-based workers.

For understanding the policy implications for industry clusters, it becomes imperative to understand the purview of policy which influences clusters in India. The notion of industry clusters has been adopted as a strategic tool for improving the competitiveness of local industries in India since the decade of 2000. Martin and Sunley (2003) point out that the governments have hardly built any cluster from scratch and contemplate on implementing policies on the existing ones. India is not an exception; the agglomeration

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<sup>1</sup> USD 1 = approximately INR 69 for the year 2019

of similar industries does exist in India under the government targeted industrial development schemes/policies. These agglomerations begin as industrial areas. In the latter years, some of these host significant firms belonging to a particular sector such as automobiles and pharmaceutical. Subsequently, these agglomerations are designated as industry clusters. This was primarily done to reap the benefits of Cluster Development Scheme. The exercise was like offering old wine in new bottles.

A notable scheme for the promotion of clusters was launched in 2002-2003 under Central Government's Industrial Policy and Promotion's (DIPP) Industrial Infrastructure Up-gradation Scheme (IIUS). DIPP is functional since 1995 for the formulation and implementation of industrial policies and strategies for industrial development aligned with the development needs and national objectives. Under its Industrial Infrastructure Upgradation Scheme launched in 2003, DIPP took the lead for enhancing the competitiveness of Indian industry through up-gradation of industrial clusters. Under this, quality infrastructure was created through public-private partnership in selected industry clusters. Under the select projects the Central Government bears 75 percent of the total project cost with a ceiling of INR 50 Crores (approx. USD 7550,000), the remaining 25 percent need to be contributed by local industry body/ies. These funds are utilized for the creation of technical infrastructure i.e. Common Facility Centers, R&D demonstration costs, environment protection infrastructure, training infrastructure, and for quality certification and benchmarking. Creation of physical infrastructures such as roads, water supply, solid waste management, and power plants is also covered under the total project cost. In the first phase of the scheme, thirty projects were sanctioned while in the second phase nine more projects were sanctioned. It is noteworthy that in India there are policy provisions based on the category of the firm (i.e. mega firms, large firms, medium, small and micro) and geographical state boundaries. However, the focus on local industry clusters is too shallow (i.e. limited to infrastructure creation only).

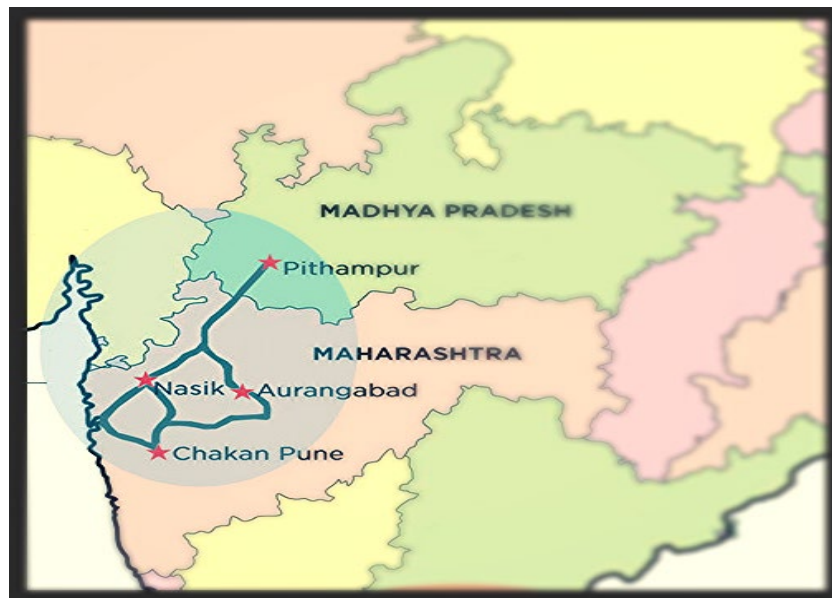
It may be inferred that the present cluster development scheme in India is limited to the creation of the Common Facilities Centers (CFC). This is not surprising, as physical infrastructure investments have remained popular with policymakers around the world (Pike, Tomaney, and Rodriguez-Pose, 2006). For policy per se, the policymakers have a vague understanding of industry clusters. Though based on geography, there are policy provisions for Special Economic Zones and industrial parks, but none of these considers city-based industry clusters in its true sense. It can be inferred from the literature on industry clusters that only hard interventions (i.e. in the form of CFC in case of India) are

not sufficient, the policymakers and stakeholders, need to improve their understanding about industry clusters for an effective policy. Thus, an important question that arises here is that is there a need to be biased depending upon the size of the firms when it comes to the provision of location-based cluster policy. Are policies pertinent to city-based industrial clusters possible? Should policymakers think beyond CFCs when it comes to clusters? What can the local cluster stakeholders and policymakers do to make clusters more competitive?

