Assessing Minneapolis–St. Paul’s Regional Economic Competitiveness: An Analysis of Industry Clusters

By Lee Munnich, Jonathan Dworin, Nebiyou Tilahun, and Matt Schmit

Abstract: The Minneapolis–St. Paul (MSP) regional economy has benefited from an abundance of successful industry clusters that are linked through a complex ecosystem of competing and supporting firms and institutions. This article presents findings from a quantitative and qualitative study of 12 established industry clusters in the MSP region. In addition, four emerging clusters of interest in the MSP region are identified—water technologies, 3-D printing, biorenewables, and robotics. The article also describes the potential for knowledge flows to occur across industry sectors in the MSP region, as seen through similarities in the occupations that different industries hire. This work may help economic development organizations, educational leaders, public policy leaders, and industry leaders as they make policy decisions and investments to enhance the region’s future prosperity and competitiveness. The research upon which this article is based was supported by a grant from the University of Minnesota Metropolitan Consortium.

Without a profound understanding of their strengths and weaknesses, no region can successfully compete in the global marketplace. Fundamental to this type of assessment is an analysis of the regional economy, with industry clusters in particular being important. Industry clusters, or “clusters,” are geographic concentrations of businesses providing similar goods or services that include multiple levels of the business ecosystem. A region’s economy can be viewed as an agglomeration of industry clusters, providing a framework that helps identify strengths and weaknesses, define a region’s relative prosperity, and provide insight on the region’s future.

Agglomeration economies, the underlying concept behind industry clusters, have been analyzed by economists since the late nineteenth century. British economist Alfred Marshall first began writing about industry clusters through his examinations of Sheffield’s metal industry. Since then, cluster studies have been used to identify how certain regions gain competitive advantages in certain industries. For example, the historic strength of Pittsburgh’s steel cluster relied on locational advantages, complementary industries, innovation, and entrepreneurialism. The auto industry, centered in the Detroit region and the Big Three automakers, includes thousands of vendors, suppliers, and ancillary businesses spread throughout the Midwest. New York City remains a global leader in finance, and Silicon Valley has become a model for a regional technology cluster.

With a gross domestic product of $220 billion, the Minneapolis–St. Paul regional economy (MSP) is the second largest economy in the Midwest (behind Chicago) and the 13th largest regional economy in the United States. Unlike many cities in the Midwest, the diversified MSP regional economy remained resilient during the recent recession. According to the U.S. Department of Commerce, between 2008 and 2011 the MSP region’s economic output grew 1.5%, whereas Chicago, Detroit, and most of the Midwest’s other big cities lost ground.

The hallmark of the MSP economy is industrial diversification and the presence of large, international firms. The region is home to 18 Fortune 500 companies, including 3M, which is headquartered in Maplewood.

The region is home to 19 Fortune 500 companies from a large variety of traded sectors, and eight additional publicly traded firms with more than $1.8 billion in annual revenue.4 Cargill, the nation’s largest private company, is also located in the region, as are several other very large private firms. The presence of several large-company headquarters across a variety of industries is key to the region’s competitive advantage and helped spark initial interest for this study of the region’s most prominent industry clusters.

The Minneapolis–St. Paul region is home to a number of important industry clusters that have contributed to the area’s competitive advantage. During the region’s formative years, key industries included finance, lumber, and processed food. Today, the most notable cluster within the metropolitan area is the medical devices cluster, which includes large firms such as Medtronic, Boston Scientific, and St. Jude Medical, smaller businesses and entrepreneurial activity, and complementary institutions such as universities, hospitals, and an active trade association. At least four, harder to define, emerging clusters are also active in the region: water technologies, 3-D printing, biorenewables, and robotics.

For companies, municipalities, research groups, and economic-development organizations, studying industry clusters has great value. Organizing policy discussions around clusters allows for state, regional, and local organizations to have a common platform for focusing programs and investments through a broader regional economic development strategy.

Methodology
In June 2012, a research team from the State and Local Policy Program at the University of Minnesota’s Humphrey School of Public Affairs set out to explore and assess the clusters most important to the MSP regional economy. The State and Local Policy Program has conducted regional industry-cluster studies within Minnesota and throughout the nation since 1995.

