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What Qualifies as a Cluster Theory?

By

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Abstract:

This paper investigates the theoretical backgrounds of the “cluster” and proposes a framework aiming at drawing the contour of cluster theory.

The profundity of the notion of ‘clusters’ is arguably conditional on the coherence of four fundamental issues associated with the concept: 1) the economic and social benefits that may accrue to firms when clustering or co-locating (the *existence* argument); 2) the diseconomies encountered when clustering exceeds certain geographical and sectoral thresholds (the *extension* argument); 3) the advantages obtained by exploiting intra-cluster synergies rather engaging in external interaction (the *exchange* argument); and, finally, 4) the possible erosion of economies and onset of diseconomies over the lifecycle of the cluster (the *exhaustion* argument).

Each of these four issues is examined in terms of three relevant major theoretical frameworks that can be brought to bear on the cluster concept. The paper considers approaches based on the idea of externalities (illustrated by the Marshall's work on ‘Industrial district’); on competitiveness issue (illustrated by Michael Porter's theory of cluster growth); on a territorial perspective (illustrated by the GREMI approach).

The analysis acknowledges the general shift in explanatory emphasis from considerations of static cost efficiency towards more dynamic interpretations that highlight the creation and use of knowledge as their pivotal theoretical element. By placing these changes within a common conceptual framework the paper shows how different theoretical solutions provide distinct points of departure for subsequent policy recommendations. Three distinctive *groups* of solutions are identified focussing respectively on local spillovers, on competitiveness and on the region and its development. The paper concludes by identifying areas of particular ambiguity where further theoretical work is most urgently needed.

Key words: Cluster, cluster theory, industrial district, innovative milieu, regional policy

JEL Codes: L22, R10, R58

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1. Introduction

Clusters may be defined as non-random geographical agglomerations of firms with similar or closely complementary capabilities (Richardson 1972, Ellison and Glaeser 1994)¹. Even though they are studied under many different labels² the terminological diversity cannot hide the fact that the cluster phenomenon as such has attracted increasing attention during the last fifteen years. A simple quantitative illustration of the avalanche of recently published academic papers in this field is attempted in Table 1.

The sudden surging interest is no unquestioned blessing. Few would, even at the outset, feel tempted to accuse the cluster literature at large for being overly concerned with precise definitions of important constructs or burdened with excessive specifications of the exact nature of the processes involved (Maskell 2001, Martin and Sunley 2003). The multitudes of existing contributions have mostly been concerned with making sense of empirical findings rather than contributing to the discovery of the serene and luminous expanse of conceptual clarity where all may meet and expatriate together. On the contrary one often finds an unfortunate habit of introducing novelty by making slight changes to the explicitly stated or implicitly applied definition of core concepts, or by importing constructs and variables from neighboring schools of thought without any impeding sensitivity towards the inherent theoretical and methodological tensions between what are, in essence, not completely parallel lines of inquiry.

¹ Whether the firms are functionally connected or not is thus an empirical question, not a feature of the core definition. A lot of confusion has been occasioned when nesting concepts of functionality and proximity.

² Some of the common synonyms may have the same essential meaning as conveyed by using the cluster concept. Yet they can differ in peripheral meaning by their *implications* (usually involving some minor idea or underlying assumptions in the meaning of the concept), *connotations* (usually including ideas that color the meaning of the concept often by providing historical or literary associations) or *applications* (usually the result of current idioms that have established restrictions on the use of a particular term). Marshall's (1890) initially general or generic term of 'the industrial district' is, for instance, now often applied when wishing explicitly to emphasize the values and norms shared by collocated firms (see Brusco, 1982 among many others). In other cases will singular academic contributions based on a particular term over time have developed into distinct schools of thought.²

Table 1.
Cluster publications 1953-2004

Number of articles, published in scholarly journals within the social sciences with the term 'cluster', its synonyms, or its more distant cousins in the title or in the abstract or among the keywords.

