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Beyond the Knowledge-Based Theory of the Geographic Cluster

Alexander Cole



Utrecht University

Urban & Regional research centre Utrecht

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Author's Contact Information:

Alexander Cole

Department of Industrial Economics and Strategy

Kilevej 14a, 3rd floor

2000 Frederiksberg Denmark

sashacole510@gmail.com or sc.ino@cbs.dk

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Abstract:

The knowledge-based theory of the geographic cluster represents a major attempt to re-conceptualize clusters. In essence it argues that the localization of firms in similar and related industries stimulates learning and innovation, giving a competitive advantage to clustered firms. This paper critically examines the knowledge-based theory the cluster, arguing that it has greatly overstated the advantages of co-location to firms and misidentified the mechanisms through which learning occurs in clusters. In particular, the theory is criticized on three points: the flexible, under-specified way that it defines its object of study; the focus on firms as an explanatory variable instead of more fundamental processes of resource accumulation; and the functionalist mode of theory that it employs as an explanation. Ways to address each of these issues are discussed. In a final section I suggest that the static notions of learning put forward in the knowledge-based theory of the cluster be replaced by a developmental theory of regional dynamics that focuses on *both* the accumulation of knowledge and other resources and on structural transformation.

Localized learning: 10 year later.

The present article presents a critical reading of arguments regarding localized learning that have been put forward to explain the geographic clustering of firms, in particular work put forward by the enduring authorial partnership of Anders Malmberg and Peter Maskell. While an interest in innovation and learning and how these relate to spatial agglomeration are a common theme across much work in economic geography, innovation studies, and organizational economics over the last decade, I focus on the work of these authors both because of the sophistication of their insights into the nature of learning, and because of the prestige and that this has given their theory of clustering in the academic community. The critique I offer, however, is far from a total rejection of the localized learning perspective, which has evolved over time and has provided many useful insights into processes of learning and clustering that I believe to be both original and fundamentally correct. This is particularly true of the analysis of regional development based around path-dependent processes of learning, institution building and resource accumulation that these authors and others developed during the mid and late-1990s (MASKELL & MALMBERG 1999, MASKEL et al. 1998). This body of work developed a theoretical framework for understanding why regions tend to build upon their existing economic

specialization, and hence why regional specialization was likely to remain stable over time. It was also concerned with a concrete, historical analysis of the development of various “low-tech” industries, particularly in the Scandinavian economies, and a theoretical account of why a low-tech developmental trajectory might be sustainable even in some of the world’s highest-cost environments.

Following those writings, the theory has since narrowed and lost much of its richness. Increasingly, with the adoption of Porter’s concept of the cluster the body of work produced by Malmberg and Maskell came to conceive of clusters as a specific organizational ideal-type akin to firms, markets, and networks, and has sought to understand this ideal-type in terms of its knowledge-creating qualities (PORTER 1990, see MARTIN & SUNLEY 2003 for a critique).ⁱ Wedding Porter’s amorphous construct to a neo-Schumpeterian concern with innovation, this later work offers an explicit “knowledge-based theory of the geographic cluster” based around an updated interpretation of ‘localization economies’, the advantages of agglomeration to firms doing similar things, with an emphasis on knowledge generation and diffusion (MASKELL (2001a), MALMBERG & MASKELL 2002).

While their interpretation of clusters as knowledge-creating organizations has been widely cited and generated a large auxiliary literature, I believe that it is fundamentally flawed. My criticism rests on three main points. First, with the adoption of Porter’s cluster concept the Maskell and Malmberg shifted their unit analysis from regional development as a process of resource accumulation towards an explanation based on the competitive advantage that collocation provides to firms. As a result they miss many of the key mechanisms by which innovation on the regional level actually occurs. Second, efforts to fit the complex and peculiar dynamics of regional development into a single ideal-type impoverish our understanding of agglomeration when compared to earlier, more context-sensitive accounts. Third, the knowledge-based theory of the cluster rests on a functionalist mode of explanation borrowed from the “theory of the firm”. This form of analysis is of limited use as a tool for understanding regional development as a dynamic process.ⁱⁱ As an alternative to the narrow concept of ‘*learning*’ put forward by these authors, I suggest the need to build theories around the concept of *development*, understood as an open-ended process of both resource expansion and the internal and external organizational transformation that accompanies this expansion.

The Localized Learning Perspective and the Knowledge-Based Theory of the Cluster

In a review of the localized learning perspective published in 2006, MALMBERG & MASKELL (2006) tell us that the localized learning perspective focuses on three related questions:

The first—and most general—question is concerned with the nature of competition in today's economy, and how the performance of firms and industries relates to space and place. The second is related to why geographical areas tend to specialize in particular types of economic activity, and why the resulting patterns of spatial clustering of similar and related economic activities are so durable. The third and final question has to do with the specific issue of how high-cost regions can sustain competitiveness and prosperity in an increasingly integrated world economy. In a way, the same answer has been provided to all three questions: It has to do with learning in general and with the development of distinct and valuable localized capabilities that promote and guide learning processes into particular trajectories. (*ibid.* p.3)

The theory, in essence, suggests the development of specific regional knowledge-bases is a cumulative, path-dependent process and so, once a regional specialization is formed, it is likely to be re-enforced over time. The micro-analytic basis of regional specialization draws on an analysis of the ways that specialization leads to the development of a specific institutional environment that then guides learning and competence development along a specific path or trajectory. Once regional specialization is set, a set of feedbacks develop that will tend to re-enforce and strengthen this specialization over time. As Malmberg and Maskell write:

Once a dominating knowledge base and institutional pattern has been created, it will attract those firms and individuals most compatible with it. Together, they both utilize and, by doing so, reinforce the existing knowledge base and institutional pattern, thereby setting the frame for the kind of activities that might be likely or even possible to perform presently or in the future. In an aggregate setting, the process of cumulative causation favors industrial specialization and territorial differentiation and helps explain why no competitive region or nation can remain a jack-of-all-trades (*ibid.*, p 3-4).

