

Clusters and Competition

*New Agendas for Companies,
Governments, and Institutions*

by Michael E. Porter

THINKING ABOUT COMPETITION and strategy at the company level has been dominated by what goes on inside companies. Thinking about the competitiveness of nations and states has focused on the economy as a whole, with national economic policy seen as the dominant influence. In both competition and competitiveness the role of location is all but absent. If anything, the tendency has been to see location as diminishing in importance.¹ Globalization allows companies to source capital, goods, and technology from anywhere and to locate operations wherever it is most cost effective. Governments are widely seen as losing their influence over competition to global forces.

This perspective, although widespread, does not accord with competitive reality. In *The Competitive Advantage of Nations* (1990), I put forward a theory of national, state, and local competitiveness within the context of a global economy. This theory gives clusters a prominent role. Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate. Critical masses of unusual competitive success in particular business areas, clusters are a striking feature of virtually

every national, regional, state, and even metropolitan economy, especially those of more economically advanced nations.

While the phenomenon of clusters in one form or another has been recognized and explored in a range of literatures, clusters cannot be understood independently of a broader theory of competition and the influence of location in the global economy. (See the insert “Historical and Intellectual Antecedents of Cluster Theory.”) The prevalence of clusters in economies, rather than isolated firms and industries, reveals important insights into the nature of competition and the role of location in competitive advantage. Even though old reasons for clustering have diminished in importance with globalization, new roles of clusters in competition have taken on growing importance in an increasingly complex, knowledge-based, and dynamic economy.

The cluster concept represents a new way of thinking about national, state, and city economies, and points to new roles for companies, governments, and other institutions striving to enhance competitiveness. The presence of clusters suggests that much of competitive advantage lies outside a given company or even outside its industry, residing instead in the *locations* of its business units. The odds of building a world-class mutual fund company are much higher in Boston

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the California wine cluster. While neither diagram can include all the entities comprising the respective clusters, each illustrates important cluster attributes. Figure 1, for example, demonstrates the several chains of related industries involved in the Italian leather footwear and fashion cluster, including those relating to different types of leather goods

(complementary products, common inputs, similar technologies), different types of footwear (overlapping channels, similar inputs, and technologies), and different types of fashion goods (complementary products). These industries also employ common marketing media and compete with similar images in similar customer segments. The

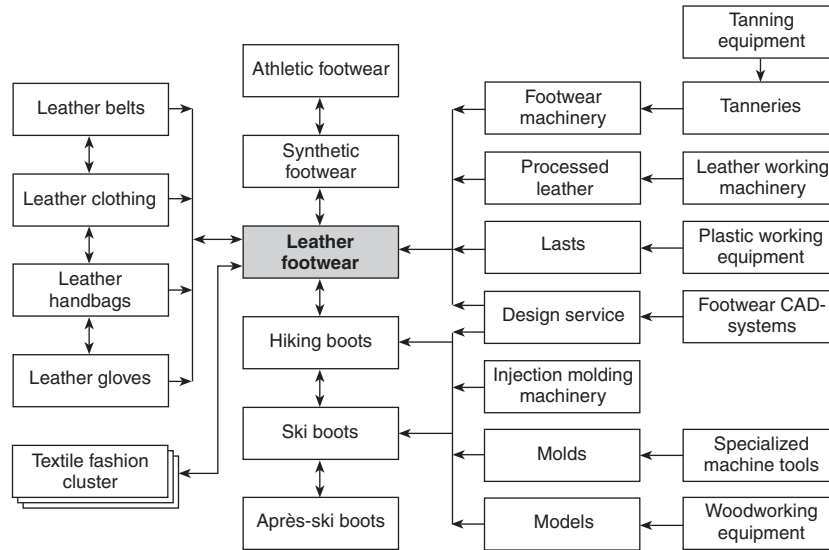


Figure 1 The Italian Footwear and Fashion Cluster
Source: Research by Claas van der Linde, 1993.