Both quantitative and qualitative data were used to profile twelve competitive industry clusters in the MSP region. Clusters were chosen primarily based on high location quotients (LQ),

Cluster Definitions

The clusters analyzed for this report come from the U.S. Cluster Mapping Project of the Institute for Strategy and Competitiveness at Harvard Business School. Clusters and subclusters were derived using statistical methods from the actual patterns of industrial location across the U.S. economy.

Analytical Instruments: Companies in the laboratory instruments, optical instruments process instruments, search and navigation equipment, and electronic components industries.

Distribution Services: Companies in the merchandise wholesaling, apparel and accessories wholesaling, catalog and mail-order, food products wholesaling, farm material and supplies wholesaling, and transportation vehicle and equipment distribution industries.

Financial Services: Companies in the depository institutions; securities brokers, dealers, and exchanges; insurance products; health plans; risk capital providers; investment funds; real estate investment trusts; and passenger car leasing industries.

Information Technology: Companies in the computers, electronic components and assemblies, peripherals, software, and communications services industries.

Lighting and Electrical Equipment: Companies in the lighting fixtures, electric laps, batteries, switchgear, electrical parts, and metal parts industries.

Management of Companies: Companies in the corporate, subsidiary, and regional managing offices subcluster. This subcluster consists of establishments that administer, oversee, and manage other establishments of the company or enterprise in a strategic, planning, or decision-making role.

Medical Devices: Companies in the surgical instruments and supplies, dental instruments and supplies, ophthalmic goods, medical equipment, diagnostic substances, and biological products industries.

Metal Manufacturing: Companies in the fabricated metal products, metal alloys, primary metal products, precision metal products, fasteners, wire and springs, metal processing, iron and steel mills and foundries, nonferrous mills and foundries, metal furniture, environmental controls, pumps, saw blades and handsaws, general industrial machinery, laundry and cleaning equipment, and metal armaments industries.

Processed Food: Companies in the milk and frozen desserts, baked packaged foods, coffee, processed dairy and related products, meat and related products and services, flour, specialty foods and ingredients, milling, candy and chocolate, malt beverages, paper containers and boxes, metal and glass containers, and food products machinery industries.

Production Technology: Companies in the machine tools and accessories, process equipment sub-systems and components, hoists and cranes, process machinery, industrial patterns, fabricated plate work, industrial trucks and tractors, and ball and roller bearings industries.

Publishing and Printing: Companies in the publishing, news syndicates, signs and advertising specialties; photographic services; photographic equipment and supplies; radio, TV, publisher representatives; printing services; printing inputs; paper products; specialty paper products; inked paper products; and office equipment and supplies.

Transportation and Logistics: Companies in the air transportation, bus transportation, marine transportation, ship building, transportation arrangement and warehousing, trucking terminal, airports, and bus terminals industries.

which indicates how concentrated particular industries are in a particular region compared with the nation. The LQ is calculated by comparing the industry’s share of regional employment with its share of national employment. The selected clusters were finalized by an advisory committee comprised of regional leaders, economic development practitioners, and industry professionals.

Quantitative data stems from the Cluster Mapping Tool that was developed for the U.S. Department of Commerce, Economic Development Administration, by Harvard Business School’s Institute for Strategy and Competitiveness. The tool defines each industry cluster by a series of subclusters, which are represented by six-digit NAICS codes. The core data set used within the tool for industry-cluster data is U.S. Census Bureau county business patterns data that cover employment, establishment, and wage data by county for each industry sector. The definitions for each of the selected clusters can be found in the Clusters sidebar.

The study solely focused on traded clusters. According to the Institute for Strategy and Competitiveness, traded clusters are industries that sell products and services across different economic regions. These industries are concentrated in specific regions where there are competitive advantages associated with the location.

Qualitative data was used to help better explain the historical and anecdotal role of clusters in the region. The research team conducted nine company interviews to gain insights into MSP’s competitive advantage. They also reviewed newspaper, magazine, and journal articles and company websites to gather more information on industries within the region. Many of the observations came from discussions with economic development leaders from throughout MSP who were interested in the study. In particular, emerging clusters of interest were identified through these types of conversations. The four emerging clusters selected were based on rapidly growing technological fields and markets where the MSP region has shown significant entrepreneurial and market leadership in commercializing these technologies and where existing competitive clusters are well positioned to advance these emerging clusters.