## METHODOLOGY

To ascertain whether uniform cluster policies irrespective of the size of the firm can exist, Kendall's tau test is administered on the responses collected from 126 firms belonging to large, medium and small category. These firms are from the four city-based auto clusters listed under DIPP's IIUS scheme. In each of the four clusters, a Public-Private Partnership Project worth INR 750 to 800 million (approx. USD 16 million), to support the local auto industry has been created. The auto clusters based at Aurangabad, Chakan (Pune), Nasik and Pithampur are shown in the map (Figure 1).

**Figure 1. Position of selected industry clusters**



Source: Created by authors for illustration purpose only

Aurangabad is the fifth largest industrial district in Maharashtra, which is one of the industrially developed states in India. Its placement on the Mumbai, Pune and Nasik quadrilateral makes it a fascinating destination for commercial activities. Chakan comes under the Pune district of Maharashtra. Pune has a strong base for many manufacturing industries including automobiles. Chakan, one among many clusters in Pune is gaining momentum rapidly because of its evolution as the major automobile hub of India. Its location on the Mumbai Pune expressway is an added advantage that can link it to the commercial capital of India within 3 to 4 hours. Pithampur falls in the state of Madhya Pradesh (MP), which is called the 'heart of India' because of its central location. Pithampur has a significant presence of auto, pharma and textile industries. Nasik is the third largest district in Maharashtra after Mumbai and Pune. A larger portion of the district belongs to fertile agricultural land. However, Nasik is not left far behind in terms of industrialization. Nasik owes its industrial development to the automotive and engineering industries. These four clusters have been taken as the representative of city-based industrial clusters in India.

Besides being a beneficiary of IIUS scheme, an obvious reason for selecting four clusters from the auto sector is its ability to fit in the characteristics of industry clusters. These auto clusters represent the hub and spoke topology, wherein a majority of small firms and scores of medium firms depend on a few large firms present in these clusters. All the four clusters individually are a combination of one to at most four OEMs, ten to twelve large firms and approximately 200-300 small firms engaged in the activities to support those at the upper tier. It needs to be acknowledged that despite the massive investment made in the clusters by the Central government along with the support of local industrial bodies, no major initiative to evaluate the effect of benefits has been carried out.

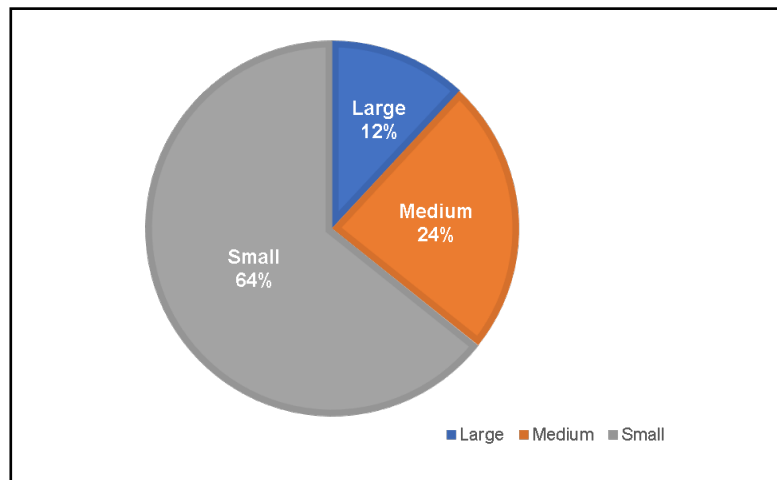
The questionnaire to collate the responses was borrowed and adapted from a framework provided by Bhawsar and Chattopadhyay (2015). The Framework addresses the competitiveness of industry clusters and is based on a thorough review of literature. It encompasses an array of factors that are relevant to industry clusters. From the four broad heads of the framework, only two, namely Government Factors (consisting indicators related to government support) and Sectoral Factors (consisting indicators related to the benefits/disadvantages of cluster formation) have been considered relevant for the purpose of this paper. The indicators under these heads were borrowed and given a form of Likert scale-based questionnaire, to collect the opinion of different category of