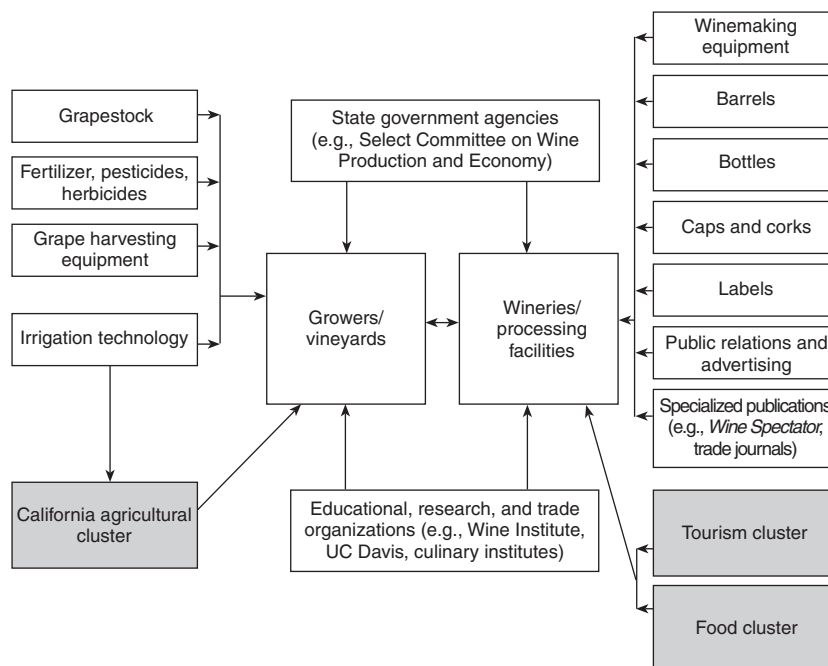


Figure 2 The California Wine Cluster
Sources: Based on research by Harvard MBA students R. Alexander, R. Arney, N. Black, E. Frost, and A. Shivananda.

extraordinary strength of the Italian cluster can be attributed, at least in part, to the multiple cross-firm linkages and synergies that Italian firms enjoy.

The California wine cluster includes an extensive complement of supporting industries to both winemaking and grape growing. On the growing side, there are strong connections to the larger California agricultural cluster. On the winemaking side, the cluster enjoys strong links to both the California restaurant and food preparation industries (complementary products) and the tourism cluster in Napa and other wine-producing regions of the state. Figure 2 also illustrates the host of local institutions involved with wine, for example, the world-renowned viticulture and enology program at the University of California at Davis and special committees of the California senate and assembly.

Drawing cluster boundaries is often a matter of degree, and involves a creative process informed by

understanding the most important linkages and complementarities across industries and institutions to competition. The strength of these “spillovers” and their importance to productivity and innovation determine the ultimate boundaries. The institutional furnishings cluster located in the Grand Rapids, Michigan, area illustrates the kinds of choices made when drawing cluster boundaries (see Figure 3). Office furniture and partitions clearly belong in the cluster, as does seating for stadia, classrooms, and transportation vehicles. These products have important commonalities in product attributes, features, components, and technology. Nearby metal parts and equipment manufacturers, plastics manufacturers, and printing companies are cluster suppliers. These supplier industries may also be part of other clusters, because they serve other customer industries such as automobile manufacturers. Particularly in metal parts, the prior existence of automotive suppliers serving the

