

# **Industry Clusters**

An Economic Development Strategy for Minnesota

Preliminary Report

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*The State & Local Policy Project Team*

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# Executive Summary

As a region, state, and nation, we are being challenged to become more efficient, more intelligent, more ecological—in short—more competitive. Today, workforce shortages and shifting economic sands threaten even the most economically stable states.

It seems prudent in these times to make the most of our regional potentials and economic endowment. One of the ways we do this is to get smarter about our approach to economic development policy. We must begin to see industry, education, and other institutions in the context of the surrounding economy and begin to develop a unified approach to economic development problems. Today we know that the health of Minnesota is intimately connected to the health of our local and regional economies.

We believe you will find this preliminary report a sort of primer for understanding the industry cluster approach. We hope that this document will be useful to state policy makers, businesses and industry, as well as, to students and other individuals interested in economic development.

An industry cluster strategy offers Minnesota an opportunity to make its economic development efforts more effective and comprehensive. It will require the leadership from and collaboration among government, business, and education. This strategy would ensure that the state builds on its strengths and has the appropriate skills and infrastructure it needs to move the state forward. To be successful, Minnesota's industry cluster strategy will also need to address both the needs of the state as a whole and the regions within it. Regional clusters located throughout greater Minnesota and also concentrated in major metropolitan areas play a vital role in the state's overall economy. As awareness and interest in cluster strategies grows throughout the state, a first step in implementing clusters is for state leaders of industry, education, and government to explore together the costs and benefits of an industry cluster approach.

In Minnesota, the reasons for pursuing an industry cluster strategy include, opportunities to:

- address the current and projected workforce shortages;
- plan for and develop the infrastructure needed to move the state economy forward;
- develop and strengthen rural communities and regions of the state;
- provide for strong companies and a strong workforce; and,
- create more efficient and effective government

In this preliminary report, we have sought to provide a clear overview of an industry cluster approach. In Chapter 1, we clearly define industry clusters and provide examples of them. In Chapter 2, we articulate the benefits of an industry cluster approach both as a means of understanding industries and to initiate and facilitate a powerful statewide economic development policy that takes into account the full potential of the state's regions. In Chapter 3, we provide examples of the industry cluster approach, and industries that have been studied by the State and Local Policy Program.

Finally, the appendices are replete with collaborators, examples, and resources that have aided this study greatly and may be valuable resources to the reader. We hope that you, the reader, will find this report helpful in understanding an important new approach to understanding economic development.

Lee W. Munnich Jr.  
State & Local Policy Program Director  
Minneapolis, September 9, 1999

# Defining Industry Clusters

## WHAT ARE INDUSTRY CLUSTERS?

Industry clusters are geographic concentrations of competing, complementary, or interdependent firms and industries that do business with each other and/or have common needs for talent, technology, and infrastructure. The firms included in the cluster may be both competitive and cooperative. They may compete directly with some members of the cluster, purchase inputs from other cluster members, and rely on the services of other cluster firms in the operation of their business.

Clusters may get their start in any number of ways. For example, a cluster may form around a large competitive firm, such as Medtronic in the Twin Cities or Microsoft in Seattle. The presence of and support of a major research institution may spur the development of a cluster, such as the information technology clusters in Silicon Valley and the Boston area. Special infrastructure conditions, or resources may also support the development of industry clusters. Examples include the wood products cluster in northern Minnesota, the wine industry in northern California, and tourism in southern Florida.

Industry clusters are dynamic entities. They may change as the industries within them change or as external conditions change. For example, as the computer hardware industry changed, the Twin Cities and Boston hardware clusters lost prominence in their states' economies and nationally. Both areas are trying to rebuild their information technology clusters around new firms and new technologies. Sometimes an industry cluster will spawn an entirely new cluster. The aerospace cluster in Southern California has spawned several other clusters that rely on related engineering skills and technologies.

An important characteristic of clusters is that they are centered on firms that sell outside the local, state, or even national market. These exporting firms are driving forces in a regional or state economy. They bring money into the area and support many local industries.

Clusters may include government, nonprofit organizations, educational institutions, and other infrastructure and service providers whose presence is key to the strength of the cluster. The California wine cluster provides a good example of the complex nature of an industry cluster. The cluster includes 680 commercial wineries and several thousand independent grape growers; suppliers of grape stock, irrigation and harvesting equipment, barrels, and labels; specialized publishers, public relations firms, and advertising agencies; world-renowned programs at the University of California; the Wine Institute; and special committees of the California senate and assembly.

An industry cluster is an interconnected group of industries and firms. It differs from trade associations, which may have a narrower membership and focus. A trade association, for example, may include the members of a single industry and focus entirely on lobbying. By contrast clusters are agglomerations of regional industries and interdependent firms that are key to the success of the industry in the state. Organized industry clusters contribute broadly to the well-being of the region by addressing workforce recruitment and training issues, developing needed infrastructure, and establishing research and training programs at universities and technical colleges, to name a few.

## INDUSTRY CLUSTERS AND COMPETITIVENESS

Harvard Business School Professor Michael Porter has examined industry cluster in cities, regions, states, and internationally. Based on his research, he developed the *Diamond of Advantage*, a model that offers insights into industry clusters and competitiveness. Porter contends that regions develop a competitive advantage based on their firms' ability to continually innovate, and that economic vitality is a direct product of the competitiveness of local industries. The factors that drive innovation and a cluster's growth include:

**FACTOR CONDITIONS:** such as a specialized labor pool, specialized infrastructure, and sometimes selective disadvantages;

**HOME DEMAND:** or local customers who push companies to innovate, especially if their needs or tastes anticipate global or local demand;

**RELATED AND SUPPORTING INDUSTRIES:** nationally competitive local supplier industries that create business infrastructure and spur innovation and spin off industries;

**INDUSTRY STRATEGY, STRUCTURE AND RIVALRY:** intense rivalry among local industries that is more motivating than foreign competition, and a local "culture" that influences individual industries' attitudes toward innovation and competition.

In addition to these conditions, Porter includes the roles of government and chance. Historical accident and/or government actions tend to play significant roles in the development or location of industry clusters.