To assess the potential for knowledge flows across industry sectors in the MSP region, the authors examined similarities in occupations that different industries hire—particularly focusing on specialized workers such as scientists and engineers. This analysis used employer-occupation data provided by the Minnesota Department of Employment and Economic Development.

Results
Characterization of Selected Industry Clusters. Medical devices, management of companies, lighting and electrical equipment, and analytical instruments are the region’s strongest clusters by LQ (Table 1). The LQ of all the clusters we studied in the report was greater than 1.0, meaning that employment in all studied clusters was more concentrated in MSP than in the nation. From the perspective of regional economic competitiveness, one of the key values in studying clusters is that it allows for comparisons across regions. In the clusters we studied, a high employment rank and a high LQ suggests a true competitive advantage for that industry in the region. In examining the relationship between a cluster’s LQ and whether its concentration increased or decreased from 1998 to 2010, we found that the three most concentrated clusters were also three of the fastest growing (Figure 1). Transportation and logistics, financial services, publishing and printing, and distribution services are the clusters where concentration decreased the most between 1998 and 2010. The decline in LQ for transportation and logistics can in large part be explained by the

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5 If an industry has an LQ of 1.0, it means that the share of an industry in the regional economy is the same as the industry’s share in the national economy. If the LQ is greater than 1.0, it means that the industry is more concentrated in the region than average, whereas an LQ of less than 1.0 means that the region has a lower than average concentration of an industry. Typically, industries with very high LQs, such as the MSP medical devices cluster, are export-oriented.


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### Table 1. Selected Industry Clusters for the MSP Region

<table>
<thead>
<tr>
<th>Cluster</th>
<th>MSP Employment (2010)</th>
<th>National Employment Rank</th>
<th>MSP Location Quotient</th>
<th>Mean Annual Wage ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Devices</td>
<td>20,097</td>
<td>2</td>
<td>3.75</td>
<td>82,399</td>
</tr>
<tr>
<td>Management of Companies</td>
<td>90,843</td>
<td>6</td>
<td>2.45</td>
<td>114,703</td>
</tr>
<tr>
<td>Lighting and Electrical Equipment</td>
<td>5,677</td>
<td>6</td>
<td>2.16</td>
<td>55,585</td>
</tr>
<tr>
<td>Analytical Instruments</td>
<td>13,157</td>
<td>9</td>
<td>1.96</td>
<td>62,816</td>
</tr>
<tr>
<td>Publishing and Printing</td>
<td>18,826</td>
<td>7</td>
<td>1.68</td>
<td>53,618</td>
</tr>
<tr>
<td>Production Technology</td>
<td>9,789</td>
<td>7</td>
<td>1.48</td>
<td>61,226</td>
</tr>
<tr>
<td>Metal Manufacturing</td>
<td>16,458</td>
<td>8</td>
<td>1.36</td>
<td>54,261</td>
</tr>
<tr>
<td>Financial Services</td>
<td>39,806</td>
<td>10</td>
<td>1.35</td>
<td>96,691</td>
</tr>
<tr>
<td>Information Technology</td>
<td>14,919</td>
<td>15</td>
<td>1.23</td>
<td>94,305</td>
</tr>
<tr>
<td>Transportation and Logistics</td>
<td>27,821</td>
<td>13</td>
<td>1.13</td>
<td>50,738</td>
</tr>
<tr>
<td>Distribution Services</td>
<td>30,108</td>
<td>13</td>
<td>1.09</td>
<td>73,209</td>
</tr>
<tr>
<td>Processed Food</td>
<td>18,256</td>
<td>7</td>
<td>1.01</td>
<td>47,065</td>
</tr>
</tbody>
</table>
Delta/Northwest Airlines merger and the movement of the headquarters to Atlanta.

Each of the selected MSP region industry clusters includes at least one large company that serves as a foundation to the cluster (Table 2). The Census Bureau assigns one North American Industry Classification System (NAICS) code to each establishment based on the firm’s primary activity, or how it generates the most revenue. In reality, however, companies may operate across industries and across clusters. As a result, some companies may appear in more than one cluster in Table 2.

