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**Industrial Clusters in India:
Perspectives and Issues for Research**

Keshab Das

Gujarat Institute of Development Research
Gota, Ahmedabad 380 060

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Abstract

This paper contributes to the on-going global debate on industrial clustering by analyzing the complexities embedded in the functional dynamics of small firm clusters, with a developing country perspective. Considering the Indian context as the basis of enquiry in this particular form of production organization, this paper identifies three important issues that largely determine the performance and strategy of firms to survive, compete and grow. These three issues relate to the characteristics of the existing and potential market; nature of informality and macro policy environment. To appreciate the issues and prior to proffering policy suggestions for intervention, it is vital to reflect upon the spatial context of the clusters in which these progress or ail. Future research could reflect upon these aspects, preferably by conducting enquiries on ground.

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1 Introduction

Over the last quarter century or so, there has been an increasing awareness across the globe on complexities that constitute the organization of productive activities, particularly, concerning the small and medium enterprises (SMEs). The remarkable contribution of SMEs in economic development has enthused scholars, development practitioners and policy makers in comprehending and promoting this crucial sector. Gaining insights into the relative preponderances of factors such as hierarchies, markets and networks in SMEs has been a key concern. Significantly, clustering of SMEs, a particular form of industrial organization, has been hailed as *the* entity that merits substantial policy intervention. Notwithstanding the on-going rich 'flexible specialization – industrial district' debate, it has been recognized that studies focusing on experiences from less developed countries (LDCs) are still very few. The need to appreciate and incorporate the spectrum of specificities extant in the LDCs has been pressing as such perspectives would affirm or serve as correctives to the efforts towards policy formulation and relevant theory building. Moreover, in order to enrich the content of the debate *per se* and enhance its relevance to the LDCs, it is necessary to learn from as many cases as possible.

Industrial clusters have grown and come to stay as hubs of business activity in India, thanks to a large calibrated domestic market for goods. However, our knowledge about their actual functioning remains limited. It is important, hence, to explore the potential of collectivities and understand their functional dynamics. Why and how certain clusters progress and perform better relative to others? Explanations to this would, *inter alia*, help appraising the role of the state, local institutions and industry organizations in fostering clusters as sources of growth, particularly in the post-liberalization period.

2 Industrial Clusters: Rise of a Reinterpretation

Nullifying the notion that small firms are essentially a transitional phenomenon and moving up in the scalar ladder would eventually 'wither away', these enterprises are, in fact, back in the reckoning. The global recession during the 1970s and 1980s, triggered by consecutive oil crises, witnessed the large vertically integrated Fordist-Taylorist plants functioning under duress. This was not just because demand had been falling or wavering but also there was a discernible shift in the *nature* of demand that underscored the need for highly customized and, hence, small batch of production. The large units could choose between downsizing employment and output, but not coopting its organization of production. Unlike the large units, the small firms exhibited a remarkable resilience in catering to the emerging demand patterns through dynamism, alacrity and purport. It eventually involved a technological and organizational paradigm shift that would hinge upon flexibility. Small firms in many western industrialized societies as also in the newly industrializing economies of Asia and Africa, not only contributed to employment generation, endogenous entrepreneurial growth, regeneration of local economies and local innovative potential, but also competed in the global market earning valuable foreign exchange (Piore and Sabel 1984; Pyke and Sengenberger 1992; Regnier 1990; van Dijk and Rabellotti 1997; and Pietrobelli and Sverrisson 2004).

As interest grew in the achievement of small firms, a number of studies, carried out in different countries, highlighted the fact of spatial togetherness of firms engaged in manufacturing similar products and providing business related services. It was held that the collectivity not only provided economies of agglomeration, but also, as argued by Coase (1937), considerably reduced the cost of 'organizing' production, or the transaction cost so vital for firm growth. Over a century ago, spelling out the positive outcomes of industrial districts (IDs), i.e., 'concentration of specialized industries in particular localities', Alfred Marshall observed that

"so great are the advantages which people following the same skilled trade get from near neighbourhood to one another. The mysteries of the trade become no mysteries; but are as it were in the air. Good work is rightly appreciated, inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed; if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further new ideas. And presently subsidiary trades grow up in the neighbourhood, supplying it with implements and materials, organizing its

traffic, and in many ways conducing to the economy of its material” (Marshall 1974: 225).