The idea that patterns of regional specialization are the outcome of cumulative processes has quite a long history in economic geography, going back at least to MYRDAL (1957), HIRSCHMANN (1958) and PRED (1966). In fact, as Malmberg & Maskell point out, and as Malmberg has explained extensively elsewhere (MALMBERG, SOLVELL & ZANDER 1996), the persistence of agglomeration can, in principle, be explained by *any* process of cumulative causation at the regional level.ⁱⁱⁱ What the localized learning

perspective adds to this discussion is a focus on the cumulative nature of learning, arguing that learning allows regions to capture the rents of innovation before the knowledge and the accompanying rents diffuse globally. Focusing on knowledge as the key resource through which competitive advantage is maintained and enhanced, MASKELL & MALMBERG (1999) suggest that competitively valuable knowledge is likely to remain spatially sticky because the embedded “tacit” knowledge needed to generate new innovations is rooted in the specific relationships and interactions of places. Hence it remains a unique, rent-producing resource for regions that possess it.

The first element of localized learning, what we might call localized learning writ large, is aimed at explaining why patterns of regional specialization tend to persist over time. It relates this persistence to the micro-dynamics of learning and innovation on the local level, including the ways that new knowledge draws on and develops existing knowledge in a path-dependent manner. The second element is concerned more narrowly with re-conceptualizing in terms of knowledge and learning the widely used geographical notions of “*localization economies*” (MALMBERG & MASKELL 2002) and theorizing the knowledge-generating advantages of clusters (MASKELL 2001a).

The key question addressed by this second element of the localized learning perspective is how geographic proximity may enhance processes of knowledge-creation, giving important advantages to localized groups of firms in related and similar industries (i.e. clusters). While in early work it is suggested that localized learning is rooted in the development of specific institutional patterns that shape regional specialization, the analysis of localization economies and the knowledge-generating advantages of clusters focuses on different kinds of interactive learning occurring between firms. This learning, it is argued, is greatly enhanced by geographic proximity. The authors suggest that the micro-foundations of regional specialization encompass two related, but distinct elements: “*One has to do with localized capabilities that enhance learning, while the other concerns the possible benefits that firms with similar or related activities may accrue by locating in spatial proximity to one another (MALMBERG & MASKELL 2006, p.2)*”

Following RICHARDSON (1972), they conceive of the industrial system as consisting of a vertical dimension, along which firms with different, but complementary capabilities collaborate in chains of interconnected activities, and a horizontal dimension across which firms with similar capabilities compete with each other. The analysis of learning along the vertical dimension builds on work by RUSSO (1986) and LUNDVALL (1987) that

suggest that agglomeration often favors learning between users and producers, particularly when this learning consists of largely unarticulated needs, and hence may emerge in the context of familiarity between interacting agents and frequent face-to-face interaction. Interestingly, as the authors point out, empirical studies do not support the generality of these insights. A review of the literature on clustering by MALMBERG & POWERS (2005) suggests that interaction between firms with complementary capabilities is not a regular feature of localized agglomerations^{iv}.

While much of the literature of the 1990s had suggested that learning within clusters is largely the effect of interactions between users and producers, in the “The Knowledge-based Theory of the Geographic Cluster” MASKELL (2001a) suggests an alternative explanation for why clusters learn. User-producer interactions, he points out, may just as easily occur within a single firm as they do between two firms in different parts of the value chain. The classic explanation for the externalization of certain activities lies in the different economies of scale, scope and other types of increasing returns that make it inefficient for a single firm to internalize different parts of the value chain. The real advantages that clusters of firms have over a single firm, he suggests lies in the parallel experimentation and monitoring and imitation of successful experiments that clusters of firms are able to engage in (see LOASBY 1998 for a similar argument). Proximity, he argues, is particularly important for monitoring and imitation because:

“While it may be easy for firms to blame the inadequate local factor market when confronted with the superior performance of competitors located far away, it is less so when the premium producer lies down the street. The sharing of common conditions, opportunities and threats make the strengths and weaknesses of each individual firm apparent to the management, the owners, the employees and everyone else in the cluster who cares to take an interest. (ibid, p 928-29)”

Again, in their review of the cluster literature MALMBERG & POWER (2005) find only mixed evidence that local rivalry is an important empirical phenomenon. One explanation for this finding, as will be explained below, is that *relational* proximity matters more than pure *geographic* proximity in the benchmarking practices of firms, particularly those that are large or simply well established in their industries. A second problem is that the theory assumes a situation of competition between firms that are similar enough to actually imitate each others’ best practices. It seems reasonable, however, to assume that local observation and benchmarking are important in certain regions typified by small-scale firms and in which all of the actors are well known to each other.^v

Malmberg and Maskell (2006) identify a third mechanism for learning within clusters that they label “*neighborhood effects*.” Neighborhood effects are very similar to what Marshall appears to have meant by ‘industrial atmosphere’ and seem to represent a re-socialization of an under-socialized theory that considered clusters only in terms of relations between firms.^{vi} Neighborhood effects occur through the general circulation of knowledge, ideas and opinions among a close network of people. This argument rests on the assumption that spatial proximity “increases the likelihood of fruitful unanticipated opinions, and ideas from a broader community of informed observers, not all of whom are necessarily directly involve in the current rent-seeking activities (*ibid* 2006, p.5).”

What is Knowledge-based Theory of the Cluster (a theory of)?

Undoubtedly the ideal type of the cluster sketched out above has its uses. In particular, the expanded notion of localization economies based around learning-by-experimentation represents an advance within the Marshallian framework for understanding the advantages of localization. However, there are several problems with the claim that these mechanisms represent “A Knowledge-based *Theory* of the Geographic Cluster.”

The first problem is the conceptual slippage between the concept of the region, as elaborated in the first part of their formulation, “localized learning writ large”, and the micro-processes underpinning regionalization in the knowledge-based theory of the geographic cluster. Localized learning is put forward as a theory of why regional specialization is a persistent feature of a global economy characterized by low transportation and communications costs and is presumably applicable to regions of all sorts; the knowledge-based theory of the cluster --localization learning writ small-- is an argument regarding the micro-processes of learning within the cluster, understood as an agglomeration of firms engaged in similar and related activities. In an often cited and much ignored article, MARKUSEN (1996) argued forcefully against such conceptual slippage and pointed out that Marshallian industrial districts account for a rather small part of the successful regional economies. While her definition of the Marshallian industrial district as a collection of mostly small firms is somewhat narrower than Malmberg and Maskell’s notion of the cluster, her claim that most American regions were driven by either “hub and spoke” districts anchored by large oligopolies, “satellite platforms” made up of branch plants, and large-scale government-related activities such as military bases, defense industries, and government laboratories, leaves no doubt that their model of

clusters describes a rather small sample of important regional economies taken as a whole. Others scholars, such as PANICCIA (2002, 2007), take the multiplicity of ideal-types even further demonstrating that there is tremendous variety of internal organization even among such a small sub-set of regional economies such as the famous and much-studied localized industrial districts found in Italy.