Large companies ranged from being relatively young firms with rapid growth (such as UnitedHealth) to historic companies that have changed their business model since the early days of their presence in the regional economy (such as 3M). Management of companies refers to the corporate, subsidiary, and regional managing offices subcluster. This subcluster consists of

Table 2. Representative Companies in Selected MSP Region Industry Clusters (Companies in bold were interviewed for the report)

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Notable MSP Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Devices</td>
<td>Medtronic, St. Jude Medical, Boston Scientific, 3M, Patterson Dental, Starkey Labs</td>
</tr>
<tr>
<td>Management of Companies</td>
<td>UnitedHealth, Target, Best Buy, CHS, 3M, General Mills</td>
</tr>
<tr>
<td>Lighting and Electrical Equipment</td>
<td>Hirel Systems, MN Wire, Precision Inc.</td>
</tr>
<tr>
<td>Analytical Instruments</td>
<td>MTS Systems, Rosemount Inc., Bergquist</td>
</tr>
<tr>
<td>Publishing and Printing</td>
<td>Thomson Reuters, Smead Manufacturing, Smyth Companies</td>
</tr>
<tr>
<td>Production Technology</td>
<td>Chart Industries, Thiele Technologies, Bosch Packaging, Quality Tool</td>
</tr>
<tr>
<td>Metal Manufacturing</td>
<td>Pentair, Metal-Matic, Kurt Manufacturing</td>
</tr>
<tr>
<td>Financial Services</td>
<td>US Bank, Ameriprise Financial, Thrivent Financial, Securian Financial</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Thomson Reuters (West Law), Dolan Company, Resistance Technology, Polar Semiconductor</td>
</tr>
<tr>
<td>Transportation and Logistics</td>
<td>CH Robinson, Carlson Wagonlit, Delta Airlines</td>
</tr>
<tr>
<td>Distribution Services</td>
<td>Cargill, CHS Inc., Mosaic, Shop NBC</td>
</tr>
<tr>
<td>Processed Food</td>
<td>CHS Inc., General Mills, Land O’Lakes, MOM Brand Company</td>
</tr>
</tbody>
</table>

establishments that administer, oversee, and manage other establishments of the company or enterprise in a strategic, planning, or decision making role. While management of companies for most regions is proportional to its employment share, MSP has an unusually high LQ of 2.31. In other words, this subcluster represents the large presence of corporate headquarters in the Minneapolis–St. Paul region.

The MSP region benefits from a diverse portfolio of industry clusters with linkages to other clusters within the region (Figure 2), as well as with competitive clusters in Greater Minnesota. For example, processed food is a competitive cluster in Greater Minneapolis–St. Paul region.

Figure 2 indicates linkages among clusters that are typically colocated within a region based on a national cluster analysis. Clusters with overlapping borders or identical shading have at least 20% overlap (by number of industries) in both directions. In addition to medical devices, analytical instruments, and lighting and electrical equipment being the clusters most concentrated and growing the most in concentration, these three are also share similar companies.

Some clusters within the region serve more so as complementary clusters than stand-alone clusters; that is, the goods manufactured within these clusters are more commonly used as inputs for the goods manufactured by another cluster as opposed to being manufactured directly for consumer use. For example, in interviews with companies and industry experts, we found that the analytical instruments cluster, which consists of tools used for precise measurements, overlaps with the medical devices cluster and other manufacturing sectors. Similarly, the production technology cluster, which includes companies that manufacture machinery to be used in the manufacturing process, is a complementary cluster that is able to shape the ways that many other clusters perform their work.

**Analysis of Knowledge Flows.** The MSP region’s diversified economy not only makes it resilient, but also enables knowledge transfers to occur within as well as across sectors. Knowledge flows across firms can help competitors to keep up with one another; they can transfer best practices across or within sectors. Some of the ways in which knowledge transfers or knowledge flows can occur among firms are through informal social relationships and interactions among workers, through trade organizations and publications, or

![Figure 2. Competitiveness and Composition of MSP Metro Area](image-url)
through worker flows between different firms as job changes occur. More formalized collaborations and partnerships among firms also enable knowledge transfers. Exploratory work as part of this project looked at the sectors that are hiring from similar occupational classes to see where worker flows (and as a consequence, knowledge flows) may be occurring. Researchers have also looked at knowledge transfers by looking at citations in patent databases (Examples, Jaffe et al. [1993]8; Agrawal et al. [2003]9) to trace the knowledge base that new innovations are based on. However, in sectors where patenting or publications with citations are not the norm, other methods are needed to find out patterns of worker movements across firms. These approaches may involve proprietary data (e.g., using data from sites such as LinkedIn or other portals) where work histories could be investigated to identify patterns of worker movements within or across sectors. This analysis looks at the potential for these types of worker (and thereby knowledge) flows by looking at more readily available (and less detailed) data that describes the different occupations that sectors employ. The data, which is a sector-by-occupation matrix for the metropolitan region made available by the Minnesota Department of Employment and Economic Development (DEED), provides a way to look at which sectors are pursuing similarly skilled workers and thereby enabling worker movement across sectors.

