

# **A Frame-work for Cluster Initiatives in the Indian Context**

*by*

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## **1. What is a Cluster?**

Clusters are geographical concentrations of interconnected firms, specialised suppliers, service providers and associations of institutions in a particular field that are present in a town, city or region. Clusters happen because they help increase the productivity of the member-firms and thus their competitiveness. Historically, there is an observed tendency, across the globe, for firms, especially the smaller ones, to come close to one another, for a variety of reasons like:

- proximity to raw material sources
- presence of skilled labour
- availability of suitably customised business services
- proximity to markets and customers
- abundant clients attracted by the cluster in that region.

This clustering process is observed in developing as well as developed countries. Studies indicate that such clusters have achieved high level of competitive advantage and leadership in profitable niches of world markets. Example: Jewellery, textiles,

leather etc. Cases can be cited in Italy, USA, Japan, Mexico, Brazil, India, South Korea, Malaysia, Indonesia etc.

## 2. Clusters in India.

Systematic cluster initiatives are of recent origin in India. All the same number of clusters have emerged in India; their relevance to the economy is not insignificant<sup>1</sup>.

- Clusters account for 40 % of the country's industrial output
- As per UNIDO Survey there are 330 small scale industries clusters and 2000 rural and artisan clusters in India.
- 60 % of the manufactured exports of India come from clusters
- Some clusters are very big and account for major portion of the output in the product segment. Example: KnitWear in Ludhiana, Gems and Jewellery in Mumbai and Surat, Sports Goods in Ludhiana, etc.
- Some clusters - like Handicrafts – are very small with less than 100 workers; but they are so specialised that they are globally unmatched in skills and quality.

Some of the prominent Clusters in India are listed below<sup>2</sup>:

S. No	Product	City	State
1	Fan	Hyderabad	Andhra Pradesh
2	Brass & Bell Metal	Hajo	Assam
3	Gun Manufacturing Units	Munger	Bihar
4	Brass & German Silver Utensils	Pareb(Patna)	Bihar
5	Readymade Garments	New Delhi	Delhi
6	Rice Flakes	Gondal	Gujarat
7	Pharmaceutical	Goa	Goa
8	Rice Milling	Karnal	Haryana
9	General & Light Engineering Industry	Parwanoo	Himachal Pradesh
10	Joinery / Furniture	Srinagar	Jammu & Kashmir
11	Cricket Bat Manufacturing	Anantnag	Jammu & Kashmir
12	Auto Components	Jamshedpur	Jharkhand
13	Foundry Industries	Belgaum	Karnataka
14	Basic Drugs	Thane	Maharashtra
15	Sewing Machine and Parts	Ludhiana	Punjab
16	Wet Grinder	Coimbatore	Tamil Nadu
17	Cotton Hosiery	Kanpur	Uttar Pradesh
19	Hosiery & Knitwear	Tirupur	Tamil Nadu

## 3. Cluster Development Initiative

The development and upgrading of clusters is a significant agenda for governments, firms and developmental institutions. Cluster development initiatives are an important

new direction in economic policy, building on the prior efforts of economic stabilisation, privatisation, market-opening, and reducing the costs of doing business.

It is generally believed that changes in technology and competition have reduced the traditional relevance of location<sup>3</sup>. However development and growth of cluster continues to indicate that location is still an important factor in the success of an enterprise. In fact economic developments of many regions are crippled by the peculiar geography of the region<sup>4</sup>. An example is north eastern part of India. This region's development has been adversely affected by the region being land-locked and being denied easy access to external markets. The economic development had also been victim of the peculiar geo-politics of the region. One of the possible methods of overcoming the inherent limitation and disadvantages of geography is development of clusters. Development of clusters would impart a new strength that individual firms normally would find it difficult to acquire; this would be their escape velocity beyond the constraints and disadvantages.