Following from such conceptualization, in the later decades, much of the research on dimensions of agglomeration economies followed approaches steeped in strong neo-classical tradition wherein scale economies and linkages in physical production assumed significance. The positivist approach, however scientific in design, would falter to capture emerging dynamics of organization of production as on ground (Das 1995a: 37). The *economistic* treatment of clustering deserved a major refurbishing to reflect the reality. It was Becattini who provided a robust redefinition of the Marshallian industrial district reinterpreting it as “a *socio-territorial entity* which is characterised by the active presence of both a community of people and a population of firms in one naturally and historically bounded area. In the district, unlike in other environments, such as manufacturing towns, community and firms tend to merge” (Becattini 1992: 38; emphasis ours). By incorporating the role of the extra-economic factors, particularly the social, in the analysis of industrial districts, the possibility of a realistic appraisal with a multi-disciplinary perspective could be affirmed.

As is well known, much of the inspiration for such reinterpretation can easily be traced to the striking performance of the industrial clusters of Third Italy, which has been made famous, *inter alia*, by Piore and Sabel (1984) in the modern classic *The Second Industrial Divide* and Sabel (1984)'s *Work and Politics*. Further, it is held that flexibility – the dynamic adaptability in the technological and organizational domain – is fostered best in such collectivities. Typically, in the literature on industrial districts, flexibility in the technological sphere refers to flexible manufacturing systems, flexible automation and so on. These, essentially, draw upon microelectronics having astounding properties to allow product/process differentiation, classification, replication and modification at great speed and occupying little physical space. The use of CAD/CAM¹ processes and computer numerically controlled machine tools (CNCMT) in production exemplifies technological flexibility (Kaplinsky 1994; Lauridsen 1995; and James and Bhalla 1995). In most clusters in developing countries, however, microelectronics hardly exists or plays a role; the source of flexibility often may be attributed to what is widely known as intermediate or appropriate technology (Schumacher 1974), which underscores the significance of local knowledge and grass-root innovative

¹ Computer aided design (CAD) or computer aided machines (CAM)

capability. As is natural, technological flexibility has clear implications for the labour process. Organizational flexibility involves redoing the shop-floor arrangement, numerical manipulation of workforce and changing responsibilities within management. Flexibilities of this sort are in response to the changes in the nature of demand.

Eventually, the new perspectives on industrial clustering have assumed a broader scope. One outcome has been that the explanation to 'why small firms cluster?' can be established as the favourable effects of economies of scale and scope that facilitate local innovative activities as well (Alcorta 2001: 78-79; and Caniels and Romijn 2003). Moreover, the potential of 'upgrading' both products and processes by firms in a cluster is said to brighten up as they move up in the global value chain (Humphrey and Schmitz 2000: 3). Competition remaining the lifeline of business, the prevalence of trust, reciprocity and mutualism were found to be the high points of industrial clusters (Humphrey and Schmitz 1998). Encapsulating the benefits of clustering, i.e., the "competitive advantage derived from local external economies and joint action", Schmitz (1995: 530) emphasizes that 'collective efficiency' acts as a catalyst for business growth. In fact, much of the policy intervention to promote clusters during the 1990s and beyond derives from these positive dimensions of collectivity.

Further, Porter (2000) visualizes a much larger role for clusters in the global economy, beyond their local level contribution to development. In a sense, the revived cluster phenomenon fits better to a globalized world raring to network for business and trade. Needless to add, these views on clustering, purely from a neo-localism perspective, assume both a certain minimum level of progress of the region (Das 2004a: 4923) and technological sophistication of the production process. Clusters in developing countries are often quite different from those highlighted as *stylized* facts in the western context. In fact, "there exists a dearth of studies focusing primarily on the whole gamut of issues on the 'actual mechanisms' involved in technology transfer, upgradation, product and process innovation and adoption in IDs of developing countries. This acts as a barrier to 'import' the European model, if there is one, to the developing countries" (Das 1995b: 37).