Term looked up in database	1950s*- 1980s	1990s	2000s**
Frequency			
Cluster(s)/clustering of firm(s)	0	9	15
Agglomeration	74	305	380
- geographic(al) agglomeration(s)	0	4	7
- spatial agglomeration(s)	3	17	23
- agglomeration(s) of (same industry) firm(s)	5	71	50
Geographic(al) concentration(s)	3	32	51
Spatial concentration(s)	7	32	30
Localised/localized industries/firms	0	5	7
Growth pole	9	12	5
Innovative milieu(s)	0	26	8
Industrial district(s)	10	126	95

Note: Though the table is based on the best current representation of the development within scientific journal publishing its inherent methodological problems should not be disregarded. Terms belonging to academic traditions that rely heavily on books are underrepresented by definition. The same apply to terms used mainly outside English language journals. Many radical and experimenting journals are never included in the ISI database because of a common 'curfew' period of ten years from the time the first volume appears before it is considered for inclusion. The number of journals published has been rapidly increasing during the period investigated and so has the number of journals included in the database. The selection criteria used in the table is the presently best available, but admittedly imperfect in many ways and should, of course, not be taken to imply anything about quality, academic significance or the relevance of the terms included. * Only including articles in journals included in the database and published January 1, 1953 to December 31, 1959., **Only including articles in journals included in the database and published January 1, 2000 to September 30, 2004.

Source: The table is based on a privately owned but publicly accessible database available through ISI Web of Knowledge <<http://isi3.isiknowledge.com/portal.cgi/wos>>. A search for each term for all years (1953-2004) was made for published articles only. An element of discretion was applied as entities were deleted from the list of results if deemed irrelevant for the purpose of this chapter (for example, 'Localized industrial melanism in the spittlebug...' and 'Teenage childbearing in Great Britain and the spatial concentration of poverty households').

So while the cluster concept and its synonyms are still in great demand for current analytical and policy purposes a scholarly practice has developed that might lead to their premature dismissal.

Paraphrasing Reich (1990: 925) we run, perhaps, the risk that the cluster concept will join those rare terms of public discourse that have gone directly from obscurity to meaninglessness without any intervening period of coherence. In dejected moments it seems, furthermore, as if an increasing proportion of current cluster studies and cluster policy recommendations are at best only partly based on sets of formally connected statements, the

final point of which is the explanation of an independent world, and discouragingly few empirical studies engage in thorough theory testing.³

It is, however, often easier to identify shortcomings than to fix them. What it needed is arguably some criteria or instrument whereby the theoretical core of the various line of thought in this field can be made more explicit.

In the next section we offer an attempt to contribute to this complex endeavor by explicitly considering the basic building blocks crucial for the construction of any comprehensive theory in the cluster field of inquiry. Within the limited space available it is, of course, only possible to provide a skeleton of an argument and we must rely on future work to assist in adding substance and supplying the contextual flesh needed for a fully satisfactory account.

In Section 3 we provide hints on how such work may be conducted by applying our scheme to three currently significant approaches that take their point of departure in i) externalities (illustrated by the Marshall's work on 'Industrial district'); ii) competitiveness (illustrated by Michael Porter's theory of cluster growth); or iii) territories (illustrated by the GREMI approach). In Section 4 we contemplate the prescriptive advice offered when following these three current archetypal lines of inquiry. In Section 5 we make a few concluding observations and identify the areas of particular ambiguity where further theoretical work is most urgently needed.

2. What constitutes a theory in the cluster field?

Most academic disciplines harbor several competing epistemological positions and this field is no exception⁴. For the task at hand we find it helpful to apply the simple framework, cultivated by Whetten (1989), according to which a complete theory must address the questions of 'what', 'how', 'why' and usually also of 'when/where/who'.⁵ The phrase 'cultivated' implies that this kind of framework can be found in numerous studies including, for example, the once much cherished *Introduction to Regional Economics* where Edgar M. Hoover summed up spatial economics in the question: "What is where, and why - and so what?" (1971:3). In Whetten's later elaboration each of his questions will, when answered, provide a distinct building block, needed for the construction of a theory.

³ See Hanson (2001) for an overview over recent attempts to test important features highlighted in the cluster literature.

⁴ See Barnes (2001, 2002) for recent reflections on two such positions. Considerations of space forces us to provide an admittedly rudimentary account of complex issues of theory building that under other and better circumstances would require a full paper or more. We acknowledge recent attempts within economic geography to reinterpret what theory is and to apply a definition much looser than that outlined above (e.g. Amin & Thrift 2000), but have not yet come across published contributions that have applied this novel interpretation within the field under scrutiny in this chapter.