firms. The questionnaire was administered in person by the researcher by means of a visit to the different firms of the clusters. Responses were elucidated from 126 firms of various sizes. The proportion of firms contacted in each category was in accordance with the operational definition of industry clusters in India (as mentioned in an earlier paragraph). The survey was conducted during the six-month period from November 2015 to April 2016.

Kendall's tau test is administered in order to ascertain the differences in the perception of large, medium and small category firms towards government support and benefits of clustering. Kendall's tau test is a non-parametric test that measures the strength and direction of the association between variables measured on ordinal or continuous scales. The beauty of Kendall's tau test is that no prior assumption about the distribution of data is made, i.e., data need not be normally distributed. Hence, its use in social science research is quite prevalent. Figure 2 gives a description of the sample, and Table 1 reports the results of Kendall's tau test. The test was administered using SPSS.

**Figure 2. Distribution of firms from the selected cluster**



**Table 1. Result of Kendall's Test for difference in perception among Small, Medium and Large Firms**

<b>Benefits</b>	<b>Kendall's Tau</b>
<b><i>Government Support</i></b>	
Extent of bureaucratic hurdles	-0.078
Extent of regulatory standards demanded	-0.038
Support received for export promotion	-0.061
Support received for participation in trade fairs	-0.026
Support received in the form of grants and subsidies	0.022
Satisfaction with taxes and duties	0.037
<b><i>Labor</i></b>	
Local availability of skilled labor	0.096
Increase in employment in the past five years	-0.008
<b><i>Competition</i></b>	
Intensity of competition from the firms present in the cluster	0.048
Intensity of competition from other local (national) clusters	0.043
Intensity of competition from imported products	-0.048
<b><i>Networking and Collaboration</i></b>	
Support received from cluster/industry associations	-0.104
Extent of trust among cluster actors	-0.046
Extent of engagement on joint projects	0.081
Extent of partnership with research/academic institutions	0.070
Cost savings from within cluster transaction	-0.047
<b><i>Knowledge Spillover</i></b>	
Level of information exchange	0.049
Role of a cluster in influencing business-related learning	-0.102
Availability of testing labs/technical consultancy center	-0.059
Quality of testing labs/consultancy centers	-0.016
Improvement of productivity in the past five years	-0.177*
Extent of new technologies emerging from a cluster	-0.025
<b><i>Entrepreneurship</i></b>	
Ability of the cluster in attracting new firms	-0.041
Ease of starting a new business	-0.031
Ease of capital availability for starting a new business/project extension	-0.023
Ease of interaction with government bodies for clearance of proposals	-0.047
<b><i>Diseconomies</i></b>	
Extent of hike in commercial land prices	-0.164*
Extent of hike in prices of related infrastructure	-0.148
Extent of damage to the natural environment	0.015
Benefits received from CSR activities	-0.094
Improvement in standard of living	-0.152

\*. Significant at the 0.05 level (2-tailed).

## DISCUSSION

The results of Kendall's Tau test (Table 1) indicate that, broadly on the indicators listed under government support, labor availability, competition, and networking and collaboration, there appears to be no significant difference in the perception of firms, i.e., size/investment independent. A possible reason could be, the origin of the indicators mentioned under above heads are exogenous in nature, thereby firms in all the three categories have responded identically.

However, on the indicator "*the increase in productivity*" listed under "Knowledge Spillover" there exists a significant difference in the perception among the three categories of the firms. A possible reason for the difference in perception could be attributed to the firms' individual capabilities in adopting quality management/productivity enhancement techniques which are more endogenous in nature. It emerges from the discussion with respondents that specifically the large firms have their own quality enhancement support/mechanism. For e.g. it emerged from the discussion that a large firm "X" in the cluster has its own Heijunka production system in order to drive its manufacturing excellence. Not only this large firm is reaping benefits of enhanced productivity with its Heijunka production system, but it is also helping its vendors (which are of small to medium-sized firms). The concept of 'vendor clusters' (buyer-supplier cooperation for improving production) is a common industry practice. The practice has improved the quality of locally made components, encouraged knowledge spill-overs and resulted in higher productivity. But not all the firms within a cluster receive these benefits. The reason being, the magnitude of support declines with the increase in distance i.e. tier of the firms acting as vendors to the large firm.