In each of the above examples, the internal structure of the region is thought to have important implications on its economic performance and on how learning and innovation are likely to occur. But the internal structure of the cluster is never really specified in Malmberg and Maskell's ideal-type except to state that the cluster consists of firms in similar and related activities. This means that the model they put forward is both too broad, attributing characteristics to all districts that are only present in some of them, and too narrow, in that it only accounts for a small subsection of the possible mechanisms promoting learning within geographic agglomerations of firms. The fact that the authors never actually give any examples of what they are referring to makes it difficult to know the range of real-world clusters that their model describes.

A second problem with the theory laid out above relates to the unit-of-analysis. While in earlier versions of localized learning the authors adopted a resource-based view of regional accumulation (see MASKELL et. al. 1998), in the later literature they describe clusters as collections of co-located *firms*. This differs an important way from the classic ideal of an industrial district put forward by MARSHALL (1890) and developed by BECCATINI (1987) in which the district consists of a collection of firms, a local labor market, and other institutions. Indeed, the little research has been conducted on the topic co-location benefits to firms and it is not clear cut that there is any. Furthermore, an emphasis on inter-firm learning leaves many of the mechanisms by which learning within clusters occurs are simply missing from the theory.

The most obvious of these missing mechanisms is the establishment of a specially-qualified pool of labor and entrepreneurial talent, which develops in a path-dependent manner as the region becomes home to firms that use and develop this specialized knowledge. Such a talent pool is not only a source of new ventures (given the right institutional conditions to encourage entrepreneurship) but also a key reason that firms might want to relocate activities into a region. Firms in agglomerations 'learn' in part because they find it easier to attract and hire qualified labor with specialized skills. Learning by interaction thus may occur inside of the firm (or even more specifically, the

work group), with some of that knowledge being carried by workers as they move between firms (see HENRY & PINCH 2000 for a recent case study). Specialized labor tends to be relatively fixed geographically for the simple reason that the presence of multiple employers reduces the risks to workers of investing in specialized skills, since the employee can leave one job and easily find another job requiring similar skills without having to sell the house, move the kids, and create a new social network. To sum up, the knowledge-based theory of the geographic cluster neglects the learning that occurs inside firms (HUDSON 1999).

The accumulation of talent and other productive resources not only provides a more general explanation of learning within regions—which are only in some cases characterized by localized inter-firm networks (see MARKSUSEN 1996, and FLORIDA 2002, and GLASER 2000 on this point) — but can also provide a more cogent mechanism for how the presence of numerous ‘rival’ firms could enhance learning within a region. If each of the firms is seen as an individual ‘experiment’, a bet on the future of some market, technology, or managerial model, then co-location not only makes it easier for less-successful firms to imitate the more successful (as suggested by Maskell), it also means that as some ventures fail, resources can easily be absorbed into those more successful ventures, which presumably will be growing. The most important movement would be that of talented individuals and dissatisfied entrepreneurs (who imagine things can be done better or see unexploited opportunities) from less-successful to the more successful ventures. However, in regions where other geographically-fixed resources are important—for example good land for wine-grapes—the co-presence of several competing firms could lead to faster innovation through the simple fact that more successful ventures have an advantage in the local competition for scarce resources. Given the richness of insights pointing to regions as localized pools of qualified labor (and other resources) it is somewhat surprising that the knowledge-based theory of the cluster focuses on firms as the unit of analysis.

Since the firm is a fixed-entity in Maskell and Malmberg and there is no story about how new firms develop or the role that localization may have in this process, their explanation of localized learning depends almost entirely on spillovers between firms. The insights provided by earlier theories on how localization may stimulate greater specialization and new firm formation are abandoned. The authors contrast their own theories to earlier theories of localization, notably SCOTT’s (1986, 1988) writings on spatial transaction-

costs, and argue that transaction-costs approaches are static and do not take learning into account. This line of argument represents a misreading of the concept of spatial transaction costs.

In Scott's use of the concept of spatial transaction costs, the reduction of transaction costs doesn't just reduce costs, as MASKELL (2001a) claims, but more importantly enables greater specialization among firms, and hence greater investment in specialized machinery and knowledge. This interpretation builds on a classical argument in economics with a history running from Adam Smith to YOUNG (1928) to STIGLER (1951), to which Scott was able to give a spatial twist, showing how localization could lead to learning by promoting learning through specialization. This notion of learning is also present in PIORE & SABEL (1984), who identify flexibility in market relationships provided by localization as an important buffer allowing firms to engage in greater specialization internally. Despite the criticism, elsewhere MASKELL (2001c) endorses a notion of learning-through-specialization that is essentially the same as Scott's position. Survey work by CANIËLS & ROMIJN (2005) has shown convincingly that most innovation in industrial clusters is driven by greater opportunities for specialization —what has often been referred to as pecuniary external economies— while the role of pure knowledge spillovers has likely been exaggerated. Of course, it is important to note that in a dynamic setting the distinction between pecuniary (market-based) externalities and knowledge-spillovers (sometimes referred to as traded and un-traded interdependencies) is somewhat blurred and that the two kinds of externalities can be seen as complementary since the later might be a key source of information enabling the former.

A third shortcoming rests with Malmberg and Maskell's rather limited notion of theory. In presenting their theory of the cluster, MALMBERG & MASKELL (2002) dismiss stylized stories about how clusters are formed, gel, and later face stagnation, crisis or perhaps renewal, as merely 'ideographic', and hence presumably atheoretical, accounts. They suggest that "The more theoretically oriented part of the literature of agglomeration usually does not focus on the origin and subsequent historical development of localized clusters. Rather it aims at explaining the *existence* of spatial clustering by identifying and analyzing those permanent advantages that may accrue to firms located close to other similar and related firms, rather than being in isolation. (*ibid.*, p. 432, my italics)"

Elsewhere, MASKELL (2001a, p. 924) argues that "the reason for the existence of the cluster can be found in the enhanced knowledge creation that takes place along its

horizontal and vertical dimensions.” The gist of the theory is to put forward the cluster can be studied as a kind of ‘non-market’ organization and then probe the logic of this organizational form.