3 Key Dimensions of Industrial Clustering

Clusters differ from one another depending upon the history of emergence, nature of the product, markets and organization of production. Based upon these, a broad typological distinction has been made wherein clusters would be identified as being on the 'high-road' or 'low-road'.² The former refers to cases where business dynamism is promoted through investment in 'efficiency enhancement and innovation' and the latter reflects negative firm strategies such as cost cutting via reducing labour income, poor input use, inadequate or no networking, what result in technological stagnation and sub-standard products. The 'high-road' syndrome is found common in developed nations (Pyke and Sengenberger 1992), where certain formal regulation, often devised at the cluster level, ensures collective vigilance against any unfair business practices. As of the developing nations, surveys of available evidence in Nadvi and Schmitz (1994) and Schmitz and Nadvi (1999) conclude that most clusters carry 'low-road' characteristics and some a combination of the two. None, however, has symptoms of an entirely 'high-road' variety.

Although such a 'black and white' classification, as the low-road and high-road, suggests a certain typological convenience, in reality, it is the *grey* – rather the many shades of it – that characterizes industrial clusters. From an analytical point of view, it is important to recognize at least three key dimensions of clustering: a) the nature of the market, both existing and potential *as envisaged by the firms*; b) the nature and degree of informality that sustains/drives the production regimes; and c) the macro policy environment that influences, directly or otherwise, the subsector or region or both.

Numerous clusters in India cater to the local, regional, national and international markets, which are both substantial and varied. In fact, so far as the domestic market is concerned, the crucial factors to reckon with are the sheer vast size of the consuming population and calibration of the market due to skewed income distribution or access to endowment. Depending upon what the product/by-

² There, nevertheless, have been attempts at classifying clusters based on certain criterion; although such categories as 'Italianate,' satellite, hub-and-spoke, natural, induced, embryonic, survival, rural, urban, dynamic, incipient and so on are not much in vogue and are used often without reference to the primary basis of classification (Markusen 1996; Knorringa and Meyer-Stamer 1998; Martin and Sunley 2002; and Enright 2003).

product/process is, firms set their target to respond to a certain market (demand). So long as demand for such products exists, or likely to come up, the production gears up to respond to that demand even if in a partial or limited manner. In keeping with the reality, not every firm produces or aims to produce for a high-end, global market. The market for certain products could be limited by the locality or culture-specific need or absence of cost-competitiveness due to high material or transport cost. For that matter, the 'success' of a cluster need not be measured by whether and to what extent its links exist with the international market; instead, supportive interventions need to be made towards product diversification and upgrading local technological capabilities of these clusters. This is in no way to undermine the importance of export-orientation, the 'value of global value chains' and the 'entrepreneur-exporters' strive for enhancing product quality. Rather, the emphasis here is to acknowledge the strong presence of a large segmented domestic market for products differentiated by quality and price. This is one dimension ruefully glossed over in the thriving literature on value chain analyses, which, in fact, does recognize that "integration into global trading systems could have both positive and negative effects for people in developing countries" (Gereffi *et al.* 2001: 2).

Once the character of the market is determined, firms would strategize to benefit from competition, by trying to improve the margin of net profit. It is in here that, being clustered, small firms may choose networking and collective action as a strategy to achieve what Brusco (1992) would refer to as *real services*. These would include basic facilities as roads, water, power, R & D, marketing outlets and so on. Such joint action, if opted, often seems to have been confined to those with a shared community³/caste/group/class identity rather than is practised across the board. While much of the inter-firm cooperation may be seen well-functioning at an intra-community/caste/group/class domain, firms still would cooperate beyond, as sectoral/regional industry associations, for accessing certain larger facilities; for instance, basic infrastructure at the work sites, fiscal concessions and promotion of brand image of the subsector/location. That is a positive outcome of clustering, subject to the state – local and higher levels – assuming the role of an active facilitator. How best, hence, the policy apparatus can be persuaded shall form a key objective of joint action. Nevertheless, such 'healthy' cooperative ethos surviving in

³ The connotation of community could vary across space. While it could refer to a caste/sub-caste/religion (as in India), groups by ethnicity, immigrant status and even acquaintance could be construed as communities in other countries.

an intensely competitive business environment would also be tempered by the prevailing informality in the cluster, especially in the LDC context.