The other indicator where the significant difference between the three categories of firms has been observed is the "*extent of hike in commercial land prices*" under "*diseconomies*". The variation in the perception exists because of government's bias in providing land on a case to case basis. Under the existing industrial development policies, the government offers various benefits to large firms. For large, ultra large and mega firms the allotment of land comes with various perks and benefits like exemption on taxes for certain period of years. Government policy assumes that this policy will induce industrial infrastructure, employment generation and in general development of the region. It needs to be reckoned that a cluster hosts a greater number of SMEs in comparison to a few large firms. Overall, the results indicate that there is a scope for having geographic cluster

specific policies irrespective of the size of the firms. This is in contrast to the existing government's policy focus.

With this, the next question in place is what policy recommendations can be made for geographic city-based clusters. The section following covers such recommendations suitable in the context of clusters in India. However, various papers covering policy suggestions from clusters from various regions of the world have been thoroughly reviewed to build the section.

## **POLICY/ STRATEGIES FOR PROMOTING INDUSTRY CLUSTERS**

On the issue of diluting cluster policy with industrial policy, Porter (1998) writes that “a role for governing cluster development and upgrading should not be confused with the notion of industrial policy...the intellectual foundation of cluster theory and industrial policy are fundamentally different as their implications for government policy”. The most striking difference in Porter's contention is “Cluster theory emphasizes not market share but dynamic improvement”. Porter (2007) stresses that the policies targeted at addressing general business environment, the competitiveness of individual firms categorizing them in favorable categories as large, small and even too at the sectoral level is distortive and interventionist. In the context of USA Porter continues “a crucial locus for the federal economic policy has been largely ignored, which is cluster”. Since cluster aligns very well with the modern economy giving a concrete identity to the regions supporting them for trade at various levels, cluster place policies should replace industry and firm-level policy. Porter believes economic policies must not only limit to national and state levels but get a place at the level of clusters too.

Porter's (2007) suggestions related to cluster policy is of great use to India. Porter argues that the government's intervention in the form of policy at the level of clusters should start with the collection of information like cluster composition, employment, performance, etc. this identifies the existence of cluster. Following the organization of clusters like trade associations is advantageous as a majority of the members that constitute the cluster are a part of such an organization. The other alternative is for the government to enter into a dialog with cluster participants to understand local constraints, gaps, and weaknesses in the public policy. Cluster policy should incentivize participants to spur collective investment in assets such as university research centers, community college,

or testing facilities, etc. that may benefit many cluster participants. However, public investment in assets involving cluster externalities can also be an dimension.

Pike, Tomaney, and Rodriguez-Pose (2006) lay responsibility on the government's shoulder, by stressing the importance of institutions as an amateur, facilitating dialog and negotiations, mobilizing stakeholders and encouraging them into the development process and for enhancing policy continuity and empowering territories. They stress that the success of a local and regional economy is a matter of its 'institutional maturity' i.e. how empowered are the local, regional and city level institutions in pursuit of development goals. An example of such a form of government support can be benchmarked from the Silicon Valley Cluster where the Federal government (i.e., Department of Defense) serves as customers of products, finances 44 percent and 66 percent of R&D expenditure at the major Universities. The State Government provides funding for the public university system while the local government supports by coordinating with all the organizations (Bailey and Montalbano, 2018).

Besides Silicon Valley USA, India can learn from the successful examples of cluster policies of European nations. The Global Cluster Initiative Survey of 2012 carried under the European Cluster Observatory reports the existence of more than 1400 cluster initiatives in Europe. According to a report by the Oxford Research (2008) that summarizes cluster policies of 31 nations in Europe, cluster policy in Europe started from 1990, post popularization by Porter. The various policy report summarizes can set an example for India to follow up. The European model of cluster policy from many nations involves various ministries like the ministry of finance/economy, ministry of science and research, ministry of urban affairs, ministry of road transport, and export promotion councils. India too can build a comprehensive cluster strategy involving all ministries. The European model states the fund for clusters comes from various sources like the federal governments, businesses itself, local and state government. In India to a certain percentage of funds should also be contributed by the constituent members of clusters.