## INDUSTRY CLUSTERS IN MINNESOTA

The State and Local Policy Program (SLPP) has identified several clusters in four Minnesota regions. These clusters play an important role in the economies of the regions studied. In some cases, a cluster is centered in only one region, while other clusters may be present in several regions and may be strong statewide. The clusters identified in previous SLPP studies are listed in Table 1.

Although an industry cluster may functionally exist, the firms in it may not explicitly work together or identify themselves as part of a cluster. To work effectively as a cluster, the industries and firms in it must recognize their role in the larger cluster and determine that the benefits of working together outweigh the costs. Section 3 of this report highlights SLPP's experience working with two industry clusters in Minnesota—the *information technology* cluster in the Twin Cities (and statewide) and the *precision chemical applicator* cluster in southwest Minnesota.

**Table 1. Clusters Identified in Minnesota Regions**

Twin Cities	Northwest Minnesota	Southeast Minnesota	Southwest Minnesota
Printing and Publishing; Computers & Software; Medical Devices; Machinery & Metalworking; Financial Services	Recreation & Transportation Equipment Manufacturing; Value-Added Agricultural Processing; Wood Products; Tourism	Composites; Food Processing; Printing, Publishing, and Software; Industrial Machinery & Computer Manufacturing	Computer & Electrical Components Manufacturing; Value-Added Agricultural Cooperatives; Agricultural Equipment Manufacturing; Dairy Processing

## INDUSTRY CLUSTER APPROACHES IN MINNESOTA

In its earlier cluster studies, the State and Local Policy Program (SLPP) identified and described the key clusters in each region. The purpose of this project is to explore how the state and its regions have used and might use an industry cluster approach in their work. During an SLPP discussion with representatives of industry, government, and community organizations, many participants reported that they were either using or could benefit from an industry cluster approach to their work. Summaries of a few of these experiences follow.

Minnesota State Colleges and Universities (MnSCU) recently initiated a *Targeted Industry Partnership Project*, which involves five key industries and educational institutions. The MnSCU project is industry-driven as leaders from the five industries reviewed proposals from MnSCU schools and selected those with which they wanted to work. The industry leaders will work with MnSCU school staff and K-12 school districts to develop curriculum that meets industry standards and to address other related issues. Currently MnSCU is working with the following clusters: healthcare, precision manufacturing, printing and graphics, software production, and taconite production.

In November, the Citizens League released a report on the labor shortage in the Twin Cities. In that report, the Citizens League made the recommendation that "*Economic development strategies can focus public and private investment and subsidies most effectively by focusing on industry clusters which are already strong in the Twin Cities.*" The organization cites the government's ability to target limited public resources to high-value, high-growth industries as a benefit. The report also states that wages in the key clusters identified in an earlier State and Local Policy Program grew faster and were significantly higher than the average for all jobs in the Twin Cities.

The Department of Trade and Economic Development has five industry specialists who work with specific industries. These specialists address the following five clusters: computer and electrical components, healthcare and medical products, printing and publishing, tourism, and wood products, plastics, and composites. The industry specialists provide technical assistance and information to businesses on financial services, supply sources, trade opportunities, and strategic partners.

A Rochester area economic development group works with the food industry, including producers, processors, and distributors to address their workforce and infrastructure needs as a cluster.

The Minnesota Department of Transportation (MnDOT) is working with four key industry clusters (medical devices, computing, printing and publishing, and metalworking and machinery) to address their transportation needs. MnDOT identified the clusters based on employment data. The approach allows MnDOT to 1) identify the metro area's strategies industries, 2) describe them as groups with similar

characteristics, 3) understand their spatial distribution, and 4) assess present and future demand for transportation services. The agency's expectation is that firms with similar characteristics have similar transportation needs.

Kandiyohi County has a business retention and expansion committee that meets twice a year with the county's key clusters to discuss topics, such as the positive and negative effects of growth, what the county and city can do to assist industries, and assess their workforce and training needs. The committee includes representatives of government, economic development agencies, education, and other county and city leaders. The Greater Minneapolis Chamber of Commerce uses an industry cluster approach in its school-to-work initiatives with the financial services sector, a key cluster identified in the State and Local Policy Program's Twin Cities industry cluster study.

Cluster-based strategies in Minnesota exist in a variety of forms and scales. Some clusters include organizations from government, education, and the non-profit arena. Some exist within townships, counties, or regions. Some clusters are strictly urban while others are rural in character. Some clusters span the entire state. The issue of the scale directly effects the character of the regional economy (or economies) involved. Nationwide there are examples of industry clusters strategies functioning successfully at urban, regional, and statewide scales. Scale should be determined by what makes sense for the state, region, or city employing the strategy. That said, several states have developed statewide economic development strategies using industry clusters with a regional focus. In this way, states realize the efficiency gains of statewide resource coordination while recognizing differences in regional clusters and economies.

## **INDUSTRY CLUSTER STRATEGIES**

Several states and regions have made industry clusters a focus of their economic development efforts. Many individuals involved in economic development policy have found that a cluster strategy offers an efficient and effective way to deliver programs and services to industry, build on the strengths of the regional economy, and foster economic development. Industry clusters also highlight relationships among industries and the organizations that contribute to the cluster's success.

The degree to which a state or region may use an industry cluster strategy varies. States, such as Arizona and Oregon, have structured their state economic development initiatives using an industry cluster framework. These states coordinate their agencies' efforts to work with the industry clusters. While the state serves to coordinate efforts, typically industry leaders drive the cluster. State and regional institutions, such as education and training providers, research institutions, transportation and technology providers, economic development agencies, provide important support to the cluster as well. Thus, instead of three agencies with three different and uncoordinated programs focused on the same industry or cluster, they work collaboratively. Agencies in this scenario, generally work with the cluster (rather than individual firms) to understand and address key concerns.