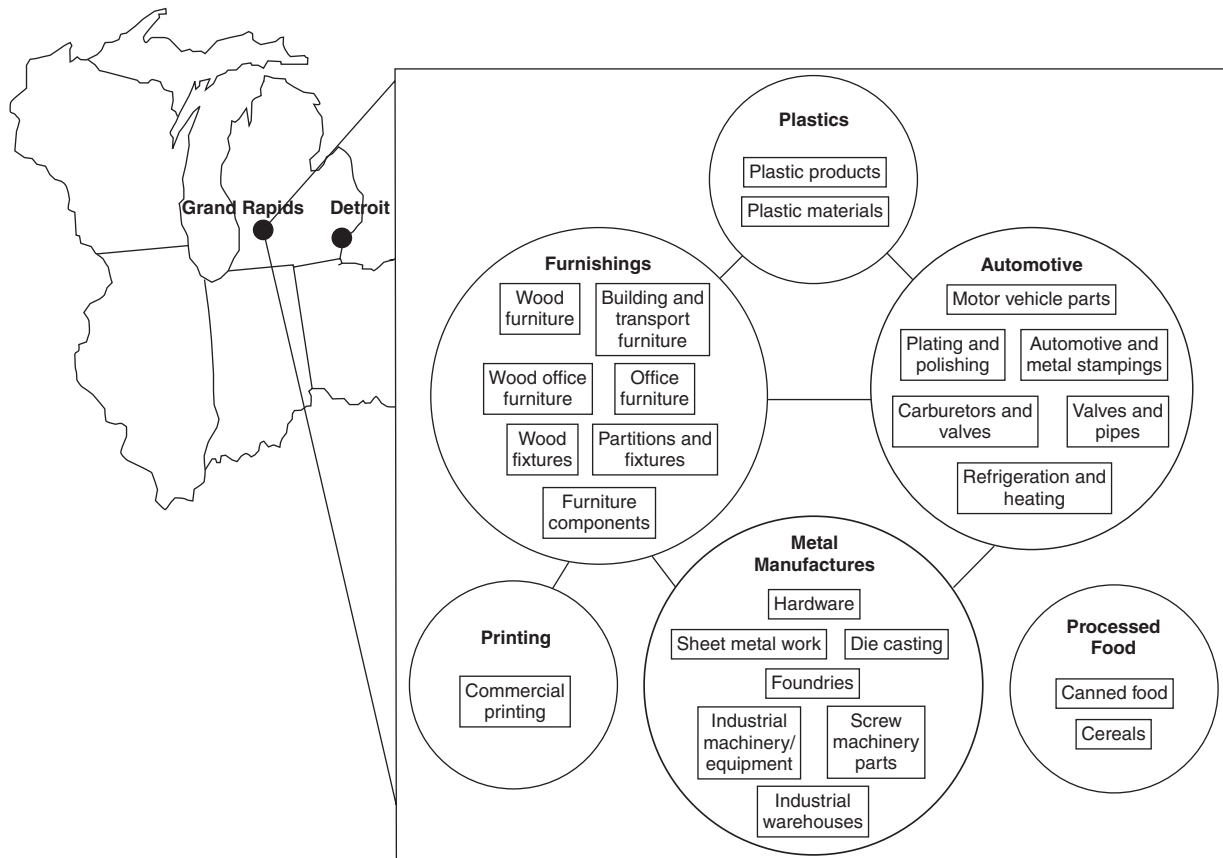


Figure 3 Greater Grand Rapids Clusters

nearly Detroit automotive cluster contributed importantly to development of the furnishing cluster. Cluster boundaries should encompass all firms, industries, and institutions with strong linkages, whether vertical, horizontal, or institutional; those with weak or non-existent linkages can safely be left out.³

Clusters encompassing broad groupings, such as manufacturing, consumer goods, or high tech, have been too broadly conceived. Such aggregates exhibit, at best, weak connections among the industries included. Discussions about cluster constraints and bottlenecks in such groupings fall into generalities. Conversely, labeling a single industry as a cluster overlooks crucial cross-industry and institutional interconnections that strongly affect competitiveness.⁴

Clusters occur in many types of industries, in both larger and smaller fields, and even in some local businesses, such as restaurants, car dealers, and antique shops. They are present in large and small economies, in rural and urban areas, and at several geographic levels (for example, nations, states, metropolitan regions, and cities). Clusters occur in both advanced and developing economies, although clusters in advanced economies tend to be far better developed.

Cluster boundaries rarely conform to standard industrial classification systems, which fail to capture many important actors in competition as well as linkages across industries. Clusters normally consist of a combination of end-product, machinery, materials, and service industries, usually classified in separate categories. They often involve (or potentially involve) both traditional and high-tech industries. Clusters, then, represent a distinct way of organizing economic data and viewing the economy.