### **3.1. Challenges of Cluster Initiative**

- Achieving competitiveness in the global market through cost-cutting, Productivity Improvement, Supply Chain Management, R&D, Public Infrastructure etc.<sup>5,6</sup>
- Achieving better access to global markets through quality up-gradation, better reach to the customers, Branding, Certification, networking and other marketing strategies<sup>7</sup>.
- Creating better patent regime through improved legislation better enforcements and better IPR culture.
- Creating an innovation culture and a vibrant eco-system through networking, attracting better talents in all fields etc.<sup>8</sup>

### **3.2 Limitation of SMEs in the Indian Context**

- Most of SMEs are owner managed and hence ill-equipped to grow beyond certain size. Size decides the organization and its mind set. This has serious impacts on the firm's ability to avail of inputs in technology, market information, supply chain management etc.
- SMEs are used to competing in the limited markets. They are not aware of the larger market needs and the changing environment. SMEs do not have the ability or the resources to study the larger market trends.
- SMEs do not have adequate resources to monitor and acquire the latest technological trends or to carryout meaningful R&D.
- The ability of SME to mobilize resources is limited.
- Seldom do SMEs have long-term perceptive plan or corporate plans.
- Succession management is a problem with most SMEs
- Long term sustenance of SMEs is a big issue at all times. As a result banks also hesitate to commit funds to the SMEs.

If the firms have to have a natural growth and long term sustenance, they have to come out of the limitations cited above. Cluster development must attempt to overcome these difficulties

### **3.3. Objectives of Cluster Development Initiatives**

Based on the challenges and limitations faced by the SMEs the objectives of cluster development initiative can be defined as

- Enhance the competitiveness of the SMEs through
  - Technological Inputs
  - Marketing Inputs
  - Operational and Managerial Inputs
- Enhance access to global markets through
  - Quality enhancement
  - Branding and Certification
  - Better reach to customers

### **4. Key Success Factors of Cluster Development**

Historically clusters have evolved for a variety of reasons. In *the industrial society* the value addition in any conversion process was relatively less and hence the factors that influenced the emergence and sustenance of clusters were primarily the availability of raw materials, followed by skills and labour. Transportation would have been the next most significant factor followed by physical climate, entrepreneurship and external ambience. Establishment of a large enterprise like Tata Steel in Jamshedpur led to the growth of a cluster of ancillary industries around Jamshedpur. Establishment of large public sector enterprises led to the development cluster of ancillary industries in Bhilai, Bokaro and similar other places. Bangalore is another example of electronics cluster in the 70s and 80s propelled by the existence of a number of public enterprises. Ahmedabad had a vibrant textile cluster as far back as the beginning of the 20th century.

In *the post-industrial society*, the extent of value addition in any conversion process has tended to increase. Technology, knowledge and skills began to assume more significance in the emergence and sustenance of clusters. Products as well as firms began to be more and more knowledge intensive. This reduced the significance of the availability of raw materials and its transportation. Other factors continued to maintain their relative significance in the same manner. Among them ambient conditions and availability of sophisticated skills began to be more significant; existence of schools, polytechnics, colleges and universities providing higher-end skills began to be more important. Customer-orientation and customisation began to be more critical. The evolution of Bangalore into an IT cluster follows the global pattern where the IT segment evolved from the electronics industry propelled by the existence of a large pool of technical manpower aided by the Universities and colleges that produced the technical manpower.

Transformation of an old order cluster into a new era cluster takes place when knowledge, skills and technology were abundantly available in addition to the

externalities like physical climate, entrepreneurship and enlightened leadership. Very often Universities and technical colleges aided this process. At the end of the Second World War, Singapore's economy was dependant on its ability to cater to the requirements of the British Army that was stationed there. Once the British Army decided to withdraw from Singapore, the economy was in a state of turmoil; thanks to the enlightened leadership and the Herculean efforts of the Economic Development Corporation, Singapore found its moorings in a new cluster of businesses<sup>9,10</sup>. When the textile cluster in Ahmedabad, the city once known as the Manchester of India, collapsed under its own legacy of indifference to modernisation, it was the inherent entrepreneurship of the local people that found a new direction in the form of pharmaceutical cluster.