⁵ See further Dubin (1987), Gagliardi (1999), Lengnick-Hall and Wolff (1999) and Sutton and Staw (1995).

First, confronting the question of 'what' will lead to identifying *factors* such as variables, concepts or constructs considered important for the explanation.⁶ Second, facing the question of 'how' provides causal *links* between these factors to form an ordered and explicit pattern of connections and relations. Taken together, the answers to questions of 'what' and 'how' constitute the field or subject of the theory.

Third, it is when answering the question of 'why' that we find the core of the theory. In order to be convincing 'why' must offer logical and compelling *justifications* for the factors included ('what') and for the links suggested ('how'). 'Why' also generates propositions that can establish new insights, challenge entrenched views and deepen our understanding of the phenomenon investigated. The explanatory and prescriptive quality and strength of any theory is often directly dependent on the solidity and novelty of the way in which 'why' is approached.

Forth and finally, 'when/where/who' adds contextual conditions and temporal or spatial limitations on the propositions generated and spell out the circumstances where the theory is unlikely to hold (Whetten 1989).⁷

According to this scheme, the profundity of the notion of clusters is thus conditional on the coherence of the reasoning when addressing the pivotal 'why'⁸. This was, by the way, also noted by Hoover a quarter of a century ago, who continued by pointing out, long before Krugman, how '[t]raditional geographers, though directly involved with *what is where*, lacked any real technique of explanation in terms of human behaviour and institutions to supply the *why*, and resorted to mere description and mapping' (1971:4, original italics).

However, the task of addressing the crucial 'why' is complicated by the fact that it is less than totally satisfactory to provide even a very compelling account for the economic and social benefits that firms may accrue when collocating (the cluster *existence* argument) without also including a justification for the diseconomies encountered when exceeding certain

⁶ Other epistemological positions may argue that conceptualisation *is* theory building, and thus protest against lumping variables, concepts and constructs into one single group. We assert that conceptualisation represents a step towards theory-building by providing important building blocks, but that concepts as such have no explanatory nor predictive power.

⁷ In Hoover's phrasing '[w]here' referred to the location in relation to other economic activities involving 'questions of proximity, concentration, dispersion and similarity or disparity of spatial patterns...' (Hoover 1971:3).

⁸ However, some theoretical contributions become known mostly for the specific and often novel way by which they confront the 'when/where/who'. The 'when' is, for instance, prominent in Piore and Sabel's (1984) much quoted book on *The Second Industrial Divide*, in which a significant theoretical contribution to the cluster literature is placed within an explicit timeframe of Fordist versus post-Fordist modes of production, while Steven Klepper's (2002) path-breaking paper on the formation of Detroit as a durable cluster of car manufacturing highlights 'who' by emphasising the pivotal role of very knowledgeable entrepreneurs who spun-off from the incumbents that survived the first dramatic shakeout in the industry. Klepper's cluster contribution is thus also an important supplement to mainstream economic assumptions of how prices a whisker above competitive levels attract new entrants.

geographical and sectoral thresholds (the *extension* argument).⁹ Without the latter we end up with a theory that claims that all kinds of activities from all corners of the world will ultimately end up at one single location because of the unrestricted benefits of collocating once the process gets started and the very first cluster is formed. A scrupulous treatment of 'why' would, in addition, also include an *exhaustion* argument that spelled out the internal or external conditions that made previous decisive collocation benefits turn sour during the lifecycle of the cluster. When the existence argument is undermined the clusters' vitality becomes threatened and the final demise might become immanent.

In the next section we examine three different lines of inquiry within the cluster field in a deliberately broad sense. In each case we attempt to identify the theoretical elements discussed above in order to show their general applicability across particular lines of investigation.