Because parts of a cluster often fall within different traditional industrial or service categories, significant clusters may be obscured or even go unrecognized. In Massachusetts, for example, more than four hundred companies, representing at least 39,000 high-paying jobs, were involved in some way in medical devices. The cluster long remained all but invisible, however, buried within several larger and overlapping industry categories, such as

electronic equipment and plastic products. Executives in the cluster had never come together before despite the fact that firms shared many common constraints, problems, and opportunities. The discovery of this cluster, the subsequent organization of an association, MassMedic, and the initiation of a productive dialogue with government will be explored below.

Clusters vary in size, breadth, and state of development. Some clusters consist primarily of small- and medium-sized firms (for example, the Italian footwear and the North Carolina home furniture clusters).⁵ Other clusters involve both large and small firms (for example, Hollywood or the German chemical clusters). Some clusters center on research universities, while others have no important university connection.⁶ These differences in the nature of clusters reflect differences in the structures of their constituent industries. More developed clusters have deeper and more specialized supplier bases, a wider array of related industries, and more extensive supporting institutions.

The boundaries of clusters continually evolve as new firms and industries emerge, established industries shrink or decline, and local institutions develop and change. Technological and market developments spawn new industries, create new linkages, or alter served markets. Regulatory changes also contribute to shifting boundaries, as they have, for example, in telecommunications and transport.

Clusters can be examined at various levels of aggregation, thus exposing different issues. In California, for example, there is a large agribusiness cluster. Mapping and analyzing this broad cluster reveals important competitive insights. The wine cluster already discussed is embedded within the broad cluster. Analysis at this level reveals some more specific and distinct issues (for example, the linkage with the tourism clusters).

The appropriate definition of a cluster can differ in different locations, depending on the segments in which the member companies compete and the strategies they employ. The lower Manhattan multimedia cluster, for example, consists primarily of content providers and firms in related industries, such as publishing, broadcast media,

Historical and Intellectual Antecedents of Cluster Theory

Clusters have long been part of the economic landscape, with geographic concentrations of trades and companies in particular industries dating back for centuries. However, the role of clusters was arguably more limited. The depth and breadth of clusters, however, have increased as competition has evolved and as modern economies have grown in complexity. Globalization, together with rising knowledge intensity, have greatly altered the role of clusters in competition.

Intellectual antecedents of cluster theory date back at least to Alfred Marshall, who included a fascinating chapter on the externalities of specialized industrial locations in his *Principles of Economics* (originally published in 1890). During the first fifty years of this century, economic geography was a recognized field with an extensive literature. With the mid-century advent of neoclassical economics, however, location moved out of the economics mainstream. More recently, increasing returns have started to play a central role in new theories of growth and international trade, and interest in the field of economic geography has been growing.^a

In the management literature, as well, attention to geography or location has been minimal. If treated at all, consideration of geography has often been reduced to assessments of cultural and other differences when doing business in various countries. Corporate location has been treated as a narrow subspecialty of operations management. The recent preoccupation with globalization has, if anything, created a tendency to regard location as of diminished and diminishing importance.

A variety of bodies of literature have in some respects recognized and shed light on the phenomenon of clusters, including those on growth poles and backward and forward linkages,^b agglomeration economies,^c economic geography,^d urban and

regional economics,^e national innovation systems,^f regional science,^g industrial districts,^h and social networks.ⁱ

The literature on urban economics and on regional science focuses on generalized urban agglomeration economies, reflected in the infrastructure, communications technology, input access, diverse industrial base, and markets available in concentrated urban areas. These types of economies, which are independent of the types of firms and clusters present, appear to be most important in developing countries. Overall, however, generalized urban agglomeration economies seem to be diminishing in importance as the opening of trade and the fall in communication and transportation costs allow easier access to inputs and markets and as more locations and countries develop comparable infrastructures.^j

Other studies focus on geographic concentrations of companies operating in particular fields, which can be seen as special cases of clusters. Italian-style industrial districts of small- and medium-sized firms dominating a local economy prevail in some types of industries. In other fields, a mixture of large domestic firms, large foreign-owned firms, and an array of smaller companies is the rule.