Whenever a cluster as well its members are not able to keep pace with the market trends and when they fail to exhibit enlightened leadership among themselves and the cluster as a whole, *death and decay begin from within the cluster*. Such situations also happen when the cluster and its members fail to move up the value-chain of activities and fail to be competitive. The collapse of the textile cluster at Ahmedabad is a classic example. The textile cluster grew for almost a century in Ahmedabad. The leaders of the mills did not care to modernise their physical facilities, neither did they exhibit an understanding of the emerging scenario; this lead to most of them finding themselves in the dust-heaps of history. Rajkot, in Gujarat had a thriving engineering cluster making predominantly oil engines and their parts. Oil-engines were catering to the needs of irrigation in the agricultural sector all over India. The country's demand for oil engines were met by Rajkot cluster and a similar cluster at Coimbatore. The demand for oil-engines began to diminish with the advent of rural electrification. Besides there was need to upgrade the designs to achieve better productivity. The Rajkot cluster and its members did not exhibit the sensitivity to understand the emerging scenario; the cluster started declining at an accelerating pace.

Theoretical back-up for the analysis of clusters continues to be the seminal work of Porter<sup>11</sup>. Michael Porter propagated the view that innovative clusters are necessary for export earnings and the development of national competitive advantage. For a nation's industry to be internationally competitive, it is necessary that there exist a synergistic relationship among the four variables described under the 'Diamond Factor Model'. The variables are: (1)Factor Conditions, (2)Local Demand Conditions, (3)Related and Supporting Industries as well as (4)Firm Strategy, Structure and Rivalry. Apart from these Porter has listed two other variables – Chance Events and Government - also to have influence over the development of clusters. In subsequent studies<sup>12</sup> it is observed that in developing countries, the development of the clusters are significantly influenced by the variable, Government. One reason could be that in developing countries the four key variables are not adequately strong leaving the onus on the Government to create the conditions for the development of clusters. In other words this amounts to saying that in developing countries Government has a pro-active role to play in the development of clusters.

## **The Bangalore Phenomenon**

The Bangalore Software cluster, with more than 1400 firms and annual exports of more than US\$5 billion in 2005 is the fifth largest in the world. The cluster includes foreign names like Texas Instruments, Hewlett Packard, Motorola, IBM and a host of others; it includes Indian software majors like Infosys, WIPRO etc. joint ventures like PST Data Systems, large number of start-ups besides an innumerable number of Small and Medium Enterprises[SMEs].

### **The Evolution of the Bangalore Cluster**

- Bangalore has salubrious climate; the British developed Bangalore as an oasis away from the tropical heat of the vast Deccan plateau. It became a well planned cantonment and a sought after place of residence.
- In the post-independent era Government of India [GOI] established a number of Public Sector Undertakings[PSUs] like Hindustan Machine Tools Ltd, Hindustan Aeronautics Ltd, Bharat Electronics Ltd, India telephone Industries Ltd and many others. This led to the creation of a technological base and pool of technologically qualified manpower.
- The PSUs attracted qualified technical manpower from all over India. Many of them chose to stay back at Bangalore because of the congenial climate and facilities. This led to the cosmopolitan culture of Bangalore.
- The House of Tatas initiated, in the 1940s, the Tata Institute of Science as a center of excellence in science and technology. After independence this transformed into the Indian Institute of Science, one of the prominent institutions in the country dedicated to pioneering research in a variety of areas of science and technology.
- The large number of PSUs necessitated the development of a large number of SMEs as vendors leading to the technological manufacturing base of Bangalore.
- Karnataka Government's liberal education policy nurtured the creation of large number of technological institutions in and around Bangalore leading to the abundant technological manpower. Since the number of such institutions in Karnataka was far more than in other states of the country, people from all over India moved to Karnataka for technological education further enhancing the manpower supply to the Bangalore cluster.
- When GOI embarked on the concept of Software technology Parks [STP], Bangalore was one of the first choices. Through quality infrastructure provided by GOI many new firms came into existence in the software industry.
- Karnataka Govt was very proactive and contributed significantly to the emergence of Bangalore by providing infrastructure and tax sops to all emerging firms. Karnataka Govt was the first among the state Govts to come up with a comprehensive IT Policy in 1997.
- In the 1980 when the concept of venture capital emerged, Bangalore was the obvious choice. In fact TDICI [Technology development and investment Corporation of India, the venture capital arm of ICICI Ltd, with its corporate office at Mumbai] chose to establish its corporate office at Bangalore only.