Industrial clusters in India, as in most developing countries, often draw their sustenance through functioning as informal production regimes, wherein informality could be embedded in the labour process, production/technology sphere, flouting of fiscal/environmental regulations, markets and the whole gamut of networks that ultimately buttress the *net profit* accruing to the owners of the firms. One must not attach secondary priority to informality in cluster studies as that often holds the key to understanding the dynamism of the business as local innovativeness; much of the intervention, hence, would be limited by the nature and extent of informality characterizing a cluster (Amin 1994). Characterizing clusters in India, Bagchi (1999: 30) observes that these “are normally relatively open; that is, the markets exploited by firms in the cluster can be invaded at a rather low cost by others. Second, there is considerable diversity in products produced by different firms and their qualities. Thus, the upgrading of skills and product qualities is constantly threatened by new entrants, and the strategies of the incumbent firms have to reckon with such threats. (Third), the firms in the cluster almost inevitably share the characteristics of oligopoly (in an industry characterized by strong economies of scale, or strong initial requirements of capital), or of monopolistic competition”. In fact, the very ‘illegality’ of the production process – whether in terms of non-payment of taxes, improper/non-recording of production and employment, theft of energy or even using sub-standard materials – can in itself be an important issue of academic enquiry in order to understand the nature and role of informality in the clusters (Das 2004b: 8).

Numerous studies on small firm dynamics, irrespective of whether those were done with a ‘cluster framework’, have demonstrated the deep-seated complex phenomenon of informality manifesting in a variety of ways.⁴ These studies have addressed such important issues as *invisible* work; contribution to output of large number of irregular/casual/temporary workers including child labour; unsafe working conditions; and precarious terms of employment. The whole range of issues concerning social/income/livelihood security to workers also forms part of such

⁴ Mention may be made of the following studies: Kashyap and Tiwari (1986); Cadene 1989; Tewari (1993); Swaminathan and Jeyaranjan (1994); Cawthorne (1995); Knorringa (1996); Basant (1997); Das (1996, 1998 and 2003); Cadene and Holmström 1998; Padh and Das (2000); and Das *et al.* (2004).

enquiries. Rising casualization of the workforce, especially in the micro and small enterprises, renders certain sections of workers – the young, old, sick, illiterate, migrant and women – vulnerable even when clusters might be functioning in a *dynamic* fashion. Despite its gravity, the side-stepping of the labour issue in the global cluster debate, including in the sphere of strategies of intervention, is difficult to imagine; if it reflects a certain tactical concern is not known (Das 1999). Studies have dealt with other *non-labour* aspects as copying/cheating on trademarks/brand names and designs; non-payment of excise and other duties; compromising on quality of material used; and unscrupulous business practices as translated into cut-throat inter-firm rivalry involving price competition and hampering product quality. How responsive and pro-active are the ‘cluster actors’ in effectively dealing with the *negative* effects of informality, which, in fact, can potentially sully the reputation of the cluster. Both joint action and specific policy cannot ignore informality.

An industrial cluster, intrinsically, is a dual-entity encompassing a sectoral *and* spatial connotation. Whereas a sectoral (or, subsectoral) concern may conventionally, have dominated cluster analyses, the *spatial/regional* dimension needs as much, if not greater, attention. The spatiality of clustering is not merely confined to the *place*, that is, say, rural or urban, but has a strong reference to the level of regional development that determines the cluster’s access to both social and economic infrastructure.⁵ It also has a political implication so far as the regional polity is able to articulate its demand for developmental intervention or determine the path of regional industrialization - an insight to be gleaned from both Trigilia (1986) and Meyer-Stamer (1998). The performance of a cluster, including its potential to move up in the value chain and be innovative, depends crucially upon the level of development of the region where it is located. Intervention for cluster promotion, hence, must place it in the broader context of regional development, the strangely-marginalized issue.

The macro policy environment can be a powerful factor to reckon with as it can influence the cluster both directly and indirectly. For instance, a move to a liberalized economic regime can heighten both innovative activity and external orientation as it opens up a hither-to restricted market and unshackles the domestic industry from a

⁵ An interesting example is the Italian ‘metadistricts’, which refer to geographically dispersed networks where social as well as business contacts are kept up by email and frequent travel. I owe this information to Mark Holmström.

variety of constrictive sectoral policies. Similarly, large scale infrastructure development of a region, as may be undertaken through policy initiatives, can open up new vistas for business growth and networking for the clusters. Even major interventions in promoting such transformative social sectors as education and health or economic service as electricity can have far-reaching impact upon the regional industrialization process, including the functioning of industrial clusters.

