

Cluster Analysis

Part of the Michigan
Prosperity Initiative



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This report presents the result of cluster analysis on 23 clusters thought to have promise in various regions of Michigan. The clusters are organized into five categories to permit easy comparison with related clusters. The five categories are:

- Transportation, Energy and Waste
- Natural Resources
- Culture, Entertainment and Recreation
- Education, Finance and Health
- Advanced Technology and Information.

Of course, there are many other ways these clusters could be organized for presentation and users are free to move sections around to meet your needs. The sectors that make up each cluster are listed in the Appendix.

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The Michigan Prosperity Initiative

The Michigan Prosperity Initiative (MPI) is an innovative effort by Michigan State University, in partnership with the Michigan Department of Energy, Labor and Economic Growth, the Michigan Economic Development Corporation, the Michigan Association of Regions, the Michigan Municipal League, the Michigan Townships Association, the Michigan Association of Planning, and Michigan State University Extension to help return economic prosperity to the state. The MSU Land Policy Institute (LPI) is leading this effort. From mid-April to mid-June, one-hundred training programs were offered across the state by LPI and MSUE educators in over fifty locations. There are three separate training programs. New Economy 101 describes how Michigan's present economic circumstances developed and emphasizes that because Michigan has many assets there is good reason to be hopeful about our economic future. The New Economy 201 program focuses on a simple common vision and basic goals for prosperity; it describes in detail Michigan's critical assets and then identifies place-based strategies to help us create new prosperity on a regional basis. The New Economy 301 program, focuses on detailed economic analyses that can be performed to help inform Regional Strategic Growth Plans and the key strategies necessary to implement those plans. Following this statewide educational effort, MSU will assist each of the fourteen State Planning and Development Regions in creating Regional Strategic Growth Plans, the results of which will be used to create the first-ever place-based State Strategic Growth Plan by the end of 2010.