3. Three sets of illustrations

Contributions with a focus on local spillovers

Since Marshall's initial reflections on the cluster issue were published in 1890 they have formed the cornerstone of much subsequent thinking.¹⁰ Even though his 'industrial districts' only occupied a fraction of the grand explanatory scheme developed in *Principles* his specific interest in such cluster phenomena is about the (uneven) distribution of economic activity over space, and more specifically about the tendency for related firms to collocate at certain places over prolonged periods of time. The core variables are thus firms' (different) location requirements and economies external to the individual firm but internal to the district ('what'). Firms are linked directly by business (supply and purchase) relations and indirectly through the market for labor and for private or public services. Locational economies or "spillovers" are initially perhaps unanticipated outcomes of a successful match between firms' location requirements and the supply of location factors ('how'). Additionally, the Marshallian framework has from the very beginning included the entire set of 'why' arguments set out in the previous section. The *existence* argument was balanced by an extension argument through the effect of the simultaneous centripetal and centrifugal forces that together determined the geographical pattern of firms' location. The centripetal forces often consisted of cost advantages in transportation or when sharing an environment made particularly

⁹ The extension arguments are usually based on some specific combination of diseconomies of scale (see further below).

¹⁰ Two current traditions derive directly from this rich source. One is the predominantly Italian Industrial District literature (see chapters 3 and 4 in the present volume for an in-depth presentation) that focus on the way in which large firms may be matched or even out-competed by flexible arrangements of a myriad of independent, small firms working together within a confined area i.e. a Marshallian Industrial District. The other tradition with direct roots in Marshall's initial contribution is the Knowledge-Based Theory of the cluster (see Maskell and Malmberg 1997, Maskell 2001, Malmberg and Maskell 2002, Bathelt *et al.* 2004) that emphasises the role of knowledge formation when addressing the 'why' and its three components: the existence, the extension and the exhaustion argument.

agreeable by, for instance, a dedicated infrastructure, a pool of notably skilled labor, an educational systems of distinctive relevance, a fine concentration of specialized suppliers etc. but went much further when including many of the less easily measured factors such as rivalry, search costs, institutional factors and various positive spillovers along both the vertical and horizontal dimensions of the cluster (Loasby 1999, 2000).

The *extension* argument of centrifugal forces was, in contrast, normally based on the costs of congestion, or the bidding-up of prices for land, labor or the services or goods provided, but could be extended to include negative spillovers when different industrial logics clashed.

The *exhaustion* argument allowed for some vital factor (for instance a mineral deposit or a climate or transport benefit) to have been fully exploited or otherwise discontinued.

It is, perhaps, at this stage worth noting how later generations of mainly Anglo-Saxon scholars by deliberate decision or by following the prevailing tradition in contemporary economic geography gradually turned to producing very descriptive, ideographic work.¹¹ The crucial 'why' was, consequentially, more often assumed or implied rather than carefully investigated and specified. It was almost as if all three arguments in 'why': the *existence*, *extension* and *exhaustion* arguments gradually became considered so self-evident that no discussion or investigation was required (Feser, 1999).

When the new wave of interest in the cluster phenomenon started growing a decade or two ago the former coherent explanatory model had largely disappeared.

With a few significant exceptions it was replaced by a one-sided model that addressed the existence argument in novel ways but almost totally disregarded the extension and exhaustion arguments. Many recent contributions stem, for instance, from the basically Marshallian belief (whether sustained by empirical evidence or not) that collocated firms benefit from the ease of identifying and communicating with suited partners in their vicinity (low search costs) or from their ability to bridge cognitive gaps that enabled them to understand motives and desires that under other circumstances would remain opaque. By reducing the costs of co-ordination and by overcoming problems of asymmetrical information the process of clustering enables, it was maintained, a deepening of the local division of labor so that a higher level of specialization and knowledge creation may be within reach. The existence argument is thus based on the combined advantages of social coherence, relational flexibility, and ease of intra-cluster interaction, as well as the deepening of the local

¹¹ The descriptive tradition was apparently less pronounced on the European continent perhaps because of the strong economic and later also sociological tradition for abstract reasoning and theoretical contributions within the field (e.g. Weber 1909). In contrast, the research tradition set out by George Goudie Chisholm in the UK and furthered by Dudley Stamp became known for its focus on the assembly and ordering of concrete facts and detesting the abstract theorising about deeper reasons or chains of causality (ridiculed in Robinson's (1908: 251) remark that it was so kind of the good Lord to have made the great rivers run through the great cities). Yet some of Chisholm's surviving notebooks cast a somewhat different light on his interests and research agenda (Chisholm 1868).

knowledge base that it occasion, while the extension and the exhaustion argument has attracted considerably less attention if any at all.¹²

One of the most notable exceptions to this trend is Michael E. Porter, to whom we shall now turn.