In 2006, Germany's Federal Government has adopted a cohort strategy for clusters promotion that involves fostering cutting edge competition among clusters, setting the pace for gearing non-technological sectors, building clusters in high technology sectors, promoting exchange between firms and universities. India should also thrive to implement partnership between institutes/university and clusters for joint project development, internships, placements, skill requirements. Promoting competition among similar clusters and motivating them by extending financial and non-financial measures. Integration of

research related institutions to clusters is one of the strategies Finland has adopted. It is notable that Finland is known around the world for its technology and innovation potential. Various committees to handle cluster level operations like strategic reflection, consensus building, quality management, and internationalization need to be formulated.

Various workable cluster strategies have been suggested in the works of notable authors. Pessoa (2011) is of the view of maintaining industrial targeted cluster policy. He argues on Rodriguez-Clare (2007) 'Classical optimal production policy perspective' to provide production subsidy to firms. Providing subsidies to firms generating externalities is also one perspective to strengthen cluster competitiveness. Martin and Sunley (2003) suggest for building cooperative networks, boosting communication between firms and relevant agencies, collective marketing of clusters production, provision of local services like financial advice, and marketing to the cluster firms, recognition of weaknesses in existing cluster value chains and fascinating investors and businesses to bridge the gap. Cumbers and Mackinnon (2004) urge on identifying clusters worthy of support. They suggest support in the form of R&D support, training, venture capital, fostering incubation culture and most strikingly they urge to inculcate a sense of cluster identity among the constituent firms and organizations.

According to Newlands (2003), the policy prescription for clusters should differ based on promoting competition or cooperation. Newland critics recent research for placing too much emphasis on collaborative actions in clusters that the idea of competition has gone extinct. However, the two concepts are not opposites. The policy prescription is that, to bolster competition government should raise investment in the cluster, while for enhancing collaboration the government should support decentralization and should encourage public-private research collaboration.

Mills, Reynolds, and Reamer (2008) is of the view that any public policy aimed at clusters should strive the three critical success factors of clusters i.e. collaboration, skills and abilities, and organization capabilities. The suggestion is to create an information center to map the geography of clusters, maintaining the records of cluster initiatives and programs, conducting research on cluster dynamics, and initiating program impacts and best practices. Financial and non-financial grants in the form of cluster support should come from the government. However, Mills, Reynolds, and Reamer (2008) strongly recommend getting rid of 'public good' or 'free rider' mindset problem with clusters. In a study on US-based clusters, Felbinger, and Rohey (2001) suggest that the private

interrelated firms within clusters should follow a bottom-up strategy by working together to identify and resolve common needs and concerns.

In terms of suggesting policies for clusters, Cortright (2006) clarifies that clusters are not just a public-sector activity neither it's a program. The uniqueness of individual cluster should be shaped for its better economic future. The focus of research should be on figuring out the specific characteristics of clusters that can lead to such performance rather than in proving what benefits clusters have on the economic performance of firms. Cortright (2006) urges local leaders, businesses, media, and government to gain a better perspective about their regions challenges and opportunities by thinking in terms of a cluster. The first step to it is to describe and analyze the regional economy in terms of a cluster. Waits (2000) suggests engaging industry leaders in crafting strategies for clusters and to foster communication and networking among companies within and across clusters.

## CONCLUSION

Industry Clusters are the central structuring element of economic activity for firms, regions and even national economies. Thus, industry clusters have been raised to prominence in policy agendas of many nations. India is not an exception in embracing the concept of clusters. City-based industrial clusters are serving as the most elementary unit of industrial activity in India. However, the cluster policy is still at a nascent stage in India. The case of functional cluster schemes and the cause for a dedicated cluster policy to be implemented in India has been discussed in this paper. Though Government offers schemes like DIPP's IIUS scheme targeted for the city-based industrial agglomerations and Cluster Development Programs targeted under various Ministries, it can be inferred that role of clusters have not been fully recognized or understood for the sake of policy per se. The mere provision of infrastructure is not going to help firms in the clusters to achieve their full potential, be it 'performability' in the context of developing countries as argued by Moon et al. (2013) or the overall 'dynamic improvement' as argued by Porter (2007). By means of a survey of 126 firms of large, medium and small size from the four auto clusters and based on the results obtained from Kendall's tau test, it can be concluded that there exists adequate scope for implementing firm size neutral policies to be functional at the geographic level of cluster.