In the 1990s when the concept of ITES [IT Enabled Services] emerged, Bangalore was again the obvious choice for all the majors in the field.

*Compiled by the author based on the information from Didar Singh A: The Essential Ingredients of Bangalore's Success: Some Lessons from Cluster*

## **5. General Approach to Cluster Development Initiatives**

Historically clusters have been happening or evolving over a period of time on their own. In the present context clusters have to be developed as a result of deliberate policy and strategy in relatively short span of time. The critical factors have to be nurtured through strategy, participation of the players and innovative implementation. The essentials of this strategy consist of three stages.

- Stage-I : Assessing the Prospects of a cluster.
- Stage-II : Creating awareness among the players/participants and preparing them to participate.
- Stage-III : Cluster Implementation

### **5.1. Stage-I: Assessing Prospects of a Cluster**

A prescriptive approach for cluster development will consist of a primary assessment of the ground level situation. After this a detailed study has to be made regarding the scope for growth and development of the cluster. Based on these one can arrive at the critical factors to be addressed for the development of the cluster. This will enable development of a suitable strategy for the cluster.

#### **a. Cluster Resources Survey**

- *Is it a cluster?* Identify the nature and definition of the cluster in terms of product [auto components] or skills [Foundry] or inputs [plastics] or outputs [garments, jewellery].
- *Size of the cluster:* No. of member entities; volume of output etc leading to an assessment of the critical mass of the cluster.
- *Supplies/Inputs:* Sources and availability, price, quality and quantity etc over short-term and long-term.
- *Conversion processes:* technology and process employed; skills and equipments; sources and supply situation; How does the process/technology compare on a national/global levels?
- *Infrastructure:* Transportation[ roads, rail head, airport, port]; power, water and other utilities; land and built-up space; communication facilities[ posts, telephones, couriers etc]; access to urban facilities; residential facilities; educational facilities; scope for expansion and growth;
- *Output/Demand side:* Quantity and quality of output; cost of production and its comparison with national/global sources; Proximity and access to customers and markets; characteristics of the customers.
- *People Aspects: Labour:* sources and supply of quantity and quality; skill levels and training facilities; ethnic, cultural and attitude aspects; trade unionism and the tradition of conflict resolution.
- *People Aspects: Entrepreneurs:* Ethnicity; single/multi ethnic and characteristic therein; Education experience and exposure levels; Culture and traditions relating to labour management, succession management, corporatisation, etc [attitude to

change]; Aspiration levels; resource mobilisation levels; achievement motivation etc.

- *Facilitators*: Presence of Banks and their experiences; Presence of Consultants and their experiences; Presence of NGOs, Educational Institutions, Govt Agencies and their experiences etc.
- *External Environment*: General Law and Order situation; Crime situation and presence of criminals/criminal-groups; Quality of law enforcement; presence of political parties, politically influenced trade unions, and their impact on work culture; history of man-days lost in a year; traditions of dispute resolution etc.

### **b. Scope for Growth and Development of the Cluster**

A clear assessment of the prospects of development of the Cluster will have to be made with specific reference to the following aspects

- a. Industry analysis of the Cluster
  - \* Is the industry/segment in the sunrise or sunset sector
  - \* Structural analysis of the industry similar to Porter analysis
- b. Future prospects of the sector and hence that of the cluster
- c. Assessment of competitive advantage of the Cluster.

### **c. Critical factors for development of the Cluster**

The earlier analysis would lead to a clear assessment of SWOT analysis and an understanding of the critical factors that need to be addressed. This would form the basis to evaluate the feasibility of developing the cluster; which essentially is an evaluation whether the critical factors can be nurtured and how.