Other states and regions, including Minnesota, have used industry clusters in a much more limited fashion. To date these efforts have not fully coordinated government agencies, industries, and education. For example, the Minnesota Department of Trade and Economic Development's "industry specialist" positions were created to increase understanding of and facilitate the delivery of services to specific industries in the state. The Minnesota State Colleges and Universities System's (MnSCU) recent effort to work with industries to develop training programs and curriculum is another example. Other agencies may work with the same or different groups of industries, however these efforts are generally not coordinated with a team of industry leaders or across public agencies.

Industry cluster strategies, unlike industrial policies, do not necessarily involve government creating special advantages for some industries at the expense of others. In Arizona, for example, the state does not provide the cluster groups with any money, nor does it limit the clusters with which it works to a set

number. In that state, the self-identification of clusters is both expected and encouraged. If a cluster can organize itself and show its value to the economy, the state will work with it to bring in government, education, and other support groups to form a working cluster.

For brief descriptions of the industry cluster strategies used in other states and regions, see Appendix A.

## **Benefits of an Industry Cluster Strategy**

An industry cluster strategy offers a state or region several benefits and opportunities. A clear benefit is the ability of industry, government, and education and to work cooperatively to strengthen both state and regional economies. This leads to more efficient and effective use of public and private resources and helps a region or state develop strong and dynamic clusters. These clusters will spawn additional economic growth. A cluster strategy can also help a region or state address critical issues such as human capital and workforce development, infrastructure planning and development, and rural and community development.

### **OPPORTUNITIES CREATED THROUGH A STATEWIDE INDUSTRY CLUSTER STRATEGY**

An industry cluster strategy offers significant opportunities for a state or region by highlighting key business relationships and linkages. States and regions are often motivated to adopt an industry cluster strategy as a result of a crisis: high unemployment, a recession, a stagnant economy, real estate collapse, or loss of a key industry. However, states and regions can also be enhanced by the opportunities created through cluster-based approaches. Examples of some of the opportunities created are summarized below. The development and improvement of infrastructure often requires large-scale investment and planning. There is invariably more work to do than resources available to do it.

An industry cluster strategy helps a state or region set priorities for these major investments and ensures that infrastructure is appropriately developed to ensure the greatest effectiveness and efficiency. For example, if Minnesota's information technology cluster is an important to the state's economy, then significant and appropriate investment in telecommunications infrastructure and workforce development may be beneficial to spur cluster growth. Similarly, if a key cluster in a rural region is having difficulty shipping its large equipment out of the area, efforts such as road improvements could be made to facilitate product distribution. The pay-off is healthier industries that generate more economic activity and, thus, provide tax revenue for additional infrastructure investments.

In Minnesota, a workforce shortage hinders the growth of some industries. By working collaboratively in industry clusters, government, education, and industry can take steps to address this problem. Industry, government, and education can respond to shortages by providing training and promoting research that enhances productivity. Employees and the region overall will benefit from enhanced skills and higher wages as their productivity increases.

It makes sense for rural regions to focus on strengthening existing industries. By supporting and developing strong clusters that promote exchange and collaboration among firms and cooperation with government and education, rural regions strengthen their own economies. Regions can strengthen existing industries, develop an attractive business climate, and foster new business growth by maintaining a strong regional economic base and investing in the skills of the new and incumbent workforce. In a strong cluster, entrepreneurs may leave larger firms to create their own businesses. This trickle-down effect of

new firms tends to complement and/or compete with existing firms, which in turn stimulates innovation and cluster growth.

Politicians, business leaders, and taxpayers often talk about the need to streamline government, avoid duplication of services, and make government more responsive. An industry cluster strategy provides a state or region with the opportunity to accomplish all of these objectives, particularly in the area of economic development. By working with clusters, governments coordinate their economic development efforts.

With regard to training, instead of creating a variety of programs around the state to train precision manufacturing workers, educational institutions can work with industry to determine the key needs, develop the curriculum, and deliver it in regions where demand exists. This saves time for educators and industry and helps ensure that students receive the latest training and develop transferable skills.

A cluster approach also offers industry an opportunity to expand in international markets and create joint ventures. Those industries already selling to or working with firms abroad can help open the doors for other cluster members. Their complementary products might also be marketed jointly. Firms within the cluster might form joint ventures to meet market needs outside the country or may partner with firms in clusters elsewhere to produce new products. An isolated firm working on its own and relying just on government export assistance is not going to have the same opportunities as an entire cluster working to expand its international presence.

## **BENEFITS TO ECONOMIC DEVELOPMENT**

Cluster strategy is first and foremost, an economic development strategy. It provides a coordinated and efficient way to promote economic growth. By making a cluster approach a key part of a state economic development strategy, state agencies are more likely to coordinate their efforts, avoid duplication of services, and develop a more comprehensive approach to economic development. In Minnesota, several agencies and organizations have identified key industries on which they are focusing some of their attention. Unfortunately, each organization has prepared its own list of industries and objectives, its own industry advisory groups and contacts. Each operates without the benefit of the accumulated knowledge from other agencies and organizations. This type of approach dilutes resources and expertise.

A cluster approach and the coordination it brings also helps an industry set priorities and establish a constructive relationship with government. A cluster approach does not mean that industry sets the priorities and then asks government to address their problems and fund solutions. Rather, the industry takes the lead in addressing the concerns while government and education play facilitation and support roles. In effect, the cluster approach can create a more positive business climate for a state or region. This climate helps existing firms grow and attracts new businesses to the area.

## **BENEFITS TO THE PUBLIC SECTOR**

An industry cluster strategy allows public agencies to direct resources more effectively and efficiently. Instead of creating myriad programs that meet the needs of individual firms, public efforts can be focused on meeting the needs of many firms with similar issues. The industry cluster approach allows public agencies the opportunity to work directly with industries and develop strategies for building a sustainable economy. A cluster strategy does not mean that government turns its back on individual firms that find themselves in a cluster with unique concerns, or exist apart from a cluster altogether. Instead the strategy provides a framework for delivering government services so they have a greater impact.

## **BENEFITS TO ESTABLISHED AND EMERGING INDUSTRIES**

An industry cluster strategy places increasing importance on the needs of a given industry or cluster and focuses public and private resources on meeting those needs. The industry clusters identify their primary needs and work with public and private entities to address them. These needs might include industry-focused training programs at state colleges and universities or infrastructure development that addresses telecommunications, transportation, or other needs.