The policy lessons can be benchmarked with the successful clusters like Silicon Valley Cluster and European Clusters. The first and foremost requirement is by remaining

abreast in the form of facts and figures with the information of the existing clusters. Providing clusters with vision, objectives and action plans, to be achieved under experienced leadership and enforcing/motivating cluster members to form horizontal ties and creating a cluster ecosystem for a free flow of ideas, goods, and people is a necessity. Eliminating the problem of the 'public good' mindset attached with clusters by initiating awareness camps on the benefits of working in harmony in a cluster, can be a good doable strategy. Various ministries should be involved with certain percentages of subsidies to foster support activities in clusters. In order to promote competition in clusters, the government can promote the respective clusters for attaining domestic as well as foreign investment. This may lead to more job creation and tax earnings leading to the prosperity of the economy of the region/city which caters the cluster. Encouraging and rewarding competition among clusters catering to the similar industry could be an indirect way to gear up competition and cooperation among SMEs which are weaker in isolation. Besides these, enabling production subsidies to firms which takes initiatives for knowledge spill-over within clusters, collective marketing of the production of clusters, organising cluster tours and exhibitions to foreign and national buyers and in lieu charging a certain percent of brokerage of the businesses generated for keeping cluster financially stable can prove as a good actionable policy initiative for clusters success.

To close the paper, it is important to mention that this study is perhaps one of its kind from India because it attempts to put forward the scope for a dedicated policy aimed at industry clusters in India. The positive aspect of the study is it directly involves survey from the firms in the clusters unlike being based on secondary data. In addition, it tries to fill in the gaps in the present schemes by recommending best practices/policies from the successful cluster policies/practices from around the world. However, the limitation lies in the small sample size wherein inclusion of more clusters and therefore more firms can strengthen the findings and opens the scope for the use of parametric techniques. Despite this limitation, the paper contributes to the literature on cluster policy from India, which is sparse.



## REFERENCES

- Basant, R. 2008. Bangalore cluster: Evolution, growth, and challenges. In S. Yusuf, K. Nabeshima, and S. Yamashita, editors, *Growing Industrial Clusters in Asia: Serendipity and Science*. Washington DC: The World Bank.
- Baily, M. N. and N. Montalbano. 2018. Clusters and innovation districts: Lessons from the United States experience. *Economic Studies at Brookings Institution*. Available at [https://www.brookings.edu/wpcontent/uploads/2018/01/es\\_20180116\\_bailycluster\\_sandinnovation.pdf](https://www.brookings.edu/wpcontent/uploads/2018/01/es_20180116_bailycluster_sandinnovation.pdf) (accessed 14 June 2019).
- Barkley, D. L. and M. S. Henry. 2001. Advantages and disadvantages of targeting industry clusters. Available at: [http://www.clemson.edu/redrl/re\\_bib.htm](http://www.clemson.edu/redrl/re_bib.htm) (accessed 4 February 2015).
- Bhawsar, P. and U. Chattopadhyay. 2015. Evaluation of cluster competitiveness: Review, framework and the methodology. *Competition Forum* 13(1): 75- 91.
- Caniels M. and H. Romjin. 2003. Dynamic clusters in developing countries: Collective efficiency and beyond. *Oxford Development Studies* 31(3): 275-292.
- Chaminade, C. and J. Vang. 2006. Innovation policy for Asian SMEs: Exploring cluster differences. *DRUID Summer Conference 2006 on Knowledge, Innovation and Competitiveness: Dynamics of Firms, Networks, Regions and Institutions*. Copenhagen, Denmark, June 18-20, 2006.
- Cooke, P. and K. Morgan. 1998. *The Associational Economy: Firms, Regions, and Innovation*, Oxford: Oxford University Press.
- Cortright, J. 2006. *Making Sense of Clusters: Regional Competitiveness and Economic Development*. Available at <https://www.brookings.edu/research/making-sense-of-clusters-regional-competitiveness-and-economic-development> (accessed 10 May 2013).
- Crawley, A. and D. Pickernell. 2012. An appraisal of the European cluster observatory. *European Urban and Regional Studies* 19(2): 207-211.
- Cumbers, A. and D. MacKinnon. 2004. Introduction: clusters in urban and regional development. *Urban Studies* 41(5/6): 959-969.
- Das, K2008. *Fostering Competitive Clusters in Asia: Towards an Inclusive Policy Perspective*. VRF Monograph Series No. 437, Institute of Developing Economies, IDE-JETRO, Chiba, Japan.
- Dasanayaka, S. W. S. B. and G. D. Sardana. 2010. Development of SMEs through clusters: A comparative study of India, Pakistan and Sri Lanka. *World Review of Entrepreneurship, Management and Sustainable Development* 6(1/2):50–70.