Our analysis focuses on sectors that are considered basic to the region (a location quotient of 1.1 or greater is used for identifying basic sectors). In addition, since many occupations are present in multiple sectors without necessarily transferring specialized knowledge, a way to exclude these occupation classes from the analysis was instituted. The criteria for specialization of an occupation was based on how many sectors employed a given occupation. This automatically removes generic occupation classes such as office administrators or generic manager titles as these appear in many sectors. Some technical jobs such as machinists were left in the occupation list for identifying the shared occupation classes while others such as butchers were removed even though they may have been only present in a small number of sectors (see full report for details). The potential for knowledge flow is then defined based on whether some sectors attract workers from multiple occupation classes that are in the “specialized” occupation list. The criteria for specializations are set at four different levels and the number of the occupations that needed to be shared among sectors also varied as the specialization criteria is changed. This enables us to look at the variation in identified knowledge sharing potential under different specifications of specialization and knowledge sharing. Figure 3 shows one such analysis where only occupations present in five or fewer sectors are used and only sectors that attract three or more of these specialized occupations are shown. As can be seen, each occupation is attracted by two or more sectors—workers who move from one sector to another as a result of these hiring needs transfer skills and knowledge across sectors.

The shared occupation needs among basic sectors suggests that many of the regions’ basic sectors, through the transfer of workers, likely enrich each other’s knowledge base. This is in addition to knowledge and worker flows that may occur within sectors, which our analysis doesn’t explore. Second, it also identifies which occupations are in common demand by many of the regions’ basic sectors. These shared occupations cover a wide range, including degree requiring statistical, engineering, and programming fields, as well as trade-oriented jobs, such as machine operators and mechanical drafters. This identification of occupations allows policy makers and educators to plan around the shared workforce needs of the region’s basic sectors.

Emerging Clusters. The MSP region has long nurtured a business ecosystem that fosters innovation and entrepreneurship. Many industrial innovations ranging from the aerospace industry to medical devices to supercomputers have their roots within the region. Four emerging clusters may provide new opportunities for the MSP regional economy: water technologies, 3-D printing, biorenewables, and robotics. Because of their emergent nature, these industries do not perfectly align within the standardized cluster definition. Still, they are of great importance, as they are likely to play a major role in how MSP is able to compete globally in the future.

If the region is able to harness the strength and encourage the growth of these emerging clusters, then they may be able to gain an advantage in the industry. If not, they may fail to mature or move elsewhere. The University of Minnesota’s MnDRIVE program, funded by the Minnesota State Legislature in 2013 to support the growth of targeted industry clusters and advance University research-driven innovations, is already making investments in water technologies, robotics and food-related biorenewables in collaboration with businesses. This may prove to be a promising approach in stimulating the growth of these emerging clusters.

Water Technologies. The MSP region is at the forefront of water- and wastewater-treatment technologies. It is home to industry leaders Pentair, Donaldson, Ecolab, and Osmonics (now owned by GE), and uses its abundant water sources as a proving ground of sorts. As water shortages impact numerous regions across the globe, the sustainability of water resources is of critical importance. The water-tech sector began in the region around a decade ago, as large firms such as 3M and Pentair began to expand and diversify their businesses by purchasing smaller water-treatment firms. Earnings per share are expected to grow at Pentair as a result of an increased demand for industrial water-filtration equipment and pumps, in addition to residential-related water-tech equipment. This emerging subsector, however, has long been a part of the Minnesota economy. For example, Osmonics, a firm formerly headquartered in Minnetonka, pioneered reverse-osmosis technology in the 1960s as environmental awareness began to grow demand for environmental stewardship. Products from the water technology cluster are related to food and agricultural products, information technology, production technology and analytical instruments clusters. DEED and GREATER MSP convened a Water Technology Business Summit at Ecolab’s Schuman Campus in Eagan, Minnesota, in March 2014 with 150 water technology business, development and academic leaders to talk about the importance of this growing industry and to identify ways to work together to build the cluster.