Industries and firms also benefit from forums and meetings convened to address issues and concerns. This saves the time and effort associated with identifying and working with all of the appropriate agencies. If an industry cluster strategy is part of a statewide policy, the clusters have a powerful voice in setting the statewide agenda for economic development.

Other benefits of effective cluster strategies come through firms' participation in an organized cluster. These benefits include:

- **access to a specialized workforce** (companies in clusters can draw on large markets of people with specialized skills and experience for related firms);
- **access to specialized suppliers** (companies in clusters have access to concentrations of specialized suppliers of inputs and services); and
- **access to extensive networks** (companies in clusters have access to information flows and technological spillovers that speed innovation.)

## **BENEFITS TO INVESTMENT IN HUMAN CAPITAL**

An industry cluster strategy focuses on developing a workforce with the skills and training necessary to strengthen and build competitive, innovation-driven industries. An industry cluster has a clear advantage over individual firms in helping set education and training priorities within a region or state. The cluster also provides cues to students and current workers on future employment options and opportunities to gain both general and specialized skills.

As the labor market becomes tighter and the need for skilled workers increases, the regional availability of skilled workers becomes increasingly important. Firms are now more likely to make location decisions based on the presence of a skilled (e.g. high quality, high productivity) workforce than on traditional economic development conditions such as taxes. A region that understands its strengths and creates a strong framework for working with key industries, education and training institutions, and other service providers is more likely to be able to ensure the industry's success and high quality jobs for residents.

An industry cluster strategy also helps ensure that a region's competitive advantage is developed and nurtured. The results are 1) healthy firms providing residents with employment opportunities in growing industries, and 2) collaboration between industry and educational institutions that helps ensure that the productivity of workers increases, creating savings for firms and higher wages for employees.

## **BENEFITS TO COMMUNITIES**

By working with clusters, community organizations may be able to increase their efficiency and effectiveness by directing services toward larger groups of firms. For example, organizations can enhance an industry's employee retention efforts through their childcare services, transportation services, housing and home ownership programs, and training programs. By working closely with a cluster, the organizations also have the opportunity to build relationships with industry that can facilitate the delivery of their services. Community organizations can work together with industry and public agencies to assist people in moving from welfare-to-work or school-to-work into specific industries with promising futures.

By listening to industry cluster needs, economic developers can develop broad strategies to complement existing industries in the area.

Rural communities can benefit from cluster strategies since they help regions strengthen and build on their key industries. Key exporting industries drive the economic vitality of a region and make a variety of important support industries possible. These support industries, including restaurants, stores, healthcare services, and recreational opportunities, contribute to a community’s quality of life.

Industry clusters are also a good way to build social capital (relationships that facilitate productive activities) within a community or region. The cluster brings together representatives of industry, government, education, and other organizations to work together for the improvement of the economy. The relationships developed are important to the economic success of the region.

### **Benefits and Challenges of a Cluster Strategy in Minnesota**

During an October 2nd discussion with representatives of industry, government, and community organizations, the State and Local Policy Program learned that many of the participants were interested in exploring how an industry cluster approach would work for their organization as well as the state as a whole. During the half-day discussion, the participants discussed the benefits and challenges of an industry cluster approach.

<b>Key Benefits</b>	<b>Key Challenges</b>
<ul style="list-style-type: none"> <li>• Creates a framework for collaboration</li> <li>• Relies on an existing organizational infrastructure</li> <li>• Helps build a common agenda</li> <li>• Helps achieve economies of scale</li> <li>• Uses workforce shortage to focus on higher wage and competitive advantage industries</li> <li>• Focuses and coordinates existing resources</li> <li>• Provides information for educators (job descriptions)</li> <li>• Facilitates developing a higher competence level</li> <li>• Mitigates inter-industry competitive fears (builds trust and cooperation) once implemented</li> </ul>	<ul style="list-style-type: none"> <li>• Needs to be industry driven</li> <li>• Defining the industry could be a challenge</li> <li>• Difficulty in selecting scale of strategy (state, regional, local)</li> <li>• Do not want to create factions in the business community</li> <li>• There may be private industry skepticism</li> <li>• The nature of the political system and traditional educational institutions may be a challenge</li> <li>• There may be a risk of dominance by big business</li> <li>• Public sector response must be quick</li> <li>• There may be institutional barriers to implementing such a strategy</li> <li>• Risks picking winners and losers</li> <li>• Defining government's role</li> <li>• Setting the criteria to define a cluster</li> </ul>

# Implementing an Industry Cluster Strategy

Implementing an industry cluster strategy involves leadership from and collaboration among government, business, and education. The strategy would ensure that the state builds on its strengths and has the appropriate skills and infrastructure it needs to move the state forward. Implementing a successful industry cluster strategy in the state will require: 1) that a few key conditions are met, 2) that Minnesotans understand what the strategy is and is not, and 3) that a commitment is in place to make the strategy work. This section addresses four key conditions that need to be met as well as ideas on how an industry cluster strategy might be implemented in Minnesota.

## KEY CONDITIONS FOR A SUCCESSFUL INDUSTRY CLUSTER STRATEGY

The experience of states and regions that employ industry cluster strategies has shown that a few important conditions need to be in place for an industry cluster strategy to be successful. Based on its research and review of cluster programs around the country and in Minnesota, the State and Local Policy Program prepared a list of four key conditions needed for a successful industry cluster strategy. These conditions include: 1) clusters must be industry-driven, 2) both government and industry leadership is required, 3) a cluster strategy must avoid picking winners and losers, and 4) the strategy must address both state and regional economies.

### Clusters must be industry-driven

Government may identify emerging or existing clusters through its study of the economy. However, it does not create industry clusters, nor should it try to lead clusters. Instead, government should try to facilitate the meeting of cluster members, conduct research to help the cluster define itself, and respond to cluster priorities with appropriate and requested assistance.

Furthermore, industry leaders must take the lead role in identifying cluster issues for the strategy to be successful. A cluster is not about industry dictating to government and other service providers. However, industry needs to take the lead in addressing issues and opportunities, while government and others can play a supporting role.