- Enright, M. 1996. Regional clusters and economic development: A research agenda. In U. H. Staber, N. V. Schaefer, and B. Sharma. *Business Networks: Prospects for Regional Development*. Berlin, New York: de Gruyter.
- Europe Innova Cluster Mapping Project. 2008. Cluster policy in Europe. A brief summary of cluster policies in 31 European countries. Available at: [http://publications.europa.eu/resource/cellar/6f14c45f-7d6a-49c7-9bbf-785b313657d4.0001.03/DOC\\_2](http://publications.europa.eu/resource/cellar/6f14c45f-7d6a-49c7-9bbf-785b313657d4.0001.03/DOC_2) (accessed on 12 March 2017).
- Felbinger, C. L. and J. E. Rohey. 2001. Globalization's impact on state and local policy: The rise of regional cluster-based economic development strategies. *Review of Policy Research* 18(3):63-79.
- Fujita, M., P. Krugman, and A. Venables. 1999. *The Spatial Economy: Cities, Regions, and International Trade*. Cambridge, MA: MIT Press.
- Fujita, M. and P. Krugman. 2004. The new economic geography: Past, present and the future. *Papers in Regional Science* 83(1):139-164.
- Ganne, B. and Y. Lecler. 2009. From industrial districts to poles of competitiveness. *Asian Industrial Clusters, Global Competitiveness and New Policy Initiatives*. Singapore: World Scientific Publishing.
- De Marchi, V., E. Di Maria, and G. Gereffi. 2017. *Local clusters in global value chains: Linking actors and territories through manufacturing and innovation*. UK: Routledge.
- Eriksson, S. 2013. *Clusters and Economic Growth in Asia*. UK: Edward Elgar Publishing.
- Giuliani, E., C. Pietrobelli, and R. Rabellotti. 2005. Upgrading in global value chains: Lessons from Latin American clusters. *World Development* 33(4): 549-573.
- Karlsson, C. 2010. *Handbook of Research on Cluster Theory* (Vol. 1). London: Edward Elgar Publishing.
- Ketels, C. H. 2006. Michael Porter's competitiveness framework recent learnings and new research priorities. *Journal of Industry, Competition and Trade* 6(2):115-136.
- Ketels, C., G. Lindqvist, and Ö. Sölvell. 2012. Strengthening clusters and competitiveness in Europe. *The Role of Cluster Organizations*. The Cluster Observatory. Center for Strategy and Competitiveness: Stockholm. Available at: <http://www.clusterobservatory.eu/eco/uploaded/pdf/1352713149177.pdf> (accessed on 29 January 2017).
- Ketels, C. 2015. Clusters for competitiveness: Mobilising the power of modern cluster policy. *18th TCI Global Conference*, Daegu, South Korea.