In place of historical accounts, which Maskell and Malmberg reject as merely “ideographic”, they put forward a functionalist theory: the *existence* of the cluster is explained by reference to its *function*. While functionalism is quite common in organizational economics, where a long literature on “the theory of the firm” has sought to explain firms by the fact that they function to reduce transaction costs (COASE 1937), functionalism is not generally credited with providing satisfactory explanations of social phenomena (HEMPEL 1965, NAGEL 1961). Functional explanations are teleological: they attribute the *reason* for the existence of an institution to the *function* that the institution is assumed to serve. In the case of humanly-designed institutions or artifacts one can assume that the artifact or institution has been deliberately created with its function in mind, so functionalism may be a good-basis for understanding why the artifact exists. In most cases, however, geographic clusters are not created by an identifiable agent^{vii} but emerge from spontaneous and self-organizing *processes* of geographical agglomeration and endogenous, place-based industrial development.

Lacking a clear teleology, functional explanations can be converted into a causal explanation by positing some feedback mechanism between the greater functionality of an institution and its prevalence in a given population (ELSTER 1979). Usually this involves the evolutionary or quasi-evolutionary argument that competition is likely to select for those institutions exhibiting more adaptive or functional traits while those that are less-functional will tend to disappear.^{viii} One major problem with a selection argument is that it assumes a strong selective environment. Malmberg and Maskell invoke with the *ceteris paribus* assumption that globalization has created a competitive environment in which *all* resources except for non-codified knowledge that is rooted in individuals and social-relationships is in the process of becoming ubiquitous. However, this assumption is never properly explored. A second problem is that the selection argument cannot account for either the transmission of successful institutions – what Marxists have called the reproduction of the relations of production— or the genesis of variety. For those researchers and policy-makers who are interested in questions such as “how do clusters form and become coherent, identifiable structures?” or “what are the typical evolutionary paths that clusters take?” or “What kind of policies might help a cluster move onto a

higher path?” functionalism offers few answers. As an alternative I suggest that developmental approach to clustering that theorizes the temporal processes generating agglomeration is needed.

This is not to claim that functional arguments do not have their uses. If we are to understand the knowledge-based theory of the cluster in terms of the larger localized learning perspective Malmberg and Maskell did not intend to explain how clusters or agglomerations form but to develop an explanation for how previously existing clusters, such as those characterizing many low-tech industries in Europe, could survive in a period of intensified global competition. This was a leading issue at the time they began formulating their ideas (for example, see HARRISON 1997). It was also the explicit focus of early formulations of localized learning theory such as those found in the book *Competitiveness, Localised Learning and Regional* (see MASKELL et al. 1997). If this is the case, it appears that instead of a theory of the cluster, what the authors were really putting forward was a functional theory of why a cluster, once it exists, may persist and resist global competition over time. They want identify those forces of localization that keep these localized inter-firm systems ‘sticky’ and localized. This is an important project; however it falls short of offering a theory of the cluster, as the authors claim.

To summarize, I have criticized the Knowledge-based view of the Geographic Cluster on three counts:

1. First, I argue that this view is based on a concept of the cluster that is underspecified in terms of its coverage but over-specified in terms of its specific contents.
2. Second, I argue that the ideal type put forward by Malmberg and Maskell has focused on the wrong unit of analysis, treating the cluster as a geographically concentrated group of firms instead of an evolving pool of resources that firms may draw on and develop. In discussing learning *between* firms, the learning that happens within firms as localized resources are used and developed disappears from the analysis.
3. Third, I have argued that the functionalist account of the cluster – that clusters are *explained* by the competitive advantage they give to firms—is insufficient and even misleading, and draws on an ad-hoc explanation of process that has little to do with how real clusters form.

In the following sections I will deepen this analysis, discussing different ways that our theory of clusters might move forward.

Different kinds of models for different kinds of regions:

The creation of ideal types or idealization is a powerful and widely used tool in the social sciences precisely because it allows one to isolate and represent abstractly what the researcher sees as important features of a given reality and to delineate the relationship between them. However, in constructing such abstractions the researcher faces certain trade-offs not unlike those that occur in all acts of codification: the more general the ideal-type or abstraction the less likely it is to capture the important elements of any given case. More ideal-types can be generated, but only at the cost of losing comparability across cases. If the ideal-type is tightly bound to the study of a specific historically constituted reality, as is the case with much case-study research, then the problem of over-abstraction can be mitigated by the in-depth contextual knowledge of the case. However, when trying to compare across cases, there is no rough and ready guide as to what the proper level of abstraction should be used. One common trick is to define a few contingencies such as knowledge-type, demand characteristics, or product type, and use these as a way of conveniently grouping cases into somewhat comparable groups. In other words, the relationship between the ideal type and the real-world phenomenon needs to be well specified.

The ideal-type cluster put forward in the *Knowledge Theory of the Geographic Cluster* never properly specifies the range of real-world phenomena to which it is supposed to apply. In her article, *'Fuzzy Concepts, Scanty Evidence, Policy Distance'* MARKUSEN (1999) took the "new regionalist" geography to task for using difficult to pin-down concepts with a poorly defined relationship to the real regional economies that the scholars were seeking to study. The article is a follow up to *Sticky Places in Slippery Space: A Typology of Industrial Districts* (1996) in which she notes that in their obsession with Marshallian industrial districts geographers have largely ignored other, more numerous and sometimes more important, kinds of regions. In addition to Markusen's broad-brush, inductive categorization, scholars such as PANNICCIA (2002, 2007), GORDON & McCANN (2000) and IAMMARINO & McCANN (2006), and ASHEIM & COENEN

(2006) have all recognized that the large variety of cluster types may require that we develop different middle-level explanations in order to understand them.

As Markusen has argued, using multiple ideal-types offers the advantage of a better fit with reality while still allowing for commonalities between regions to be studied. The trick is to find an appropriate level of abstraction that is both general enough to capture a wide range of cases and specific enough to say something useful regarding what is happening in those cases. However, while potentially providing a useful approximation of the structured relationships characterizing different regions, even the use of multiple ideal-type models provides only guidelines for interpreting regional development. First, because there are the pure ideal type is never found in the real world, the difference between the ideal and the real world case is often conceptualized in an ad-hoc manner. Real world cases become ‘hybrids’ of one or the other ideal-types. Second, while ideal-types represent the structured relationships between different aspects of a totality at some given point in time, the cases that it is used to interpret are, in reality, caught up in processes of constant transformation. As such these idealizations make it difficult to capture processes of change within the region. This leaves the researcher with only a succession of models and no way of explaining the change between them. However, ideal-types can provide markers of how the organization of the region changes over time when coupled with strong historical accounts (see COE 2001 on the transformation of Vancouver’s film and T.V. production sector and IAMMARINO & McCANN 2006 on the structural transformation London’s financial district and New York’s garment).