### Both government and industry leadership is required

If an industry cluster strategy is to be implemented successfully, high-level industry and government leadership is required. Both industry and government need to be squarely behind the strategy and committed to fulfilling their respective roles. In some states, such as Arizona and Oregon, the governor has taken an active role in inviting industry leaders to participate in their cluster initiatives. The governors were able to engage the top management of the state's most prominent firms, which helped generate interest in the initiative by other industry leaders. Without the involvement of top government and industry management, the likelihood that an industry cluster strategy will become a statewide policy and practice is diminished significantly.

Industry and government leadership will be particularly important to Minnesota since, unlike many other states that adopted industry cluster strategies, the state is not currently faced with an economic crisis. In other states, both government and industry were eager to work together to help the economy. In Minnesota, the reason for pursuing an industry cluster strategy is to capture current economic opportunities. These include opportunities to 1) address the current and projected workforce shortage, 2) plan for and develop the infrastructure needed to move the state economy forward, 3) develop and

strengthen rural regions of the state, 4) provide for strong companies and a strong workforce, and 5) create a more efficient and effective government.

In implementing a cluster strategy, continued leadership by government and industry will be required. Industry leaders will need to define their cluster (or agree on a definition of their cluster) and set priorities for the cluster. Government leadership will be required to ensure that agencies respond quickly to industry concerns and that the clusters remain a priority. Top government leadership may also be required to keep industry leaders engaged in the ongoing process.

### **Cluster strategy cannot be about picking winners and losers**

Government may want to start by identifying clusters by a set of criteria, such as employment, earnings, exports, growth, or wages, it should not limit its efforts to these initial clusters. If a cluster can organize itself and demonstrate that it meets the criteria and possesses a viable set of relationships, government should make all efforts to work with it. In Arizona, an initial study of the state's key industries did not include the optics cluster. Industry leaders from the cluster came forward and explained that 1) there was a large concentration of optics firms in the state, 2) they exported out of the region, and 3) they had a network of suppliers. The state added optics to their list of clusters and continues to work with the cluster.

### **Cluster strategy must address regional and local economies**

To be successful, a state industry cluster strategy needs to address both the needs of the state as a whole and the regions within it. If attention is focused on only the largest industries or clusters in the state, important regional clusters may be overlooked. These regional clusters may play a very important role in regional economies but may be masked by larger clusters concentrated in major metropolitan areas. *The precision agricultural chemical sprayer industry* for example, is very important to southwestern Minnesota and the *composites industry* is critical to southeastern Minnesota. However, given the dominance of the Twin Cities metropolitan region in the state economy, these key industries could be easily overlooked in a statewide economic analysis.

Regional clusters must also receive the attention of state agencies and organizations. A state economic development strategy needs to ensure that state agencies coordinate their efforts to address key regional clusters and that educational institutions work closely with the clusters in identifying needs even if their programs are delivered on a firm-by-firm basis. Retaining these regional clusters and supporting their competitive advantage is a key part of a state effort to keep rural communities vibrant.

## **AN INDUSTRY CLUSTER STRATEGY IN MINNESOTA**

The previous section addressed key conditions that need to be in place for a successful industry cluster strategy. This section examines how a cluster strategy might move from the discussion phase to implementation.

### **How might an industry cluster strategy be initiated?**

Since awareness and interest in cluster strategies is growing throughout the state, a first step in implementing clusters might be for state leaders to invite industry and education leaders to explore with them the benefits and costs of adopting a cluster strategy in Minnesota.

Leadership at the state level is required to implement a successful industry cluster strategy in Minnesota. One of the key aspects of a cluster strategy is the coordination of government and education's efforts with respect to economic development. In order for state agencies and educational institutions to work collaboratively, they need the support and encouragement of state leaders.

The State and Local Policy Program has found that many Minnesota state agencies, local governments, and education officials are favorably disposed to a state industry cluster strategy. They see the benefits of such an approach and in many cases are already working with clusters. Their efforts, however, are often not coordinated with other state and local agencies and organizations. Several state, regional, city organizations and educational institutions have targeted the information technology cluster. However, these efforts are often not coordinated, with each group having its own contacts in the industry and priorities.

Initial case studies in Minnesota and examples from other states indicate that industry is usually willing to work in cluster groups with government and educational institutions. Each group sees benefits of the approach and appreciates the efficiency that is achieved in a cluster. However, bringing industry to the table requires the support and involvement of recognized industry leaders. These leaders play an important role in selling the idea to other businesses, ensuring a good turnout at meetings, and generating support for the implementation of action plans.

### **How Would Clusters Be Organized?**

Clusters should be organized around key industries in the state. These industries should be self-identified or identified through university or state agency research. A cluster should be centered on key exporting industries, or industries that sell a large share of their products or services outside the state. These industries bring dollars into the state through their exports or, in the case of tourism, through the visitors they bring into the state. These industries drive the economy and create a base that supports additional economic activity. Additional criteria might be considered in selecting initial industries (e.g. average wage, employment, recent growth of the industry, or environmental friendliness). A key to making this work across the state is to identify industries that are important to specific regions.

In addition to the industries, the appropriate representatives of key state or regional agencies and education could be invited to participate in the cluster group. These people would work with the business leaders in the cluster to address key concerns identified by industry. Additional clusters may emerge spontaneously or be identified through research. The state should be open to working with new clusters and to changes within clusters.

### **Once the Clusters Are Identified**

Once the clusters are identified, key industry leaders could be invited to a meeting or small series of meetings to define the cluster, discuss important trends, set priorities for action, and start working to address key concerns or opportunities. The State and Local Policy Program used this technique with the *information technology cluster* in the Twin Cities and the *precision agricultural chemical application industry* in southwestern Minnesota. Other states and regions have also used this approach.

The results of the State and Local Policy meetings were very favorable. The industries liked the approach and saw the benefit of working together as a cluster. Although they appreciated the opportunity to discuss key issues, they wanted to make sure the clusters were action oriented. They also saw an important role for education and government in the clusters. Each group expressed a strong interest in meeting again.