Contributions with a focus on competitiveness

Few contributions to the cluster literature have gelled the interests of a generation of scholars as Michael E. Porter's work on competitive strategy. The commotion occasioned by his 1990 book and supported by his subsequent cluster-related papers has helped fulfill his prophecy that 'economic geography must move from the periphery to the mainstream' (Porter 1994: 38). Most bright second year students of business, strategy, management or economic geography will now probably be able to reproduce his famous 'diamond' model where the boxes addresses the 'what' while the connecting arrows (and the accompanying explanation) take on the 'how' in his theory. Students will most likely also be well aware of the fact that his main aim was to provide not a theory of the cluster, but a 'theory of national, state, and local competitiveness within the context of a global economy.' (Porter 1998: 197). As he initially explained:

'The basic unit of analysis for understanding national advantages is the industry. Nations succeed not in isolated industries, however, but in clusters of industries connected through vertical and horizontal relationships. A nation's economy contains a mix of clusters, whose makeup and sources of competitive advantage (or disadvantage) reflect the state of the economy's development' (Porter, 1990a:73).

In spite of *not* aiming at creating a theory of the cluster he does, nevertheless, address the 'why' in ways that meet the criteria set out in Section 2. His cluster *existence* argument includes the way in which proximity (also in the form of shared culture and low transaction costs) makes: 'Benefits flow forward, backward and horizontally. Aggressive rivalry in one industry tends to spread to others in the cluster''exchange of R&D and joint problem solving lead to faster and more efficient solutions'.... 'Suppliers also tend to be a conduit for transmitting information and innovation from firm to firm. Through this process, the pace of innovation within the entire national industry is accelerated. All these benefits are enhanced if suppliers are located in proximity to firms, shortening the communication lines' (Porter 1990a: 151 & 103). He later spelled out how '[D]eveloping clusters also attract - and cluster participants seek out - people and ideas that reinforce the cluster. Growing clusters attract skilled people through offering greater opportunities. Entrepreneurs or individuals with ideas migrate to the cluster from other locations, as well, because growing cluster signals

¹² The extension argument is, however, explicitly addressed in, for instance, Maskell (2001).

opportunity. A cluster's success stories help attract the best talent' 'Cluster membership makes possible direct observation of other firms' (Porter 1998: 241 & 221).

His *extension* argument is based on the old Marshallian duality of dispersing versus locating activities (see Porter 1990a: 156-157) while his *exhaustion* argument includes a whole range of potentially important intra-cluster forces (such as ebbing domestic rivalry, the development of internal rigidities and regulatory inflexibilities) as well as a number of externally induced influences (such as technological discontinuities, deteriorating factor conditions and shifts in buyers' needs (Porter 1990:166-169 & 1998: 243-244).

Contributions with a focus on the region and its development

In contrast to the Porterian 'what', with its focus on competitiveness and neglect of issues concerning uneven spatial development, the *innovative milieu approach*¹³ is concerned with technology, organization and, most significantly, with territory. Together these three elements is seen as constituting a localized initial context without frontiers in a strict sense, but presenting a certain degree of unity in terms of identifiable and specific behavior (Maillat, Quevit and Senn, 1993). The 'how', in turn, is addressed by introducing 1) a set of actors, who are independent enough to make strategic choices when managing material (infrastructures, machines, financial capacities, etc.) and immaterial (know-how, institutions resources, etc.) resources; 2) a learning dynamic that reveals the actors' capacity for adapting to changes in the environment; 3) an organizational logic according to which actors cooperate to innovate and develop networks of interdependent commercial and non-commercial relationships (Maillat, Quevit and Senn, 1993).

The innovative milieu approach is much broader in its scope than Marshall's or Porter's cluster theories but it does contain the three crucial elements of 'why' required to make a theoretical contribution within the field dealt with in this paper. The *existence* argument is based on a set of relationships that develops spontaneously within a given geographical area and generates a localized dynamic process of collective learning. Together 'they act as an uncertainty-reducing mechanism in the innovation process' (Camagni 1995: 320). An innovative milieu thus stimulates the development of know-how and the formation, development and vitality of innovation networks (Maillat, Quevit and Senn, 1993). 'It facilitates mutual acquaintance, collaboration, dissemination and exchange of information, just as it allows for the development of trust-relations. It offers options for reciprocal openness and for disseminating know-how without any risk of unilateral appropriation, because the players