- Krugman, P. 1991. Increasing returns and economic geography. *Journal of Political Economy* 99(3):483-499.
- Kuchiki, A. and M. Tsuji. 2004. *Industrial Clusters in Asia*. UK: Palgrave Macmillan.
- Marshall, A. 1890. *Principles of Economics*. NY: Prometheus Books.
- Maskell, P. and A. Malmberg. 1999. Localised learning and industrial competitiveness. *Camb J Econ* 23(2): 167-185.
- Mills, K. G., E. B. Reynolds, and A. Reamer. 2008. *Clusters and competitiveness: A new federal role for stimulating regional economies*. Washington: Brookings Institution. Available at: <https://www.brookings.edu/research/clusters-and-competitiveness-a-new-federal-role-for-stimulating-regional-economies/> (Accessed 5 January 2017).
- Moon, H. C., J. Parc, S. H. Yim, and W. Yin. 2013. Enhancing performability through domestic and international clustering: A case study of Samsung Electronics Corporation (SEC). *International Journal of Performability Engineering* 9(1): 75-84.
- Motoyama, Y. 2008. What was new about the cluster theory? What could it answer and what could it not answer? *Economic Development Quarterly* 22(4):353-363.
- Majumdar S. and N. Choi. 2011. Cluster dynamics and performance in traditional industries: critical review of lock, metalware and glassware industries in North India. In *Prospects of Regional Economic Cooperation in South Asia & Special Studies on Indian Industry*. Oxford: Chanos Publishing,
- Nadvi, K. 1999. Collective efficiency and collective failure: The response of the Sialkot surgical instrument cluster to global quality pressures. *World Development* 27(9):1605-1626.
- Narayana, M. R. 2014. Growth effects of industrial clusters: Evidence and implications for India. *South Asia Economic Journal*, 15(1): 71-92.
- Niu, K. H., G. Miles, S. Bach, and K. Chinen. 2012. Trust, learning and a firm's involvement in industrial clusters: A conceptual framework. *Competitiveness Review* 22(2):133-146.
- Okada, A. and N. S. Siddharthan. 2007. Industrial clusters in India: Evidence from automobile clusters in Chennai and the national capital region. [IDE Discussion Papers](#) 103, Institute of Developing Economies, Japan External Trade Organization (JETRO) Retrieved September 2013 from <https://core.ac.uk/download/pdf/10844387.pdf>.
- Oxford Research. 2008. *Cluster Policy in Europe. A Brief Summary of Cluster Policies in 31 European Countries*. Kristiansand, Norway. Europe Innova Cluster Mapping Project.

- Retrieved December 2016 from  
<https://www.scribd.com/document/53330456/cluster-policy-in-Europe>.
- Pessoa, A. 2011. The cluster policy paradox: Externalities vs. comparative advantages. *Universidade do Porto, Faculdade de Economia do Porto*, 431.
- Pike, A., J. Tomaney, and A. Rodriguez-Pose. 2006. *Local and Regional Development*. UK: Routledge.
- Pillai, P. M. 2000. Industrial clusters under duress: Coimbatore pump manufacturers and Liberalisation. *Economic and Political Weekly* 4207-4216.
- Porter, M. E. 1990. *The Competitive Advantage of Nations*. London: MacMillan
- Porter, M. E. 1998. Clusters and the new economics of competition. *Harvard Business Review* 76(6):77-90.
- Porter, M. E. 2000. Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly* 14(1):15-34.
- Porter, M. E. 2007. *Clusters and economic policy: Aligning public policy with the new economics of competition*. Cambridge: Harvard Business School.
- Ranawat, M. and R. Tiwari. 2009. *Influence of government policies on industry development: The case of India's automotive industry*. Working Paper (57), University of Hamburg, Germany. Available at: <https://ssrn.com/abstract=1583449> (accessed on 12 January 2014)
- Rodriguez-Clare, A. 2007. Clusters and comparative advantage: Implications for industrial policy. *Journal of Development Economics* 82(1):43-57.
- Rosenfeld, S. A. 1997. Bringing business clusters into the mainstream of economic development. *European Planning Studies* 5(1): 3-25.
- Saxenien, A. 1994. *Regional networks: industrial adaptation in Silicon Valley and route 128*. Cambridge: Harvard University Press.
- Sonobe, T. and K. Otsuka. 2011. *Cluster based Industrial Development A Comparative Study of Asia and Africa*. UK: Palgrave Macmillan.
- Tallman, S., M. Jenkins, N. Henry, and S. Pinch. 2004. Knowledge, clusters, and competitive advantage. *Academy of Management Review* 29(2):258-271.
- Yusuf, S. K. Nabeshima, and S. Yamashita. 2008. *Growing industrial clusters in Asia: Serendipity and science*. Washington, DC: World Bank.