In a counterfactual scenario, as are envisaged with a sectoral preoccupation, it may be possible to address the issue of reduction of poverty by promoting clusters (Nadvi and Barrientos 2004). But, evidently, a sectoral/subsectoral level intervention would be too weak an instrument to tackle structural constraints plaguing a depressed region. Or, as argued in Tendler (2002: 10) in a broader framework for small firm functioning in developing countries, to promote a more inclusive style of economic development, “the widespread sympathy for small firms as a special category – and in particular their “inability” to pay taxes and conform to environmental and labour standards – tends to undermine other important concerns about appropriate strategies for reducing poverty, increasing employment and development, and improving governance.” In other words, cluster development agents or business development services or even efforts at export orientation *per se* are unlikely to make a dent on regional poverty or structural backwardness. “What does the emerging trade policy expect from these ‘ghettos’ and ‘gullies’ manufacturing ‘sub-standard’ products at ‘subsistence’ levels of technology and management under ‘sub-human’ conditions of work?” (Das 2001: 87). That is to say, unless cluster promotion goes beyond the *sectoral* bind and incorporates the problematic of *spatial* infirmities in the policy framework, a limited sectoral emphasis or *tinkering at the margins*, in the name of business development, or promoting innovative behaviour of firms would not thin the incidence of poverty nor raise job opportunities in a given region. This is especially the case with the so-called rural/artisanal clusters, which are in dire need for a supportive basic infrastructure, both social and economic (Saith 2001; and Das 2005b).

Nonetheless, it is plausible that certain fiscal measures as a lower interest rate regime or a reduction/exemption of excise duties or even cheaper availability of land can encourage entrepreneurs to set up new units or expand existing ones which might contribute to regional economic regeneration (Morris *et al.* 2001). Of particular relevance is the provision of microfinance to micro and small enterprises on flexible terms – may well be channelized through cluster-level associations – which would

spur entrepreneurial activities in rural and urban areas, in both dynamic and incipient clusters (Nair 2001). While the banking apparatus needs to undergo a metamorphosis in terms of easing lending norms (including the issue of collateral), incentivizing bankers' performance, deepening and widening of its physical access to the regions and local entrepreneurship overlooked so far, would bring about a drastic positive turn-around in the sphere of cluster development. The role of the state, both provincial and central, is of great significance here in identifying the right catalysts and fiscal instruments to energize broad-based cluster development. The so-called cluster actors can help provide clues to inform such macro policy formulation.

4 Small Firms and Clusters in India

In India, small firms constitute the lifeline of the process of industrialization and development. With a history of over half-a-century of policy making in the small scale industries sphere, India's small enterprise development initiatives are rich in details and insights, although may be poor in practice (Bala Subrahmanya 1998). One may recollect that way back during the mid-1970s India's policy framework for small firms and industrial estates even had provided for technology upgradation pool and marketing networks as promotional measures – something the current cluster development approaches are reiterating as *novel* ideas! In fact, by the turn of the century, 2000-01, the small scale industry could be credited with close to 80 per cent of manufacturing employment. From around 4 million persons employed in the small scale industries in 1973-74, the figure has risen to a massive 18.56 million by 2000-01. The primacy of this sector can be gauged from the fact that over 40 per cent of gross turnover in manufacturing and 35 per cent of total exports were accounted by this sector by 2000-01. Concurrently, between 1973-74 and 2000-01, whereas the number of units has multiplied eight-fold, reaching 3.37 million, the value of production in current prices has risen from about Rs. 72 billion to 6455 billion. The remarkable aspect of such performance is that the capital productivity of the small scale sector has invariably been higher than that of their large counterparts, at least during the 1980s and 1990s. The growth of this sector has been “generally above” those achieved by the industrial sector as a whole (Government of India 1997: 132; SIDBI 2002: 26; and Singhanian 2003).