While the State and Local Policy Program cannot direct these clusters, it is in a good position to help facilitate and provide research for the cluster. Government and industry leaders will need to play a larger role in these efforts to ensure that the cluster work is an ongoing activity.

## **Ensure an On-Going Process**

A successful industry cluster strategy requires sustained commitment on the part of government, business, and education. The cluster groups should not view their collaboration as a singular event to address a few concerns. Cluster groups should be seen by their participants—and supporting agencies and industries—as an effective way of doing business. The cluster identifies key issues and works on solving them. The cluster also provides a forum for discussion and planning. Through this forum, government will learn about an industry's infrastructure requirements and projected workforce needs, and firms will discover opportunities for mutually beneficial collaboration.

## **TWO EMERGING CLUSTERS IN MINNESOTA**

The State and Local Policy Program began work with two key clusters in the state to explore how an industry cluster strategy might be employed in Minnesota at the cluster level, and to determine interest in such a strategy. The *information technology cluster* in the Twin Cities (and state-wide) and the *precision chemical application manufacturing industry* in southwest Minnesota were selected for this study. These clusters are extremely important regionally, as well as to the state.

The clusters were identified as part of earlier cluster studies of the regions. The clusters were defined differently in those studies, but upon further research and conversations with the industries and analysts, the names and boundaries of the clusters changed to better reflect the character of the clusters.

The *information technology cluster* is extremely large and includes several large categories of firms (e.g. telecommunications, hardware, software). The *precision chemical application manufacturing industry* is much more limited in its scope and is centered around a small number of firms in southwest Minnesota that represent 80 – 90 percent of the North American market for their products. Both of these industries support many other industries in their regions.

## **Information Technology Industry Cluster**

The *Information Technology* cluster is a large employer in the state, has significant potential for growth, and is critical to the growth of many other industries. Several industry leaders and analysts are concerned that Minnesota is not positioned to be a leader in the field and that more needs to be done to strengthen the cluster in the state. Achieving success will require the collaboration of industry, government, and education.

## **Key Industry in the State**

*Information technology* (IT) firms in the state are growing and provide good jobs for Minnesota workers. High technology industries in Minnesota accounted for more than eight percent of all employment in the state with over 167,000 jobs in 1996. Employment in the computer and data processing services industries increased dramatically during the 1990s, with an increase of 130 percent between 1990 and 1996. In addition, employment in IT occupations such as computer programmers/aides, systems analysts, computer engineers, and computer scientists and other computer professionals expanded by almost 70 percent between 1989 and 1996. Over the next decade, almost 8,800 workers will be needed each year to fill positions opening in these occupational areas. Wages in the computer and data processing services industry increased by 39 percent between 1990 and 1996, compared with an overall wage increase in the state of 25 percent.

## **Defining or "Mapping" the Cluster**

Efforts to define or "map" the state's *information technology* (IT) cluster included initial meetings with representatives from the Minnesota High Tech Association, industry representatives, the Minnesota Department of Economic Security, St. Paul Planning and Economic Development, the Office of Technology Policy and other collaborating organizations. It became clear that defining the cluster would

be difficult since the rapid evolution of IT products and services make classification of specific firms by product line difficult. Also, traditional data sources, such as the Standard Industrial Classification (SIC) system, do not explicitly place many IT firms in information technology categories.

Based on its research, the State and Local Policy Program (SLPP) developed a draft map of the cluster and presented it to industry leaders and analysts at a cluster meeting in early December. While the map was viewed as an important step in trying to define the industry, the group concluded that the information technology cluster is too large and complicated to depict as a small diagram or map.

One of the primary concerns about defining the IT cluster is that the lines between categories are very blurry with many companies involved in several areas of business. Industry leaders and analysts also expressed concern that trying to find the perfect map of the industry can stand in the way of making genuine progress in implementing a cluster approach. The industry cluster group assembled concluded that they should not completely disregard the classification effort, but use it to show how vast the cluster is in the state.

The cluster group agreed that the main categories within the IT cluster are hardware, software, services, networking and telecommunications. Hardware is subdivided into computers, components and peripherals, and semiconductors. Services include consulting and systems integration, solution providers and internet services. Telecommunications is broken into equipment and services. (For an abridged listing of representative companies in these industries see Appendix B)

**Table 2. Information Technology Cluster**

	<b>Software</b>	<b>Services</b>	<b>Networking</b>	<b>Telecom.</b>
<b>Hardware</b>				
-Computers				
-Components		-Consulting		-Equipment
-Peripherals		-Systems integration		-Services
-Semiconductors		-Solution providers		
		-Internet services		

**Need for the State to Seize Important Opportunities**

There is consensus on the part of the industry cluster team that the State of Minnesota needs to seize the opportunity that the IT industry presents. There have been missed opportunities for expansion of the IT cluster due to a lack of skilled workers, venture capital, and state leadership and coordination. Although, the Twin Cities region was formerly known as a hot bed of computer technology, in a recent story on high tech cities, the Twin Cities was noticeably absent.

Some important first steps have been taken by the University of Minnesota’s Digital Initiative, but the process needs to move further and in a more expedient manner. The opportunities to put Minnesota on the IT map will not wait. The cluster group and other analysts agree that there is a strong need to create a supportive environment for the growing industry. This will require a focused approach with strong leadership. In addition to needed leadership, the cluster group identified the following major issues that must be addressed.

- Increase and enhance the supply of qualified workers at all levels in the industry. There is a large shortage of IT workers in Minnesota and the plight will become worse if a strategy is not developed to reverse the trend. Approximately 1,000 students graduate from IT-related post-secondary programs in Minnesota each year, while there are projected to be over 8,800 new positions available each year through 2006.
- In order for the cluster to expand around the state and for other industries to use information technology to increase their productivity and sales, a strong telecommunications/information infrastructure is needed. This includes high-speed fiber optic services, Internet connections, and other IT-related infrastructure.
- Greater awareness is needed of the importance of the IT cluster to the state, the opportunities that growth of the cluster present, and the challenges faced by the cluster. The cluster group was concerned that many politicians and other Minnesotans do not appreciate the importance and size of the IT cluster.
- A revision of some regulations, tax policies, and economic and other incentives may be also be needed to encourage development of the IT cluster in the State.