## **5.2.Stage - II : Creating Awareness**

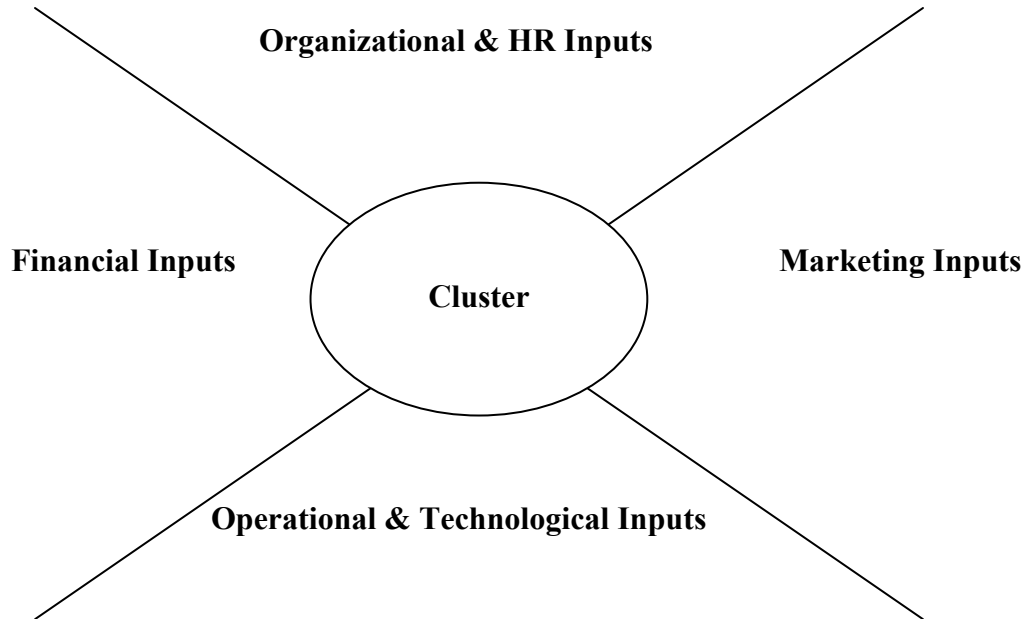
*a. Creating a Nuclei*: Successful development of cluster requires active involvement of the participating entities. This calls for **awareness** among the prospective participants and identification of some of them to act as nuclei. This will also include creating a skeleton organization through participation of the entities and empowering and professionalizing it in a gradual manner.

Initially a facilitator (a bank, NGO or a consultant) will have to work with the entities in the region and make them aware of the concept of cluster development. It has to gradually evolve an organization/association of the member-entities and instil knowledge about the benefits of networking. The facilitator has to empower this organization by inducting qualified and competent persons into the organization, either from among the member entities or from outside, and develop processes that will facilitate the capacity building of the network.

*b. Empowering*: Various inputs are to be provided to the member entities and to the cluster organization as a whole to enhance its capability in various functional aspects and also in leveraging the network for the benefit of the member entities. The various inputs



that will be required to be provided are shown in the diagram below. Some details of each of the inputs are also given in tabular format.



**Inputs forming part of the Cluster Development**

Organizational & HR Inputs	<ul style="list-style-type: none"> <li>• Guidance on Corporatisation</li> <li>• Guidance on organization structure</li> <li>• Manpower selection and training</li> <li>• Creating systems</li> </ul>
Marketing Inputs	<ul style="list-style-type: none"> <li>• Understanding markets, Market Research</li> <li>• Product Development</li> <li>• Pricing</li> <li>• Distribution</li> <li>• Market Information, Data analysis</li> <li>• Branding</li> <li>• Buyer-seller meets</li> <li>• E-Marketing</li> </ul>
Operational & Technological Inputs	<ul style="list-style-type: none"> <li>• R &amp; D</li> <li>• Process development</li> <li>• Selection of equipment, technology etc</li> <li>• IT orientation, creating IT infrastructure</li> <li>• ISO certification</li> <li>• Supply Chain Management</li> </ul>

Finance Inputs	<ul style="list-style-type: none"><li>• Creating financial discipline, system etc.</li><li>• Financial reporting, due diligence etc</li><li>• Enhancing financial viability</li><li>• Benchmarking for financial performance</li><li>• Resource mobilisation</li></ul>
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In providing these inputs the facilitator has to function like a mentor and network with specialists / experts and consultants in various fields. The facilitator will have to negotiate for excellent terms; he will have to create performance parameters and ensure compensation in accordance with them.