Michigan Prosperity Initiative Partners

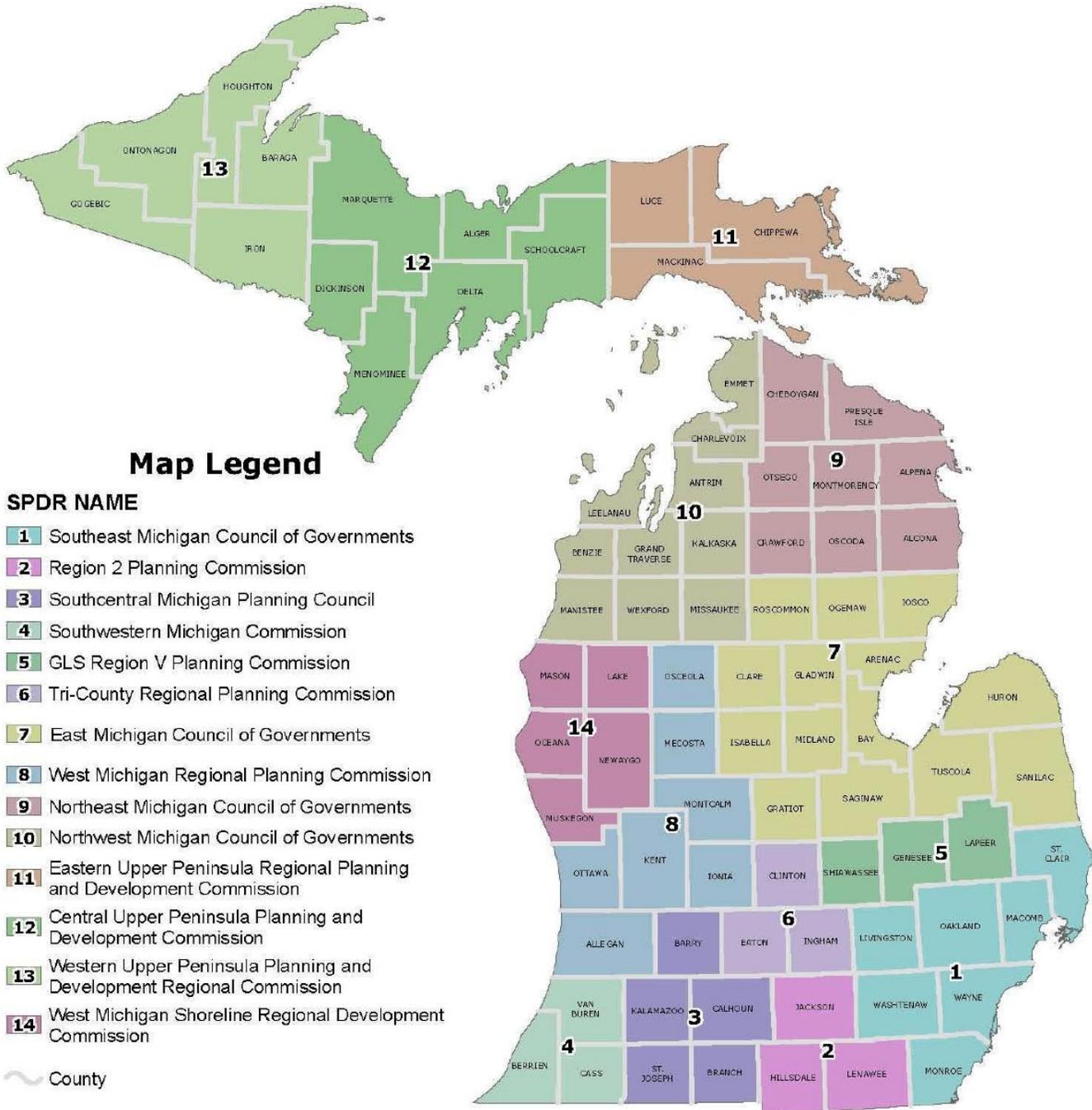


michigan municipal league



Land Policy Institute

State Planning and Development Regions



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Report Overview

This report and the analysis herein was compiled to assist Michigan's 14 State Planning and Development Regions, the Michigan Department of Energy, Labor and Economic Growth, and the Michigan Economic Development Corporation develop new strategies for economic development as part of the Michigan Prosperity Initiative. This work shows where Michigan has strengths in its economy and illustrates the potential for diversification in 23 economic clusters. The clusters selected were culled from economic development literature, successful case studies, and Michigan's traditional strengths; with special consideration given to those that are projected to experience growth in the U.S. and global markets.

There are two primary analysis methods used on this assessment. First, the location quotient and spatial co-location analysis developed by Michael Porter at Harvard University (Porter, 2000). Second a traditional Shift Share Analysis to begin to separate the national, industry and local influences on each of the clusters (for a full explanation of the Shift Share analysis process, please see Loveridge et. al., 1998).

The analysis is presented at three different scales:

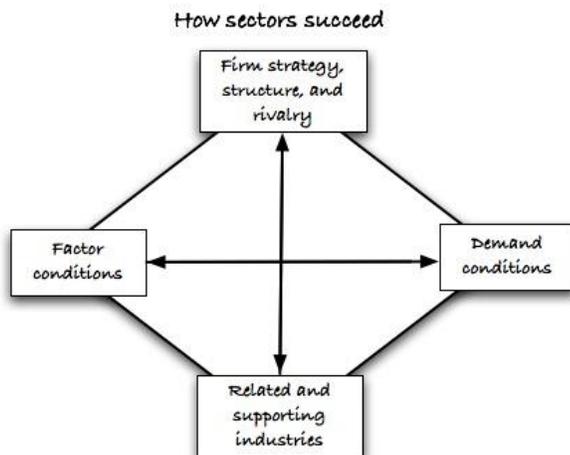
1. National - Michigan relative to the other 49 states.
2. Regional - Each of the 14 State Planning and Development Regions relative to Michigan.
3. County and Local - County analysis, graphing and mapping in the clusters is provided in addition to the number of establishments, their employment and their sales at the community level to illustrate finer grain economic patterns in Michigan's regions.

Cluster Identification

Clusters are “geographic concentrations of interconnected companies and institutions in a particular field.” Clusters encompass an array of linked industries, suppliers, competitors and supporting organizations. Two examples of highly developed clusters are Silicon Valley and its computer/software/semiconductor cluster and Detroit and its automotive cluster.

Economic analysis and development efforts historically focused on sectors rather than clusters. This approach did not tend to focus on the interrelated nature of economic growth and development in a geographical context. Cluster analysis identifies regional specialization and competitiveness in national and global competition. The cluster approach provides an analytical framework for industries and organizations to upgrade and develop more mature economic clusters.

Following the Michael Porter Diamond Model, 23 cluster models were designed and developed by the Land Policy Institute for the Michigan Prosperity Initiative.



Source: Michael Porter

Note: There was no effort to allocate portions of each sector to a cluster because of the lack of information to base an allocation on, and because these results do not vary much from a cluster analysis performed in the Lansing region in 2009 on some of the same clusters where allocation was used.

The 23 clusters analyzed in this analysis are:

- Engineering Technology and Design
- Construction and De-constructioun
- Advanced Transportation
- Arts and Culture
- Advanced Waste Management
- Fisheries and Freshwater Industries
- Film
- Tourism
- Defense and Security
- Finance and Insurance
- Supply Chain and Logistics
- Advanced and Flexible Manufacturing
- Robotics and Automation
- Mining
- Forestry and Wood Products
- Education and Knowledge Creation
- Information Technology
- Aerospace
- Food Innovation
- Energy
- Environmental Technology
- Life Sciences
- Health Care

Location Quotient Analysis

Location quotient analysis is one of the most common economic base analysis techniques. Typically, a regional economy is compared to the national economy in order to determine specializations in the local economy. If, for example, 10% of the regional economy is in one sector, but only 0.1% is nationally, then the local economy has a specialization in that sector 100 times greater than the national average. The analysis is usually done to determine the share of the economy that is local versus export oriented and other times as part of an analysis to identify strengths and weaknesses in the local economy. In the simplest approach, local employment by cluster or sector is divided by total local employment, which is then divided by national employment in that cluster or sector as divided by total national employment. It is essentially the regional ratio of total employment by cluster or sector divided by the national ratio of total employment by cluster or sector.