3-D Printing. The MSP region is home to Stratasys, the world’s

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largest manufacturer of 3-D printers and 3-D production systems. Their products include 3-D printers, rapid-prototyping solutions, and direct digital-manufacturing solutions. Because of the specialized nature of many of the region’s production technology and manufacturing firms, 3-D printing has largely been used for prototyping because it is less wasteful and more efficient for specialized one-off jobs. The Digital Fabrication Lab at the University of Minnesota has strategically positioned Minnesota students around this emerging industry. 3-D printing is also being explored for use in the health sciences. Recently, scientists and researchers have begun investigating 3-D printing to print tissues and organs. As a result of MSP’s strength in both 3-D printing and medical devices, an intersection could occur between these two sectors in the region. 3-D printing is also closely tied with the region’s information technology and production technology clusters.

**Biorenewables.** Research at the University of Minnesota’s Center for Sustainable Polymers has focused on advanced synthetic polymers for use as environmentally friendly, cost-efficient plastics made from natural and renewable materials. The center researches these polymers on the molecular level in order to make materials stronger and more elastic, giving them the properties admired in petroleum materials. Biorenewables have been used in a variety of commercialized products, including pressure-sensitive adhesives for tape or “sticky” notes, foams for seat cushions, bedding or insulation, and hard plastics for items such as cell-phone cases.

Expansion of the advanced-biofuels and bio-based chemicals sector has a high potential for strong employment growth throughout Minnesota, with the industry contributing more than 2,000 indirect and direct jobs in 2011. This growth occurred in three main categories: headquarters; agriculture bio-refineries (manufacturing capacity for advanced biofuels and bio-based chemicals that utilize agriculture-based resources); and forest bio-refineries (industries that utilize forest-based resources). The emerging biorenewables cluster is closely tied with the Greater Minnesota food and agricultural products, forest products, plastics and chemical clusters.

**Robotics.** Minnesota is a global leader in ground and industrial robotics at its basic and applied research institutions, established firms, and young companies. The robotics field in Minnesota stems from the MSP region’s strength in bioscience, agriculture, mining, retail, and industrial manufacturing. In addition to benefiting these traditional industries, robotics is also at the forefront of some of the state’s more
emerging industries, such as security and defense.

Several cluster-strengthening organizations are also encouraging Minnesota’s robotics industry growth. For example, Robotics Alley was founded as a way to create public and private partnerships around robotics. The Global Robotics Innovation Park in Minneapolis is a research park and business incubator for the entire robotics industry in the upper Midwest, and seeks to act as the hub for the entire regional industry cluster. Robotics at the University of Minnesota, particularly development of the Scout, has received national attention.

Discussion

Our research, in particular the discussions with economic development leaders and interviews with businesses, led to several findings about the regional economy.

Many of the large companies headquartered in the MSP region are located here because they were formed within the region, as identified through interviews and discussions. All interviews identified the MSP region’s well-trained workforce as a strength that allowed them to continue to operate in the region, despite shipping costs to major markets on the east and west coasts limiting some manufacturing, especially of larger products. One result of this is the region’s specialization in advanced manufacturing exemplified by a high concentration of analytical instruments and lighting and electrical equipment employment.

Harvard economist Michael Porter proposes a framework for analyzing and explaining what drives industry clusters to be competitive, which he calls the diamond of advantage (see sidebar). This diamond can be used to examine the conditions of an economy that allow for higher levels of innovation and productivity. The company interviews suggest that a highly skilled labor force, a factor condition, is one of the principal reasons for the region’s competitive advantage.

With regards to knowledge flows, it is helpful for policymakers and economic development professionals to know which occupations in particular are most important to the region. The need for highly skilled and specialized labor was intrinsic in most of the companies interviewed. Although the researchers found that some Minneapolis–St. Paul companies often would relocate manufacturing facilities outside the region, they would frequently keep specialized jobs such as engineers and designers within the region as a result of this talented workforce.