¹³ The concept was coined by the GREMI group. GREMI is an acronym for 'Groupe de Recherche Européen sur les Milieux Innovateurs' or the European Research Group on Innovative Milieux, that was formed in 1986 to study the interaction between innovations and localised factors (together termed 'territory') in particular in the new French spatial dynamics - *the retournement spatial* - in order to explain different regional development trajectories and the diffusion of new technologies (Aydalot 1986). Scholars working with this line of inquiry are careful in stressing that no fully-fledged theory has yet been formulated (Crevoisier 2004:368).

share the same work ethic and a common will to cooperate' (Maillat 1998: 19). In short: Innovative milieus help the local actors conceive, devise and complete their joint projects¹⁴.

The *extension* argument is based on the proposition that cooperation between actors lead to the building of *relational capital* involving the mobilization of resources that are not necessarily of a monetary nature alone. Local sets of values (entrepreneurial, family, professional, etc.) guide actors to contribute towards innovation and production while making social investments that permits them, ultimately, to cooperate on a basis of trust and reciprocity. The resulting networks help maintain and reproduce the boundary between the innovative milieu and the exterior in the sense that they define which actors constitute part of the local coordination system and which do not (Crevoisier 2004: 371).

The *exhaustion* argument builds on the acknowledgement of how all milieus may lose cohesion because individual interests gain the upper hand over those of the community, if and when 'opportunistic behavior causes defiance or the outward openness becomes inadequate to ensure the enlargement of new cooperative relations or the replacement of technologies' (Maillat 1998:15). Consequently, territories differentiate and old industrial fortresses disintegrate.

4. Prescriptive consequences

Within the common field of cluster theory each of the three specific lines of investigation briefly introduced in Section 3 have a distinct perspective on the cluster phenomenon and provide dissimilar justifications for the *existence*, *extension* and *exhaustion* of clusters that could, perhaps, be developed into new propositions and testable hypothesis.

Our aim with the following is less ambitious: namely to point out some of the prescriptive differences that stem from how theory is constructed in each of the three examples. In doing so we restrict ourselves for reasons of space to concentrating on the realm of advice aimed at public policy makers while acknowledging that cluster theory at large may also forward potentially influential recommendations useful mainly or exclusively for managers or stake holders in the business community.

Some policy suggestions are universal in the sense that they are rooted in all three cluster theories when implicitly sharing the acceptance of the currently prevailing division of labor between a private and a public sector, with the latter in charge of providing most of the infrastructure, education and similar essential elements of general demand and applicability. Others pieces of policy advice are more intimately associated with one or more specific stream of theories and it is to these we shall now turn.

¹⁴ This research agenda represents a clear break from former French traditions in which large firms, with the capacity to shape the territory and to generate innovation, used to occupy centre stage in the investigation of spatial development issues (Matteacioli, 2002).

Policy contributions with a focus on local spillovers

If for the sake of brevity we allow ourselves to assume that Marshall's industrial districts follow a lifecycle model, where stages of infancy are succeeded by increasing maturity and subsequent stages of stagnation or decline, the framework developed in the previous sections may be taken to suggest how each such stage can merit a set of specific public policies distinctively different from what will be generally beneficial at the other stages.

At the infant stage, when firms with complementary or similar capabilities have started to reap some of the benefits of collocation through experimentation or conjecture, the relevant public policy options are mainly *market conformist* by supporting what is already in the making and by helping to provide inputs in short supply. *Targeted* labor mobility improving measures, *specific* educational efforts and vocational training programs, *dedicated* initiatives to enhance creativity and collaboration, physical infrastructure improvements, actions to develop *competent* seed and venture capital *sensitive to the particular requirements and structure* of the local firms through taxation relief or by redirecting public funds all belong to this set of infant stage policies.

Most of the abundant policy ambitions and initiatives to support and develop clusters in recent years have been concerned with the next, mature, stage of cluster development. The important point is that precisely because the Marshallian cluster theory is about self-organized, market-led dynamics, the factors and processes emphasized by the theory largely takes care of themselves. All policy initiatives in the mature stage of a cluster's life-cycle are therefore at least partly misdirected.