Although no exact estimate is available, in all probability, a large proportion of the small firms occur in clusters. In India, industrial clusters – traditional and modern, natural and induced – galore. A recent account indicates that the total number of clusters in the country could be over 2400, including about 2000 rural/artisanal clusters (www.smallindustryindia.com/clusters/clus/ovrclus.htm). Tables 1 and 2 present sectoral and region wise information on both artisanal and modern clusters in India. As is obvious, these lists are incomplete and a sound database on various clusters and their characteristics is still to be prepared. It may be pertinent to note here that these partial lists are only about *manufacturing/processing* clusters, reflecting a somewhat static view about types of clusters. Even as manufacturing/processing clusters dominate cluster discussions, it is important to recognize that the services clusters have both existed historically and are also emerging in a notable manner, especially those linked to the information technology (IT) and IT enabled services (ITES). These have been growing in importance at least as major employment hubs (Das *et al.* 2004) in India.

The advent of the process of liberalization of the Indian economy, mid-1991 onwards, has posed new challenges for the erstwhile 'protected' small enterprises. The growing emphasis on market orientation and direct exposure to the international competitive environment has necessitated a fundamental restructuring of the institutional framework towards enabling small enterprises to perform with competence. Hence, in the changed situation, the importance of customized production, often requiring the use of microelectronics, export orientation and quality consciousness, especially for the industrial clusters, has been realized. Clusters are now required to develop networking with service provisions, for instance, consultancy, financial services, market research, advertising, packaging and product design, to be able to perform a more active role than before. Also, a greater thrust on upgrading labour skills, provision of flexible norms of work, improved methods of supervision and quality control has been considered essential for achieving a competitive edge. While these aspects are important to encourage competitiveness in small firms, larger issues of turning informality into an advantage rather than treating it a constraint, bringing the region centrestage and ensuring social security for workers and their families continue to seek earnest attention. It would be patently unwise to presume the growth of an industrial cluster without a reference to its wider socio-territorial context. In India, or other LDCs, a purely neo-liberal approach to firm growth just would not help.

Table 1: Artisanal Clusters in India

Artisan Cluster	Regions					
	North	South	East	West	North-East	All-India
Wood Products	73 (23)	36 (25)	(15)	56 (22)		245 (95)
Metalware	27 (10)	27 (4)	81(28)	32 (6)	5	169 (45)
Stoneware	8 (8)	10 (10)	12(12)	14 (14)	-	44 (44)
Textile Products	153	67	94 (1)	102	40 (2)	456 (3)
Bamboo/Cane	25	28 (3)	65 (1)	44	43	205 (4)
Leather Products	17	2	6	24	2	51
Bone, Horn, Ivory	6 (2)	10 (3)	8 (4)	6 (1)	1	31 (10)
Clay/Pottery	37 (25)	14	65 (39)	35 (6)	10 (5)	161 (75)
Carpets	40	4	7	13	4	68
Jewellery/ Fashion	37	23	36	42	9	146
Dolls and Toys	6 (6)	15 (15)	15 (15)	12 (12)	2 (2)	50 (50)
Glassware	5	1	-	-	-	6
Misc.	7	4	8	2	3	18
Total	435 (74)	241 (60)	457 (115)	383 (61)	139 (19)	1656(276)
% To Total	26	15	28	23	8	100

Notes: Bracketed figures indicate number of artistic/decorative (as distinct from utility) products. North: Delhi, Himachal Pradesh, Haryana, Jammu and Kashmir, Punjab and Uttar Pradesh. South: Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. East: Andaman and Nicobar Islands, Bihar, Orissa and West Bengal. West: Gujarat, Lakshadweep, Madhya Pradesh, Maharashtra and Rajasthan. North-east: Arunachal Pradesh, Assam, Manipur, Mizoram, Nagaland, Sikkim and Tripura.