### **Next Steps**

The cluster group's next step is to develop an action plan to address the key issues identified in the previous section. Building awareness of the cluster in the state was also agreed to be a good starting point. The group also discussed the need for leadership and coordination of the cluster. Members agreed that additional industry, government, and educational leaders would need to be recruited. It was not clear who would facilitate the meetings of the group. However, a partnership among the State and Local Policy Program, the Minnesota High Tech Association, and a state agency might serve as convenors and coordinators of the cluster group at least initially.

## **Southwest Minnesota's Precision Agricultural Chemical Application Industry**

The *precision agricultural chemical application industry* has emerged as a clear example of the success of industry clusters in rural areas. In 1997, the State and Local Policy Program conducted an industry clusters study of the economic base industries in southwestern Minnesota. The agricultural systems manufacturing industry emerged from the data and from the interviews with economic development professionals as an important emerging industry in the region. In subsequent meetings with industry leaders and economic development professionals, the industry was redefined as the precision agricultural chemical application industry, which better reflected the character of the cluster's key exporting firms.

### **Key Industry in Southwest Minnesota**

From the State and Local Policy Program's initial cluster study, a great deal of interest in the industry was generated in southwest Minnesota and in state organizations. The southwest Minnesota *precision agricultural chemical application industry* is a highly export-oriented industry that accounts for approximately 80 percent of North American production of agricultural chemical application systems according to industry sources. The industry relies on several suppliers from the region and supports many other industries in the region as well.

### **Defining the Cluster**

The State and Local Policy Program conducted interviews and site visits in August and September 1998 in an effort to understand the *precision agricultural chemical application cluster*. While cluster-based strategies have been employed by local and state governments in metro areas, less is understood about implementation in rural areas. **SLPP** has focused on understanding and organizing pilot clusters in greater

Minnesota. A meeting of southwest Minnesota economic development specialists was convened in October 1998 to gather additional input on the nature of the industry and the parameters of the cluster. An initial diagram or "map" of the industry was developed based on those meetings and additional research.

In November 1998, a group of *precision agricultural chemical application industry* leaders and others (e.g. educators and economic developers) who work with the industry was convened. The purpose of the meeting was to discuss the industry clusters strategy, define the industry cluster and the relationships among firms in the cluster, and identify key issues affecting the growth of the industry generally and in the region. The group also reviewed and revised the cluster map at the meeting. The map is on page 31.

## Opportunities for Cluster Growth

Minnesota is not the national center of agriculture and construction manufacturing equipment. Southwestern Minnesota is, however, extremely competitive in certain sectors of the market, including the precision agricultural chemical application industry. In order to remain competitive, the region needs to focus on this and other key industries. The cluster group identified a few areas in which they might want to focus their efforts to strengthen the cluster.

- A collaborative approach to addressing the cluster's key issues is needed. The group agreed that enhanced communication and collaboration among cluster members and with government and educational organizations on issues such as workforce and training, software design, and standards would be good places to start.
- The cluster agreed that education and training issues were a top priority. The workforce shortage is a potential challenge to competitiveness of the industry in the region. A responsive education and training community could take advantage of the opportunity to work with industry cluster to create innovative training programs.
- The industry has used conditions that appeared to be competitive disadvantages to innovate and gain market advantage. For example, the global economy, world grain prices, and the cyclical nature of agricultural production create fluctuations in demand for the industry. To address these fluctuations, some firms have diversified their product lines (e.g., **Case Tyler** is making de-icing equipment, **AgCo** is expanding into other production lines, and **Custom Ag Products** produces kayaks). This type of innovation will help ensure the health of the firms, the industry, and the regional economy that relies on them.

## Next Steps

Industry representatives and regional experts agree that additional cluster meetings are necessary and would be beneficial to the industry and the regional economy. Members of the cluster would like to see additional assessment of the regional economy and of the cluster itself in order to gain a clear understanding of the economic context.

A keep next step for the cluster is to identify an area of need that the cluster can focus on and address collaboratively. Many have suggested that the current workforce shortage would be an ideal starting point. In this way the cluster can pursue a common goal while also learning how to work collaboratively as a cluster with each other, education, and government.

## **Southwest Minnesota Precision Agricultural Chemical Application Industry End Producers**

### **QUESTIONS ABOUT A CLUSTER STRATEGY**

#### **Q. How would an industry cluster strategy address emerging businesses and industries?**

**A.** By developing strong clusters that promote exchange and collaboration among firms and cooperation with government and education, regions can strengthen existing industries, develop an attractive business climate, and foster new business growth. In a strong cluster, entrepreneurs may leave larger firms to create their own businesses. These new firms will complement and/or compete with the existing firms, which helps spawn innovation and the growth of the cluster.

#### **Q. How would an industry cluster approach work regionally and in rural areas?**

**A.** In regional clusters, the cluster group would meet in the region and be led by regional business leaders. State, regional, and local government and educational institutions would participate in supporting roles. In the southwest Minnesota case study, well-respected economic development directors from two counties and an Extension Educator coordinated the first industry meeting. They knew which firms and local service providers to involve and when and where the session should be held. Representatives from state agencies and the University of Minnesota were invited to participate.

In southwestern Minnesota and other areas, key clusters of industries serve as dynamic forces in the regional economy. If the future of these regions is to be ensured, the state will need to pay special attention to these clusters. Regional and local organizations have in many cases already taken the lead in working with these clusters. However, they will need state support and collaboration to be truly successful. These regional clusters should include key state agencies and educational institutions and should meet in the region to save travel time and costs.

#### **Q. Aren't our industries already organized?**

**A.** Many Minnesota industries are already organized. However, most are organized as trade associations, which serve a purpose different from that of industry clusters. A cluster group includes supporting and related industries as well as important foundation groups, such as infrastructure providers, specialized training organizations, and government agencies and public educational institutions. As a cluster the group works together to identify and address key concerns and create and seize opportunities.