Finally, when clusters for one reason or another reach the exhaustion stage the policy challenge shifts from being supportive to becoming creatively destructive by actively disjoining present means-ends designates and by dismantling institutions molded to accommodate and support yesterday's economic structures. By assisting communities when faced with the need to unlearn previously successful routines such policies provide cognitive and economic space for new waves of entrepreneurial activity that might subsequently help put the cluster on a new and promising track.

Interestingly, there appears to be a great local variation in the ability to unlearn. Some clusters can inaugurate novel institutions and simultaneously dissolve obsolete ones while similar or stronger efforts in other clusters are unsuccessful. In the volatile environment of the current globalizing exchange economy such 'unlearning' capabilities might turn out to be of paramount significance for the ability of clusters (as well as the larger entities of regions or even nations) to attract firms and participate in sustaining their competitiveness in an already established industry, or to rebuild competitiveness by developing new industries. In areas under less fortunate circumstances, making an appropriate policy response is an even more formidable task. In such difficult situations a successful outcome of even the most energetically pursued and cleverly designed policies may appear so late that little remains to

be saved. More than one initially enthusiastic development agency have over the years come to a complete standstill due to the numerous and complex difficulties that emerge when renewal implies jeopardizing the interests of individuals or larger groups with the incentive and power to prevent or impede the process in spite of the cost of their actions to the overall society. Openness, and competition among different political entities provide what is arguably the best check. While local coordinated action is usually a blessing, local closely knitted power groups are thus often an unquestioned evil when uncomfortable decisions have to be made.

Policy contributions with a focus on competitiveness

Given the overall and explicit aim of Michael E. Porter's cluster theory it is no wonder that the overarching emphasis is placed on establishing and maintaining competition. There is a strong current running through the theory that the business sector, if left to itself, might easily slip into unhealthy practices of cartels and monopolies that will, ultimately, prevent rivalry and thereby undermine the cluster *existence* argument. Securing competition is therefore undoubtedly the single most important policy recommendation emerging from his theory and the perhaps the only area where strong and constant public presence and intervention is required.

The second and optional role remaining for public policy makers is demanding. The authorities must become catalysts and challengers that encourage and push enterprises to raise their performance even though this can be unpleasant or painful for the firms involved. It is to this end that Porter has advocated for the enforcement of strict product safety and environmental standards long before such thoughts became fashionable and very long before social responsibility became part of managerial rhetoric and practice. He realistically notes that 'Most of the policies that would make a real difference either are too slow and require too much patience for politicians or, even worse, carry with them the sting of short-term pain. Deregulating a protected industry, for example, will lead to bankruptcies sooner and to stronger, more competitive companies only later.' (Porter 1990b: 87).

Other kinds of governmental action have the limited prospect of being partially successful and only if working in tandem with favorable underlying conditions in diamond model (the theory's 'what' and 'how', see previous section).

Finally, he argues consistently that the default recommendation for policy makers is of a hands-off nature. He frequently warns against intervening in factor and currency markets and stresses that '...in politics, a decade is an eternity. Consequently, most governments favor policies that offer easily perceived short-term benefits, such as subsidies, protection, arranged mergers - the very policies that retard innovation' (Porter 1990b: 87).

His disregard for the possible damaging consequences of successful clusters for a just and even regional development is a direct consequence of his theory's main focus on national competitiveness. Cluster growth is a mean towards this end and no mercy should be shown

towards policy makers who wish to restrict this process due to some misdirected passion for regions or places that bleed while fuelling the process.

Contributions with a focus on the region and its development

The completely opposite focus and recommendations can be found in the 'innovative milieu' approach take a much more favorable view on the role of government and semi-public forms of governance in a much less sinister light. The approach is not at all embracing the market economy nor does it hail its alleged blessings. Firms are not the only important actors and local synergy could and should in some circumstances be enhanced through the creation from above of a local 'agent d'animation' or cross-firm organizer.