Emerging clusters are especially important to the region, as the proper cultivation could lead to a key advantage, while the wrong decisions could prompt the clusters to flounder or move elsewhere. Business climate and over-regulation could place burdens on these emerging industries, while support from institutions such as trade associations or universities could provide additional support for growth.

Conclusions

Ultimately, no region can compete in the constantly shifting global marketplace without an implicit understanding of its strengths and weaknesses. Cluster studies have been used to identify regional competitive advantages. The strength of the Minneapolis–St. Paul regional economy lies in diversification, a talented workforce, and a high concentration of Fortune 500 headquarters.

High-value traded clusters are of particular importance to the region, especially in medical devices, lighting and electrical equipment, and analytical instruments. The region also has an opportunity in the four emerging clusters of interest identified – water technology, 3-D printing, biorenewables, and robotics.

In order for MSP to remain a prosperous region, its clusters must be nurtured by public policies that benefit the region’s long-term interests. Policies that encourage innovation and entrepreneurship are especially important for the region in the long-term, especially as economic trends change. Policies tied to infrastructure, quality of life, education, environment, social equity, and workforce quality are critical to the
In 1990, Harvard Business School Professor Michael Porter proposed a framework for analyzing and explaining what drives industry clusters to be competitive, which he called the diamond of advantage (see figure). The diamond consists of four complementary parts: factor conditions; demand conditions; related and supporting industries; and firm strategy, structure, and rivalry. These parts interact with one another to create conditions where innovation occurs and the region becomes more competitive.

### Factor Conditions

Factor conditions refer to the inputs necessary to preserve a healthy cluster, such as specialized infrastructure, natural resources, or labor pools, or disadvantages that drive innovation. For the MSP regional economy, notable factor conditions include a highly skilled technical workforce and anchor institutions (such as universities and government offices). Historically, the region’s clusters have heavily relied on Minnesota’s natural resources, such as agricultural land, vast forests, mineral deposits, and extensive water resources.

### Demand Conditions

Demand conditions refer to the customer demand, particularly local demand that is needed for companies and industries to grow. It is expected that demand will always exist for industries such as processed food, water technology, and medical devices. In the past, local demand for computer and telecommunications industries (and later medical devices) has contributed to the development of the region’s lighting and electrical equipment, analytical instruments, and metal manufacturing clusters. The MSP region is also home to a large number of professional-services firms that cater to the demands of the region’s corporations.

In addition to professional-services firms, many other related and supporting industries exist throughout the MSP region. Because traded clusters require transportation and distribution as well as other support services, these complementary industries also have high concentrations within the region. In addition, products and services within the information technology cluster are utilized by a large and growing segment of the regional economy. The connected talent of the region creates additional linkages between competitive clusters and their related and supporting industries.

### Firm Strategy, Structure, and Rivalry

Firm strategy, structure, and rivalry refers to intense local rivalry among local industries that supports more sophisticated competition and higher levels of productivity; that is, a local culture, institutions, and policies that influence individual industries’ innovation and competition. Overall, the MSP region’s strength in multiple clusters, in conjunction with its high concentration of corporate headquarters, creates an ecosystem that is ripe for innovation and entrepreneurship. The strength of this ecosystem, where industries work with one another transferring products, services, ideas, and talent, is one explanation for the regional economy’s resiliency during the recent recession. The corporate headquarters within the region compete for and recruit against each other in the war for talented workers, further creating linkages throughout the regional economy.

For more information, see M. Porter, On Competition (Boston: Harvard Business School Press, 2008).

region’s future competitiveness and its ability to attract and retain talent. In this sense, regional stability is important to regional prosperity. State, regional, and local policymakers and economic development leaders benefit from a better understanding of the regional economy as a result of a study such as this and can make targeted investments accordingly.

Minnesota has long been known for its entrepreneurial and innovative nature, beginning with advanced manufacturing from the mining industry, its legacy as a global milling hub, and as a global epicenter for medical devices. For the MSP region to continue to grow and prosper, it must not only continue to support its legacy industries, but, more importantly, renew and enhance the entrepreneurial and innovative spirit that led to their establishment.

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**Nebiyou Tilahun** is an assistant professor at the University of Illinois at Chicago, who specializes in transportation planning and policy as well as his work on knowledge transfers in industry sectors. **Matt Schmit** is a researcher for the State and Local Policy Program and specializes in economic development, transportation, and telecommunications policy.

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