A different and somewhat opposite approach has been suggested by GIULIANI (2005), BELUSSI (2007) and others. Giuliani, for example, points to the proliferation of a large number of related and partially over-lapping concepts that have been invoked to describe regional agglomeration. As a remedy for this situation, she suggests that it might be useful to adopt a *less-specific* definition that focuses only on those features that are common to all clusters—namely the geographical agglomeration of firms operating in the same industry. This would not exclude the possibility that other things, such as learning, are important within a given cluster. However, those other features should not be part of the definition, and given that they are often missing, they certainly shouldn’t be used as a theory to explain clustering. This approach conforms to the idea that ideal-types designed

to cover a broad variety of cases will necessarily need to be less specific regarding the features that are likely to be found in any given case.

The simple definition of clusters suggested by Giuliani can be supplemented by an empirical study of the kinds of localization advantages that may or may not develop within a given cluster. In most theories these localization advantages consist of internal and external increasing returns, including, of course, those that accrue to specialization and localized knowledge spillovers. Such an approach seems to have been particularly useful to the study of geographic clusters in developing countries where one is unlikely to find 'fully developed' clusters exhibiting a range of higher-order capabilities. Such an approach allows one to carefully decompose the advantages and disadvantages of clustering and trying to explain when, and under what conditions in a region's development these different advantages and disadvantages are likely to be realized (CANIËLS & ROMIJN, 2003).

Regions and firms: getting real.

Maskell and Malmberg have written extensively about the need for greater attention to the roll of firms in economic geography (see MASKELL 2001b and DICKENS & MALMBERG 2001 for examples). However, the *knowledge-based theory of the cluster* offers an limited understanding of firms and gives little analytical space to what actually occurs inside of firms (HUDSON 1999). In fact, in the theory the firm does not appear as a historically constituted entity but as a representative agent. In this regard, the authors perpetuate one of the persistent short-comings in the literature on clusters and agglomeration. This literature has generally focused on the region as the site of important inter-firm and inter-organizational relationships while paying little attention to the difference between firms and how these matter.

To remedy this under-specified treatment of the firm, I suggest that a developmental theory should try to take into account how firms evolve and co-evolve with the localities, networks, and industries in which they are embedded (STAM 2007, WAL & BOSCHMA upcoming). Since learning within firms is undoubtedly a large part of what drives the development of localized competences, this omission is serious. It also represents a misreading of Marshall, who noted that internal economies-of-scale as well as external economies were important for regional growth.

The learning processes that occur *between* firms and other economic actors and those that take place *within* firms should be seen as highly complementary. These complementarities are captured to some extent by COHEN & LEVINTHAL's (1991) concept, "absorptive capacity", which has become widely used within cluster studies. Absorptive capacity forwards the notion that firms (and other organizations) will have to invest in a certain level of internal knowledge in order to make sense of and use new knowledge that becomes available in their external environment. Resource-exchange theories, which have been somewhat neglected in regional studies, also provides an interesting perspective on these complementarities: a firm with weak internal capabilities does not make a very interesting party for exchange, and hence, all else being equal, has far fewer and lower quality networking opportunities than a more capable firm should have (OINAS 1999). This later rational suggests in a much stronger way that internal and external learning opportunities are complementary and reinforcing sources of advantage to firms. In other words, the development of internal competences co-evolves with the structure of networks.

LAZERSON AND LORENZONI (1999) have made this point quite strongly in their criticism of the use of the Marshallian ideal-type to understand Italy's industrial districts. This ideal-type had been rediscovered and introduced to the study of Italy's local economic systems by BECATTINI (1987), who had argued that one could not understand the success of these systems by looking at individual firms, which were generally small and only weakly organized, but had to look at the organizational advantages of the district as a whole. Becattini's choice to shift the unit of analysis from the individual firm to the district as a system of firms and social relations has become part of the DNA of cluster studies, and may explain why such studies have tended to ignore firms as agents of change. However, as Lazerson and Lorenzoni point out, the hermetically closed systems described by the ideal-type would have no source for new ideas or knowledge to enter the district, and hence would stagnate. They argue that stagnation does not occur because real districts don't really confirm to the ideal type. Instead, they suggest that inter-firm networks within districts are characterized by quasi-hierarchy, in which certain 'focal' firms play the important role of funnelling new ideas and knowledge into the productive structure of the district.

A theory of the firm as a developmental entity may also shed light on when access to knowledge and tacit knowledge in particular is likely to be an important factor in the

locational decisions made by firms. Like many other neo-Marshallian theories, the knowledge-based theory of the cluster suggests that firms are spatially trapped because knowledge, particularly “tacit” knowledge, moves more easily when firms are in proximity to one another. The explanation lies in the assumption that proximate firms will share background knowledge and a common institutional infrastructure and shared and that proximity also facilitates frequent face-to-face interaction.

The belief that physical proximity is either a necessary or sufficient condition for the communications of tacit knowledge has been challenged by a large literature that makes a distinction between institutional and cognitive proximity. This literature argues that in most cases it is cognitive proximity, perhaps supplemented by occasional face-to-face interaction, that enable knowledge to move easily between firms and individuals in a given trade or industry.^{ix} BRESCHI & LISSONI (2001) and LISSONI 2001, for example, have suggested that knowledge moves selectively through clusters, and is shared by networks of people engaged in common enterprises; what the recent literature refers to as “epistemic communities.” While cognitive and relational proximity may rely on physical proximity, particularly when knowledge is highly contextual, the relationship between the different kinds of proximity is strongly dependent on the organizational and institutional context within which knowledge is being exchanged. These contexts may be territorial, shared by a network of people engaged in a common enterprise (such as a professional or epistemic community), or may be formed by the routines and structured interactions taking place within a firm. For the most part any given communicative act may draw on all three kinds of context “Different kinds of transactions—and the communities that congeal around them,” STORPER & SCOTT (1995, p. 507) tell us, “occur at different geographical scales...At the first level we are dealing with a community that coalesces around frequent, repeated transactions among colleagues...At the second level we find a community of occasional contacts through professional networks, consisting of structured and routinized professional associations and activities...” The importance of proximity between firms is highly contingent on institutionalization of a communicative infrastructure on all of these levels.