Some clusters center on research universities, while others draw little on the resources of formal technological institutions. Clusters occur both in high-tech and traditional industries, in manufacturing as well as in service industries. Indeed, clusters often mix high tech, low tech, manufacturing, and services. Some regions contain a single dominant cluster, while others contain several. Clusters appear in both developing and advanced economies, though the lack of depth of clusters in developing nations is a characteristic constraint to development.

Earlier studies have, nonetheless, contributed to our understanding of the influence of clusters on competition. The literature on agglomeration economies stresses input cost minimization, input specialization made possible because of the extent of the local market, and the advantages of locating near markets. The economic development literature focuses on induced demand and supply, certainly an element of cluster formation. The normative implication of the concept of backward and forward linkages, however, emphasizes the need to build industries with linkages to many others. Cluster theory, in contrast, advocates building on emerging concentrations of companies and encouraging the development of those fields with the strongest linkages to or spillovers within each cluster.

Overall, most past theories address particular aspects of clusters or clusters of a particular type. Many traditional agglomeration arguments for the existence of clusters have been undercut by the globalization of supply sources and markets. Yet the modern, knowledge-based economy creates a far more textured role for clusters.

The broader role of clusters in competition is only now becoming widely recognized. To understand this role requires embedding clusters in a broader and dynamic theory of competition that encompasses both cost and differentiation and both static efficiency and continuous improvement and innovation, and that recognizes a world of global factor and product markets. Some of the most important agglomeration economies represent dynamic rather than static efficiencies and revolve around innovation and the rate of learning. Clusters occupy a more complex and integral role in the modern economy than has been previously recognized.

Clusters, then, constitute an important multi-organizational form, a central influence on competition, and a prominent characteristic of market econ-

omies. The state of an economy's clusters reveals important insights into its productive potential and the constraints on its future development. The role of clusters in competition raises important implications for companies, government, and other institutions.

a. See Krugman (1991A, 1991B).

b. Hirschman (1958).

c. There is an extensive literature on agglomeration including Weber (1929); Lösch (1954); Harris (1954); Isard (1956); Lloyd and Dicken (1977); Goldstein and Gronberg (1984); Rivera-Batiz (1988); McCann (1995B); Ciccone and Hall (1996); and Fujita and Thisse (1996).
d. See Storper and Salais (1997A, 1997B); Storper (1997); Amin and Thrift (1992); and papers by Storper, Gertler, Mair, Swyngedouw, and Cox in Cox (1993).

e. Scott (1991); Glaeser, Kallal, Sheinkman, and Shleifer (1992); Glaeser (1994); Henderson (1994); Glaeser, Scheinkman and Shleifer (1995); Henderson, Kuncoro, and Turner (1995); and Henderson (1996) are some interesting examples.

f. See Bengt-Åke (1992); Dosi, Gianetti, and Toninelli (1992); Nelson (1993); and Cimoli and Dosi (1995).

g. See, for example, Giarratani (1994) and Markusen (1995A).

h. This literature includes the work of Piore and Sabel (1984); Becattini (1987); Pyke, Becattini, and Sengenberger (1990); Pyke and Sengenberger (1992); and Harrison (1992).

i. See, for example, Burt (1997); Granovetter (1985); Henton, Melville, and Walesh (1997); Nohria (1992); Perrow (1992); Putnam, Leonardi, and Nanetti (1993); Fukuyama (1995); and Harrison and Weiss (1998).

j. Harrison, Kelley, and Grant (1996) construct an imaginative test of the relative importance of industry and urbanization economies in the diffusion of innovation in machining and find that urbanization effects are more significant. They acknowledge, however, that the test is far from definitive. This is because, among other reasons, they picked a widely applicable (versus specialized) innovation in a not very geographically concentrated field. Metalworking, indeed, is not normally a cluster itself but part of other clusters.