Gradually in a span of two to three years, the facilitator should create adequate talent within the networking organization and impart the skills in various activities so that the cluster organization becomes self-sustaining.

### c. Strategy Formulation for Cluster Initiatives

Based on the above assessment and analysis our team of consultants would be able to develop and suggest a set of strategies and initiatives to develop the Cluster. These would be unique and specifically customised to the Cluster and would look into the following aspects;

1. The strategy would depend on the characteristics and peculiarities of the Cluster
2. They would be targeting on confidence building and gradual transformation of the Cluster.
3. They would be built around a set of nodal agencies that would be identified in terms of their ability to function as the nuclei for the transformation.
4. The strategy would aim at the following
  - a. Involvement and participation of all players
  - b. Economy in terms of time and other resources
  - c. Ease of implementation
  - d. Quick yielding results to enable demonstration effects
5. The strategy would also identify targets, parameters of measuring the targets [metrics] and initiatives to achieve those targets.

### **5.3. Stage-III: Implementation of the Cluster Initiative**

In the earlier stage when awareness is created, part of the implementation has already begun. However major part of the resources will be committed in this stage as per plans created. This process will take some time for the cluster to be effective. Hand-holding will be required for a couple of years till the cluster organisation is able to stand on its own.

#### **Deccan Blooming: Floriculture Cluster at Pune**

Floriculture industry is nascent in India; in Maharashtra it evolved around Pune and the surrounding districts. In 2002, about 100 greenhouse-operated farmers were cultivating gerberas and carnations in about 25 hectares. They accounted for a turnover of Rs 120 million and employed 500 persons. They catered to the domestic market. There were also another 16 larger corporate farms spread out in 65 hectares, accounting for Rs 800 million turnover and employing about 1600 persons. They produced carnations and Dutch roses. The only association worth its name was Western India Floriculture Association. This is the scenario at which UNIDO Cluster Development Program[CDP] was initiated.

The major problems were diagnosed as

- a. *Low margins.* The business was capital intensive since it had to create the greenhouse infrastructure. The operating costs were high due to the costs of fertilizers, pesticides etc. Market linkages were not adequate resulting in poor price realization. High operating cost and poor market linkages.
- b. *Quality and Productivity related Issues.* Inability to control the quality and costs of inputs, inability to protect against pests, sub-optimal agricultural practices, absence of cold-chain, inadequate R&D/training support, absence of proper linkage with institutions etc were the main factors.
- c. *External factors.* High international freight costs, high cost of power and diesel, and competition from countries like Kenya were the main external factors

The UNIDO CDP defined its vision as enhancing the business potential of the cluster and capability building of the farmers. The intervention objectives were identified as increasing the area under cultivation,

better market access, building infrastructure, diversification, institutional linkage etc.

The program got initiated through series of meetings and exposure visits to institutions R&D labs and each others facilities. Once trust has been built among the farmers, small network of farmers were created and the program got gradually introduced. The major interventions were:

- a. *Increase in the value-realisation.* 75 % of the farmers got networked; they started common procurement of inputs. They started common marketing initiatives to distant domestic markets with significant results. They were also able to negotiate with bulk traders for the domestic as well as export markets.
- b. *Quality and productivity Issues.* The networks established better relationships with R&D and training institutions. Regular training programs were conducted on various aspects; a specialized institution – Horticulture Training Centre - was established at Telegaon. Banks, Technical consultancy organizations also started networking with the cluster.