The ability of a firm to develop the communicative infrastructure that enables extra-local communications rests, in part, on the degree of closure around the firm as an organization. It also depends on the degree to which industry practices have been stabilized. In the early, entrepreneurial stages, firms are likely to be more open and highly dependent on their

immediate environment. Later on, as codification and other aspects of a communicative infrastructure are developed, long-distance communications, even of complex kinds of knowledge, becomes more manageable.

Consider an idealized case of a newly founded firm with few internal resources. The firm is almost completely embedded in its local environment and has little margin for autonomous action or decision-making. However, as some internal accumulation process emerges, the firm begins to generate resources in excess of what it takes from outside actors. This surplus, what CYERT & MARCH (1963) called organizational slack, can then be used to better arrange relationships with the outside world in order to further internal accumulation processes. As the processes of specialization and differentiation proceed, the firm's specific identity within the division-of-labor begins to take shape. Accumulation, learning, and specialization then reinforce each other in a cumulative manner, creating a strong identity for the firm. As this happens, the firm becomes progressively disembedded from some relationships —perhaps those local ones that were essential in its birth process— and re-embeds itself in a network that reflects more closely its emergent identity. A Shakespearean actor enters the relational 'world' of Elizabethan theatre; the tool-maker searches for clients outside of its district and gains a world-wide reputation; the specialized plastics firm begins scanning the world for the latest developments in polymers. Through a process of organization, the importance of geographical proximity declines and relational proximity becomes more salient.

Of course this process of closure and spatial disembedding is neither necessary nor does it always proceed smoothly (STORPER 1985). Furthermore, it is almost never total (GERTLER 1995 is particularly strong on this last point). It depends on an evolutionary process whereby internal processes of accumulation and specialization are reinforced by the ability to command or control greater external resources. When external market environments are highly unpredictable, the ability of firms to generate internally reinforcing accumulation processes may be seriously hampered.^x Here, autonomy from a local context might remain minimal, and there would be little chance of outgrowing them. Hence, it is not surprising that geographical proximity is particularly important in industries characterized by rapidly shifting demand or rapid cycles of creative-destruction. Learning in such environments is likely to occur through the constant churn of firm formation and dissolution against the backdrop of an ever-expanding pool of material and institutional resources. The assumption of much of the literature is that clustering is

particularly important when innovation rates or when change in an industry is unpredictable. However, to reiterate Markusen's point, these cases are interesting but cannot form the basis for a generalized theory of the cluster.

Towards a Developmental View of the Region

The knowledge-based theory of the cluster put forward by Malmberg and Maskell focuses on the advantages that firms in related and similar industries gain from being co-located in the race to create new knowledge. While this is an interesting question it does not in itself constitute a theory of clusters or clustering or explain the existence of clusters.

Furthermore, a focus on the advantages of localization paints a misleadingly static picture of how innovation and learning are tied to organizational change, both at the level of the individual firm and of the region. A proper theory of the cluster would offer an account of how clusters are likely to form and how they come to exhibit particular organizational features such a multiplicity of related firms. It would seek answers to questions such as how a group of firms in similar and related industries came to be co-located? what forces may stabilize this organizational arrangement? and how the organizational models that characterize the region will change over time? To answer the above questions and provide a more dynamic account of regional learning and change, I suggest that a developmental theory of the region is needed.^{xi}

Developmental theory starts from the presupposition that change is always accompanied by periods of reorganization. Applied to regional economies, we can state that their development is characterized by *both* the localized accumulation of resources and knowledge *and* constant organizational change. This organizational change occurs in the form of both gradual evolution (incremental change) and through episodes of radical restructuring. These episodes are precipitated by both a combination of exogenous changes and endogenous changes in the relations of power that give some actors the power to re-arrange the relations of production.

While the literature on regions and clusters abounds in historical accounts that offer clues to the above questions of how regions form and are transformed over time, Malmberg and Maskell marginalize these accounts as merely 'ideographic'. The suggestion that ideographic accounts are 'atheoretical' runs against recent development in realist theories of science (SAYER 1988), which argue that real events inevitably consist of both necessary both necessary and contingent factors, and hence the outcomes of these

processes will always be somewhat unique. This is why ideographic accounts—in our case stories about how particular regional economies developed in particular times and places—are invaluable and to some degree inescapable (FLYVBERG 2006). This does not mean that there are no general principles at play in these stories, but that general processes may lead to unpredictable outcomes. However, because so much is contingent in the developmental path taken, even general principles can only offer heuristics for understanding particular cases

It is generally agreed that industrial specialization as a feature of regional growth can be accounted for by processes of path dependency and cumulative causation (KRUGMAN 1991, WOLFE & GERTLER 2006). What Malmberg and Maskell's localized learning perspective adds to this account is a theory of learning as a social process that is cumulative and path-dependent. The basic insight of the localized learning perspective is that both learning on the individual level and the institution structures that co-ordinate the division-of-labour within a given field of activities exhibit increasing returns that drive the economy along a given pathway.^{xii}

But how are these regional processes initiated? Typically, regional specialization has its origins in a single organization such as a university, government laboratory, or single large firm. A process of firm formation and diversification through entrepreneurial spin-offs then exploits and further develops this resource pool. Interestingly, KLEPPER (2002) has used a case-history of the development of the automotive industry in the U.S. to argue that local spin-offs *by themselves* may be a sufficient explanation for explaining the localization of certain industries, a result that BOSCHMA & WENTING (2007) have replicated with data on the English automotive industry. Strong localized external economies, particularly the pooling of specialized labour and other resources may provide the foundation for further rounds of development. HÅKANSON (2005), for example, suggests a basic model of cluster development in which successful firms give rise to the formation of a localized 'epistemic community' which acts as both a pool of skilled labour and potential entrepreneurs capable of starting new, successful. The basic insight that his model provides – that regional development is about the progressive accumulation of a resource base-- seems to have been lost in the search for 'higher-order', difficult to imitate capabilities.