#### **Q. Are industries, government, and educational institutions interested in this?**

**A.** Through its research and work with clusters, the State and Local Policy has found that all three components of the cluster strategy: industry, government, and educational institutions are very interested in learning more about how a cluster strategy might work and how they could use it. Those who participated in the two case studies were very interested in continuing to work together as a cluster.

#### **Q. Where can we get more information?**

**A.** Appendix D includes the names of some resources addressing industry clusters. You can also contact the State and Local Policy Program at the University of Minnesota.

## **Appendix A: Industry Clusters Strategies in Other States and Regions**

### **Arizona**

In 1988, a variety of individuals and organizations looked at the state of Arizona's economy, decided there was room for improvement, and issued a call to action. The Enterprise Network formed a task force to design a strategic planning effort. In 1989, the Arizona Legislature responded by enacting the Omnibus Economic Development Act directing the Department of Commerce (DOC) to assess Arizona's business climate and to draft the first statewide strategic economic development plan.

In 1990, the Enterprise Network brought together the DOC, Arizona Economic Council, Greater Phoenix Economic Council and Greater Tucson Economic Council to commit \$190,000 for the effort known as Arizona Strategic Planning for Economic Development, or ASPED. Their first project was to assess Arizona's economic strengths and weaknesses--referred to as Phase I. ASPED contracted with SRI International to provide consulting support and assigned their first task: to better understand how regional economies create quality jobs. SRI produced the Strategic Framework, which was used to identify the state's key clusters.

Once the Phase I was completed, ASPED sponsors provided an additional \$200,000 to design an economic development plan (Phase II) based on the Strategic Assessment. More than 1,000 Arizonans took part in Phase II. Nine clusters, seven foundations, and four groups dealing with key issues met regularly from May through October 1991. There were also six public forums, two regional town halls and a statewide town hall in November --out of which resulted in the development of the Strategic Plan.

The final phase of the ASPED process, designing the Strategic Plan's implementation, was completed in June 1992. At that point, ASPED had completed its lifecycle and moved Arizona to the next step, which is actual implementation of Arizona's plans for economic development. That implementation process is known as the Governor's Strategic Partnership for Economic Development, or GSPED. The Governor's Strategic Partnership for Economic Development, or GSPED, is a public/private partnership that operates to enhance the competitiveness of the state's economy through export-driven industry clusters.

### **Greater Tucson Area**

The Greater Tucson area embarked on its own urban/regional) cluster strategy at the request of the City of Tucson and Pima County. A data assessment of the greater Tucson area economy was performed and a survey of business leaders identified the leading economic development issues in the area. An initial workshop was convened in to prioritize critical economic issues. A Strategic Plan emerged from these discussions which encouraged recruitment, retention, and expansion of specific clusters of industries in the area and overall community development. The Plan also identified a set of cluster selection criteria and recognized the importance of collaborating with the statewide cluster-based strategy.

### **Massachusetts**

With the assistance of Michael Porter, the Harvard Business professor who wrote *The Competitive Advantage of Nations*, Massachusetts engaged in a statewide analysis of its economic base. Clusters were identified regionally and the specific context that may have produced the cluster in each region was carefully assessed. This intensive research led to the statewide initiative, *Choosing to Compete*. The Massachusetts study focused heavily on the base economy (export-oriented) of the state, specific regional economies, and what economic development efforts can be pursued to improve the state's export industries.

## **Other examples include:**

**Silicon Valley:** *Joint Venture: Silicon Valley Network* . A regional approach.

**California:** *Collaborating to Compete in the New Economy:* A statewide strategy with a regional focus.

**Oregon:** *Oregon Shines.* Identifies key industries crucial to the "vitality, diversity, and competitiveness of Oregon's economy." State wide strategy with regional distinctions

## **Appendix B: Project Participants**

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## **Appendix C: Selected Resources on Cluster Strategies**

Grassroots Leaders for a New Economy: How Civic Entrepreneurs are Building Prosperous Communities (1997). Doug Henton, John Melville, and Kim Welsh. Jossey-Bass Inc., Publishers. San Francisco.

*Choosing to Compete: A Statewide Strategy for Job Creation and Economic Growth.*(1993). The Commonwealth of Massachusetts.

*Collaborating to Compete in the New Economy: An Economic Strategy for California* (1996). California Economic Strategy Panel

*Key Industries in Oregon* (1994). Oregon Economic Development Department

*Creating a 21<sup>st</sup> Century Economy: Arizona's Strategic Plan for Economic Development* (ASPED). (1992). Arizona Strategic Planning for Economic Development

*The Joint Venture Way: Lessons for Regional Rejuvenation* (1995). Joint Venture: Silicon Valley Network.

*Help Wanted: More Opportunities Than People* (1998). Citizens League, Minneapolis, MN.

*Developing Entrepreneurial Economies in Rural regions: Lessons from Kentucky and Appalachia* (1996) The Aspen Institute Rural Economic Policy Program.

*The Added Value of the Industry Cluster Approach to Economic Analysis, Strategy, Development, and Service Delivery.* (1997) Mary Jo Waits, Arizona State University.

*The Competitive Advantage of Nations.* (1990). Michael Porter

*Cluster and the New Economics of Competition.* Michael F. Porter, Harvard Business Review, November 1, 1998.

*Cluster-Based Economic Development: A Key to Regional Competitiveness.* (October 1997). Economic Development Administration, United States Department of Commerce

## **State and Local Policy Program Publications**

*Innovations in Economic Development: The Evolving Direction of Economic Development in the New Economy* (1997) State & Local Policy Program

*Twin Cities Industry Clusters Study* (1995) State & Local Policy Program and the Metropolitan Council

*Financial Services Industry Clusters Study* (1995), State & Local Policy Program and the Metropolitan Council

*Southeast Minnesota Industry Clusters Study* (1996), State & Local Policy Program and the Initiative Fund

*Northwest Minnesota Industry Clusters Study* (1998), State & Local Policy Program and the University of Minnesota Extension Service

*Southwest Minnesota Industry Clusters Study* (1998), State & Local Policy Program and the University of Minnesota Extension Service