Another area where local firms needs help to develop in the overall interest of the region has to do with trans-border activities. Through public policy measures such activities can be encouraged to secure the inflow of ideas and exchange of resources beneficial for an immediate and long-term growth trajectory. This line of argument is somewhat in parallel with the recent thinking developed within the knowledge-based view of the cluster. Both approaches point to areas of interaction with the outside world where the local dynamics are not necessarily sufficient to maintain long-term sustainability and where explicit policy measures may be warranted even during the mature stage. While collocated firms thus usually have a good sense for and understanding of the relevant global technological frontiers they are often less well equipped to monitor and grasp categorically new knowledge especially if organized differently. The reason is that the clustered firm's international network of contacts to suppliers, customers and immediate competitors does not automatically include novel developments along parallel technological or commercial trajectories even when they are pertinent to future competitive positions. Rather than making extensive efforts in generating and promoting local buzz (Bathelt *et al.* 2004) through various forms of social engineering the main emphasis should therefore be placed on external communication policies directed towards widening the horizon and extending the reach of the local actors by confronting them with other equally competitive or superior ways of how to organize and develop well-known local products or services.

It is quite characteristic of the 'innovative milieu' approach that the *exhaustion* process is seen as containing the seeds for revival and new periods of flourishing. The innovative milieu is envisioned as potentially able to utilize the tensions that emerge during the process of change by guiding the localized production system towards a new state in which the territorial logic continues to manifest itself. 'The result is a milieu that possesses specific resources, rules for functioning, its own territory, and on a deeper level a technical culture and one of interdependencies....The territory is thus both the imprint of the former functioning of the milieu and the matrix of its transformation' (Crevoisier 2004: 374). If it does not succeed in this turn-over process 'the localised production system disappears and the territorial logic gives way to the functional logic' (Maillat 1998:21).

Common features across lines of investigation

Taken together, it is to some extent striking that regardless of the rather deep theoretical differences between the three approaches discussed above they basically share the same view when coping with derelict clusters. All argue that the main policy target in the post-exhaustion restructuring process is to create room for novel private sector initiatives as swiftly and effectively as possible rather than to pursue some governmental strategy of picking-the-winner by applying a range of top-down measures.

In this they are probably very wise.

Countless well intentioned but ineffectual cluster policies from all parts of the world seem to highlight the limits of the nation state, or any other political authority, in creating economically sustainable competitive advantages by design from above. No kind of vogue phrasings or remolded instrument packages can apparently alter the fact that the role of policy in the development of cluster advantages can only be marginal, indirect and long-term. Results are measured in decades if measurable at all.

5. A few final comments

The paper attempts to make four basic points.

The first is the simple claim that the theoretical underpinning of the recent deluge of cluster studies is often less than totally clear. It is especially maintained that while the cluster concept and its synonyms or more distant cousins are still in great demand for current analytical and policy purposes, a scholarly practice has developed that might lead to their premature dismissal.

The second point suggests that theory-development authorities might, in fact, have provided tools helpful for identifying and highlighting the factors ('what'), relations ('how') and justifications ('why') that together constitute the core of a theory. It is argued that by paying more attention to disentangling what each theory is about or not about some insights might also emerge regarding its possible range of applicability.

The third point concludes that, in order to be convincing, a theory of the cluster must do more than provide even a very compelling account for the particular benefits of collocation (i.e. the *existence* argument). It must also include an explanation for the balancing forces that prevent unconstrained cluster growth (i.e. the *extension* argument) and for the conditions that may lead to the decline or extinction of the cluster (i.e. the *exhaustion* argument).

The fourth point concerns the difference in theory-constituting elements that emerge when a closer look is taken at some commonly used approaches, and the dissimilar public policy options that follow.

No thorough or fully satisfying account of any of these points has, of course, been possible within the limited space available and much work remains to be done. Nevertheless, the paper does illustrate how the three specific approaches investigated provide very dissimilar justifications for the *existence*, *extension* and *exhaustion* of clusters that could, if given sufficient care, be developed into new propositions and testable hypotheses. The usefulness of many current cluster studies would be vastly improved if more effort was directed towards developing critical hypotheses and using the empirical material, often painfully assembled, for cautiously testing such hypotheses before prescriptive advice was offered.

What is urgently needed is further work aimed at distilling basic explanatory elements of some of the many theories currently in play in the field and bringing them to trial by confronting them with real world data. There are several reasons for this. First, such work is much needed in order to get rid of explanations that simply do not hold true and to understand more precisely the 'when/where/who' of the survivors. Second, such work is, of course, the only way in which reliable prescriptive advice can be developed and offered to managers and policy makers. Third, and most important for this field in academic terms, it is by engaging in such processes that a new stage of theoretical progress may become possible.

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