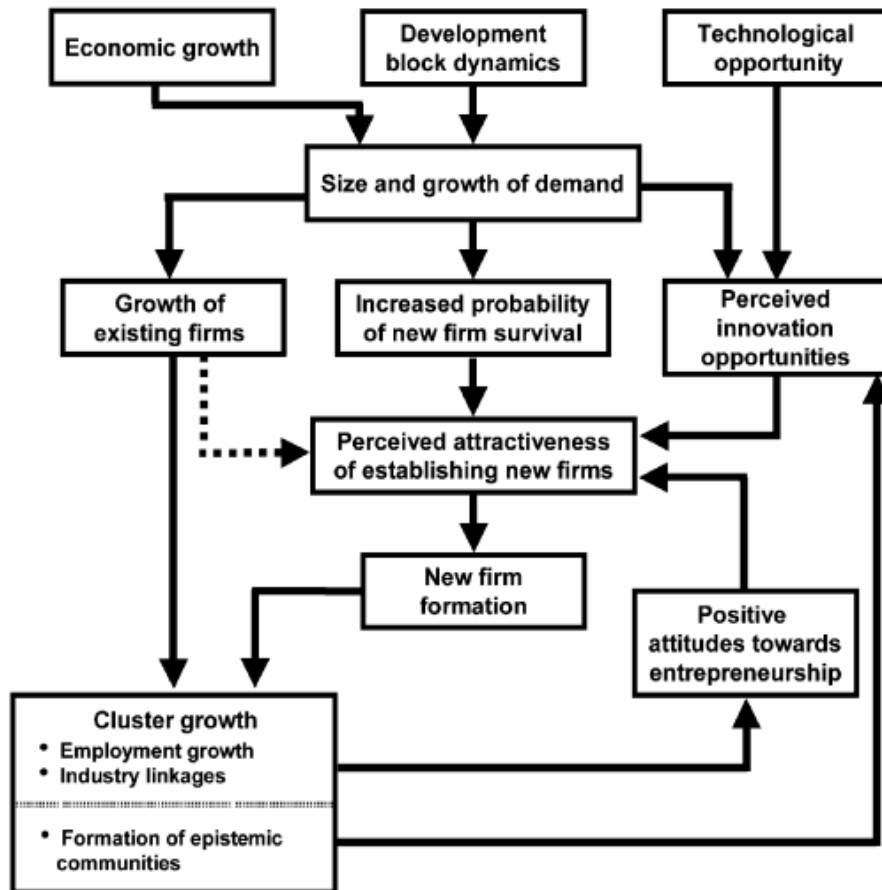


Figure from HÅKANSON (2005)

An idealized developmental process is suggested in FELDMAN, FRANCIS & BERCOVITZ (2002) and FELDMAN & FRANCIS (2006). Based on their research into the biotechnology cluster around Washington D.C., they hypothesize that the development, or genesis, of high-tech clusters may follow a typical path. This starts when entrepreneurs create new firms. In the case of Washington’s biotech industry this occurred after top scientists were laid off by government laboratories or by large-firms. The rents produced by these firms can be accounted for by their ability to use an existing knowledge-base, learned at their old job, and apply it in new ventures. In a second stage, pioneering firms build institutions, a set of rules and communicative norms that, once in existence, make it easier for new firms to enter the industry. These institutions and rules exhibit true external economies of scale, and can be thought of as the “soft infrastructure” enabling further rounds of regional development. In a third, “mature” stage, the system

gains critical mass, drawing in new entrepreneurs and workers (a pooled labour market is created), and specialized service providers such as venture capitalists, consultants, and legal services.

The idealized model presented by Feldman and Francis describes one developmental path for science-based clusters, but there is no reason to believe that cluster dynamics should end in a stage of maturity. In fact, over the longer term, regions show much greater variability than this idealized model suggests. The transformation of the organizational relations of production is a common feature of pretty much every region when studied over the longer run. Long-run case histories of Hollywood (SCOTT 2006), Silicon Valley (KENNEY & PATTON 2006), Route 128 (BEST & HAO 2006), New York's Fashion Districts (GODLEY 2001, cited in IAMMARINO & McCANN 2006, pages 1030-1032), London's financial industries (CASSON & McCANN, also cited in IAMMARINO & McCANN, 2006) and even the Third Italy (PANICCIA 2006) all demonstrate how regional economies may retain and develop a specific regional knowledge-base all while undergoing radical restructuring in the ways that this knowledge, and other resources, are organized to create and capture value.

A developmental perspective suggests that growth and change are accompanied by periods of structural transformation that change the relations of production within the region and change the regions relation to the economy beyond the region as well. In fact, organizational change can be seen almost everywhere if we lengthen our time-frame from the infinite-present of functionalist ideal-types to the somewhat longer time-frame of decades or more in which business-cycles play themselves out. The relationship between organizational change and resource accumulation should be seen as recursive: as new opportunities to create value appear, entrepreneurs use the power conferred by the control of key resources to reconfigure the organization of these resources into higher order capabilities. In turn, the new ways that they configure or organize these generates a surplus that is then invested in further rounds of resources accumulation. Organizational change is an incessant characteristic of regional development and an integral part of the innovation process.

While ideographic accounts are inescapable there are some common factors that seem to drive the ways the ways that the organizational structure of a regional economy is likely to evolve. Conditions shaping the internal structure of regions include the strength of increasing returns, and how these drive the cumulative nature of resource accumulation in

the region, the strength or weakness of the appropriability regime, and the relations of power along the value-chains in which regional economic actors participate. These affect both the nature of the material and ideational and the institutional and organizational structure that condition access to these resources.

While contemporary scholarship on the knowledge economy focuses on knowledge, learning, and innovation as *the* source of sustainable quasi-rents, other forms of increasing returns such as the creation of functional institutions, economies of scale and scope, branding, marketing, logistics, and network externalities all play a role in shaping industrial structure. The presence of these returns not only account for the economic dynamism of regions, but also condition the internal structure of the region through the power they give actors to capture the rents generated along the value chain. The nature of the appropriability regime, helps determine whether these increasing returns are captured by a small group of firms, or are the sources of wide-spread opportunities for new entrepreneurs (see ORSENIGO 2006). Where knowledge is strongly cumulative and appropriation regimes are tight, a monopolistic or oligopolistic structure, quite different from the Marshallian ideal is likely to emerge. When they are not fully captured in the single firm, then it may be the regional complex that holds a strategic position in the process of creating and capturing value.