'Miscellaneous' includes the following product groups (number of clusters): *Agarbathi* (10); *Bashetaries* (2); *Pactra* tribal jentiles (1); *Dhokra* (2); and Other Domestic (3)

Source: Cluster Development Programme, UNIDO, New Delhi (regional and subsectoral groupings by the author)

Table 2: Non-Artisanal/Modern Clusters in India

Clusters	Regions				
	North	South	East	West	All India
Animal products, vegetables, horticulture, forest products, tobacco, pan masala and non-edible water/spirit and alcohol, chiefly used in industry	13	16	10	23	62
Ores, minerals, mineral fuels, lubricants, gas and electricity	4	5	0	10	19
Chemical and allied products	5	3	1	16	25
Rubber, plastic, leather and products	10	6	1	6	23
Wood, cork, thermocol, paper and articles	10	2	2	7	21
Textile and textile articles	17	28	6	22	73
Base metals, products thereof and machinery equipment and parts thereof, excluding transport equipments	45	22	15	36	118
Railways, airways, ships, road surface transport and related equipment and parts	5	1	1	5	12
Other manufactured articles and services, not elsewhere classified	14	5	2	14	35
Total	123	88	38	139	388
Percentage to total	32	23	10	36	100

Notes: For the list of states under different zones, see Notes in Table 1

Source: <http://clusters.smallindustryindia.com/clusters/unPrint.jsp/filename=/clusters/clus/ smelist.htm> (January 2005).

5 Issues for Research

The aforesaid discussion has made a strong case for pursuing in-depth case studies on various aspects of Indian industrial clusters. Without *pre-supposing* a certain stylized cluster framework, the future research could delve into aspects of functional dynamics of clusters and, deriving upon the field learning, provide insights into inter-firm relationship (cooperation and competition), technological and organizational flexibility, informality in the production process, labour, the role of the social milieu, forms of supportive institutional arrangements and the nature of linkages with agencies external to the cluster. The policy instruments for SME development, in general, and relevant local economic regeneration in LDCs, in particular, may benefit from the discussions of detailed case studies of

clusters and perspectives emanating thence. Such attempts can, in a substantive manner, contribute to the theorisation exercises in industrial organization literature focusing clustering.

As dynamic clusters are said to be holding the key for much of the small firm development in the future, it would be most useful to understand and appreciate their *modus operandi*. That would serve a valuable input to any policy intervention that may be construed. Detailed studies on Indian clusters covering both modern and traditional subsectors in different parts of India would enrich our comprehension of the dimensions of technological dynamism, inter-firm relations, social embeddedness and support systems. For one thing, little is known about factors promoting or hindering joint action; whether clustering *automatically* creates an environment fostering local innovative activity; role of the state in regenerating the regional economy with reference to incipient clusters; and, for the other, much needs to be learnt regarding discrete strategies of internal differentiation as also employment implications of clustering. For purposes of both policy and debate on clustering, studying as many cases as possible would be essentially enriching. Research may underscore the fact of small firm clusters often functioning within the limits of the informal sector framework. Hopefully, more such enquiries and analyses in diverse settings (both sectorally and spatially) would inform, in a realistic manner, the interventions at the cluster level and theory-building.

Notwithstanding the well-articulated interpretations and interventions of achieving clusters in the occident, the myriad manifestations of industrial clusters in the developing country context can be better appreciated only through an earnest perusal of their functional dynamics and contexts within which these emerge, survive, grow or ail. It is important to do so and learn from diverse clusters from different countries before embarking upon a 'unified' theory of clustering and prescribing the panacea for promotion, however tempting, based on selective knowledge. Just as an aside, even the current boom in literature on clusters has hardly have acknowledged the dynamics and potential of *non-manufacturing* clusters based on services, such as those concerning tourism, health services, IT, ITES in developing economies; these could be from traditional as well as modern sectors (Das *et al.* 2004). The fast changing technology, role of the local innovative milieu and massive potential to create jobs and income of these clusters are yet to be comprehensively addressed. Similarly, issues such as social security for workers; discrimination in work and remuneration guided by gender, caste, class and age;

environmental/ecological concerns; and influence of local political cultures, to mention only a few relevant themes in the context of underdevelopment of regions or poor endowment, need fuller and sensitive treatment.

6 Concluding Observations

It is rather microscopic and hasty an approach to overburden industrial cluster analysis and intervention with mere references to networking and participation in global trade as also hoping the magic wand lies with certain development agents and business services. To repeat a point, the performance of industrial clusters is also a function of the character of the spaces in which these *live*; to turn a blind eye to that embeddedness of the geographies would, in the least, jeopardize the objective and a constructive approach to cluster development. Understanding theoretical underpinnings of small firm clusters in LDCs and also indicate steps towards effective policy making could be a desirable contribution.

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