Buoyed by the good tidings and performance of the cluster, Telegaon Floriculture Park was created by MIDC[ Maharashtra Industrial Development Corporation] under the Agri-Export Zone of the Ministry of Commerce Govt of India. The cluster at Pune has grown into a major floriculture cluster catering to domestic and export markets in a big way.

*Compiled by the author based on data from Dr Tamal Sarkar: Working Together Works – Cluster case Studies, Foundation of MSME Clusters, New Delhi 2006.*

## **6. Governance Issues**

Clusters would develop and evolve into powerful business complexes with active involvement of the participating entities and with enlightened leadership emerging from the participant entities. In all probability, in the initial phase, the leadership is provided by the facilitator and the participating entities would take charge gradually. It is necessary that the cluster organisation develop and evolve professionalism to be able to address the challenges of managing the cluster. One method is to have an elected council at the top to represent the participating entities and a professionally competent secretariat to take care of the day-to-day management of the cluster. The levels of autonomy, independence and professionalism that get imbibed into the organisation will have a direct impact on the capability and effectiveness of the cluster.

## **7. Conclusion**

Clusters are as old as man on this earth. The concept and relevance of clusters have changed over time. Today clusters have some of the following characteristics:

- Cluster Initiatives are necessary and deliberate attempts to enhance the competitiveness of nations in specific sectors
- In the current context clusters do not happen; they need to be planned and nurtured systematically. This will require significant roles for one or more catalysts
  - A government that is sensitive to make a proactive set of policy framework.
  - An NGO or an incubator or a University-Lab or an angel investor who has all the cleverness to identify a set of nuclei and patience to nurture them.
- Cluster initiative is about assembling a set of people and systems together; of enhancing their aspirations; of imparting knowledge and skills; of creating systems that become self-sustaining; of nurturing governance and leadership; and a lot more.

The real challenge before the Cluster initiative is how to nurture and sustain vibrant clusters despite the sub-optimal functioning of the external environment; how to create a system that is more optimal than its environment; how to equip people handle bigger responsibilities than what they had shouldered in their entire life; how to kindle and energise the aspirations of people towards a set of goals that they have not seen for ages.

**End Notes:**

1. SIDO online: *SME Clusters*; Nov 24, 2006. <http://web5.laghu-udyog.com/clusters/clus/indsmehtm>
2. [www.clusterpulse.org/cl\\_india.htm](http://www.clusterpulse.org/cl_india.htm)
3. Michael E Porter: Location, Competition and Economic Development: Local Clusters in Global Economy. *Economic Development Quarterly* 14, No. 1, February 2000: 15-34.
4. Jeffrey D Sachs: *The End of Poverty*, Penguin Books, New York, 2005
5. Christian Katels, Goran Lindqvist and Orjan Solvell: *Cluster Initiatives in Developing and Transition Economies*, HBS Publication, May 2006.
6. Michael E Porter: *Clusters and the New Economics of Competition*; Harvard Business Review, November- December 1998.
7. Christian Katels: *All Together Now*; fDI Magazine; June 02, 2004.
8. Christian Katels: *European Clusters: Structural Change in Europe 3 – Innovative City and Regions*; Hagbarth Publications, January 2004.
9. Huff W G: *The Economic Growth of Singapore: Trade and development in the twentieth century*; Cambridge University Press; 1994.
10. Kernial Singh Sandhu: *Management of Success: The Moulding of Modern Singapore*; Institute of South Asian Studies, 1990.
11. Michael Porter: *Competitive Advantage*, HBS Press, 1985.
12. Wickham, Dr Mark; *Regional Economic Development: Exploring the 'Role of Government in Porter's Industrial Cluster Theory*. CRIC Cluster Conference: Beyond Cluster – Current Practices & Future Strategies, Ballarat, June 30 – July1, 2005.
13. Didar Singh A: *The Essential Ingredients of Bangalore's Success: Some Lessons from Cluster*; ICT & Trade Development Program, New Delhi 2005.
14. Bock, Chan Chin: *Heart Work – Insights into Singapore's Economic Success*, Tata McGraw Hill, 2003.