Where accumulation is wed to weaker appropriation regimes and multi-purpose technological bases, increasing returns will be internal to the firm, but numerous opportunities will arise to compete through creating new variety, in effect leading to monopolistic competition. In technological regimes where appropriation regimes are weak, entry to the industry may be quite easy, leading to a situation akin to perfect competition. Under the right institutional conditions, as a long literature on both dynamic and less-dynamic clusters has demonstrated, this situation may give rise to localized external economies that benefit all actors in the district. While interesting, this situation is likely less frequent than a quick scan of the literature would suggest.

Finally, the possibility of capturing increasing returns of different types and the power that it gives different actors to appropriate upstream and downstream rents provide entrepreneurs the incentive to re-organize of value-chains (BRESNAHAN & GREENSTEIN 1999). Accumulation is accompanied by structural change because the control of strategic resources is the source of power with which entrepreneurs can reconfigure industries and value-chains, opening up the possibility for further rounds of

resource accumulation. In other words, control of resources (the means-of-production) allows entrepreneurs to reconfigure organizations (the relations-of-production), although this always occurs against a menu of institutionally acceptable alternatives.

Conclusion:

This paper has investigated the knowledge-based theory of the cluster as the latest iteration of a learning-turn in agglomeration studies. It argues that with this theory initially promising insights into the cumulative, path-dependent nature of learning gave way to functionalist accounts of cluster maintenance and expansion that are based on a narrow and poorly contextualized set of cases. The resulting attempts to theorize the ‘importance of proximity’ outside of a specific institutional and historical context led to a set of dubious propositions regarding the role of space that distract from the more pertinent question of how certain places —and other kinds of communities— are organized internally and articulated externally. While this functionalist turn, properly contextualized, can play a role in our understanding some of the issues surrounding agglomeration and regional development, it is difficult to see how the knowledge-based theory of the cluster represents a significant advance over earlier theories of agglomeration.

In the Schumpeterian-inspired literature on innovation, a distinction is often made between *radical innovations*, innovations that shift both the cost structure and preferences in large parts of the economy and hence provoke a restructuring of existing institutional and organizational arrangements, and *incremental innovations* that consist of small improvements within an existing technological and organizational paradigm. The general assumption in this literature has been that geographic clusters of similar and related firms are particularly good at generating incremental innovations. These emerge from the constant experimentation of firms and entrepreneurs seeking out the profitable application of some underlying knowledge base, and the easy circulation of knowledge and idea. This is the reason why a theory of the cluster has been seen as an integral part of Malmberg and Maskell’s attempt to theorize “low tech” learning as a process of continual incremental innovation that can create something like “sustained competitive advantage.”

The ending point for this paper is the idea that functionalist explanation of clusters based around incremental learning gives a misleadingly static picture of regional dynamics while failing entirely to account for the formation and generation of new clusters. In its place, I argue in favour of a developmental theory of the region. Such a theory would require a

shift from the notion that growth of a local knowledge base occurs incrementally within some static structure and a greater attention to the structural transformations that occur in regions as new opportunities for generating and capturing value arise. A developmental approach would require that we put aside the analysis of the cluster as an organizational form and instead look at the organizational processes through which regions and regional specialization emerge, take a definite form, and change—perhaps even dissipate—over time.

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ENDNOTES:

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- ⁱ Indeed, without rejecting outright the concept of the ‘cluster’, there seems to be a shift under way to the slightly broader concept, ‘Regional innovation systems.’ It is beyond the scope of this paper to elaborate the differences between these concepts, much less pass judgment on whether the new improves on the older one.
- ⁱⁱ Each of the criticisms in this article and particular the last, regarding functionalists approaches to understanding regional learning applies in greater or lesser proportions to the use of organizational ideal types of agglomerations more generally. Although, for the sake of simplicity in argument, I single out the “Scandinavian School” and work by Maskell & Malmberg, I will leave it to readers to decide how widely or narrowly this critique may be applied in given cases, however my suspicion is that much of it can be applied to any generalized ‘theory of the cluster’ as an organizational form.
- ⁱⁱⁱ For this reason, the author’s claim that localized learning was developed in response to claims regarding the “Death of distance” and the “End of geography” seems misleading. Other scholars such as SCOTT (1998) and PORTER (1998) have arrived at similar conclusions without embracing a specifically knowledge-based theory of the region. Even CAIRNCROSS (1998), whose book title *The Death of Distance*, is cited as making this claim and who seems to be a general figure of disapprobation for geographers, writes, “The communications revolution has created opportunities for companies to site themselves far from markets. But it has not overcome the powerful centripetal forces that create clusters of similar businesses (Ibid., p. 201).”

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- ^{iv} Contrary to Malmberg & Power’s findings, the literature on innovation has found user-producer interactions to be important (VON HIPPEL 1987). This literature, however, does not have a specifically spatial ontology, and hence the relevant interactions may be on other scales than the tightly-defined regions generally referred to in cluster studies. It may also be important to specify at what point in an industry’s life-cycle user-producer relationships are likely to be important.
- ^v Interestingly, most of the examples that Maskell gives of rivalry leading to new knowledge are based around motivation rather than spillovers; that is, firms that observe rivals do not directly benefit from new knowledge; rather, they are motivated to search out and develop new ideas in order to remain competitive.
- ^{vi} This “under-socialized” ideal-type can be contrasted with the more sociological approach of BECATTINI (1987) and those who follow him in using the concept of industrial districts BELUSSI (2006).
- ^{vii} There may be some exceptions. China, for example, has pursued a policy of deliberately creating clusters in order to generate the localization advantages that these may create.
- ^{viii} This kind of selection argument, which was invoked by ALCHIAN (1950) to claim that changing market conditions will likely bring about adaptations in populations of firms that are largely in accordance with the efficiency predictions of neo-classical economics, an argument that was discredited by WINTER (1964).
- ^{ix} See RALLET & TOURE 1999, KIRAT & LUNG 1999, and BOSCHMA (2005) for a good summary of the debates on proximity.
- ^x MASKELL & LORENZEN 2003 make a similar observation

^{xi} The notions ‘development’ and ‘evolution’ are largely synonymous. One difference may be in the unit of analysis. In arguing for a development approach, I am taking the dependent variable, the region and how its internal and external structure change over time, as the unit of analysis. An evolutionary approach would take the independent variables (variety creation, selection, and transmission) as the unit of analysis and the dependent variable, the region, as one among many possible outcomes.

^{xii} The related, various systems of innovation approaches focus on the creation of value by capturing the increasing returns inherent in knowledge at the local, national, and industrial