The formal definition of location quotient is as follows:

$$\text{LQ for cluster X} = \frac{\text{Employment in Cluster X in County Y}}{\text{(Average Employment in Cluster X for all Counties/Regions)}}$$

The location quotient was calculated for each of the clusters analyzed at a national and state level. This analysis indicates an area's relative strength within each of the clusters within Michigan and across the country; results are depicted on maps that show regions with specialization in the given cluster.

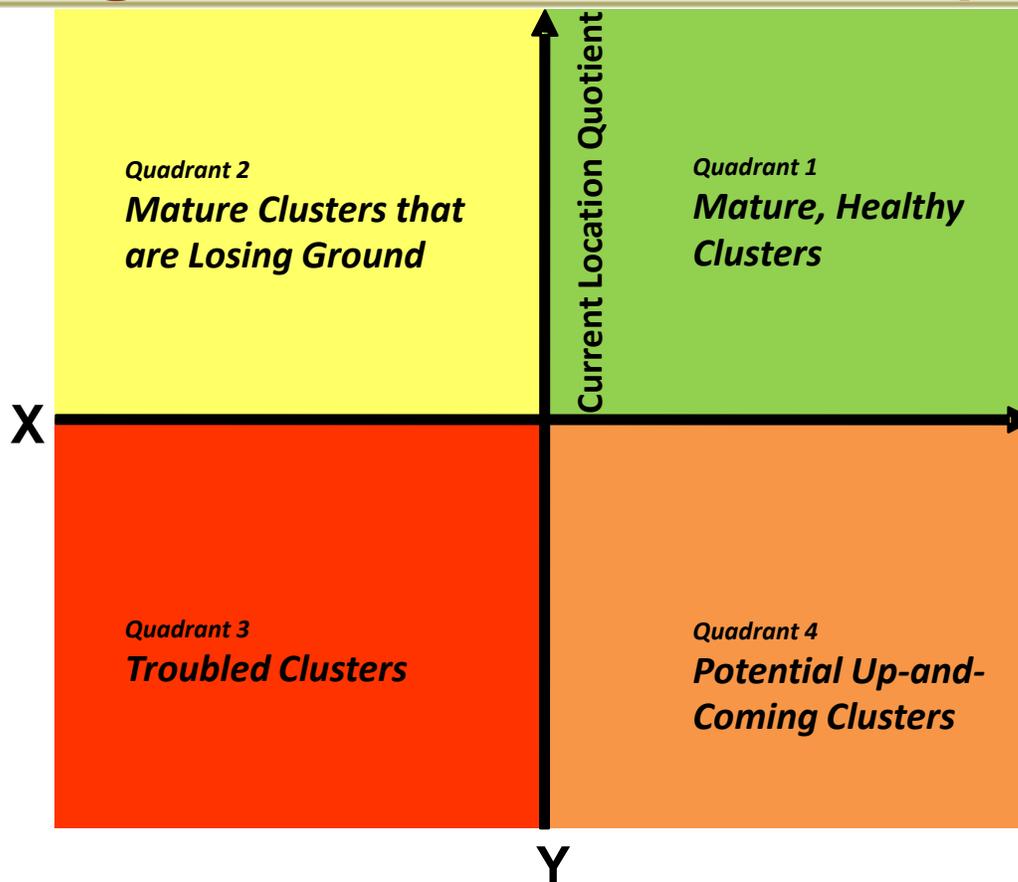
Data depicted on the national maps is from County Business Patterns (U.S. Census Bureau), while data on state maps is from Dunn and Bradstreet data. Thus, the state maps are not smaller versions of the national maps and cannot be directly compared

Reading Cluster Maps

Information depicted on national cluster maps is County Business Patterns data (U.S. Census Bureau), while information on state maps is National Establishment Time Series (NETS) data, which uses information gathered by Dunn and Bradstreet. Thus, the state maps are not smaller versions of the national maps and cannot be directly compared.

Circle size on the maps indicates the strength of a state, region, or community's relative specialization of employment within a cluster. Larger circles with a positive value indicate greater specialization, while smaller circles and those with a negative value indicate smaller specialization.

Reading Location Quotient Graphs



The Y axis shows the latest location quotient, which is the concentration of an industry cluster in an area relative to either the state or the nation (depending on which graph is being read). High values on this axis indicate large concentrations of a particular cluster.

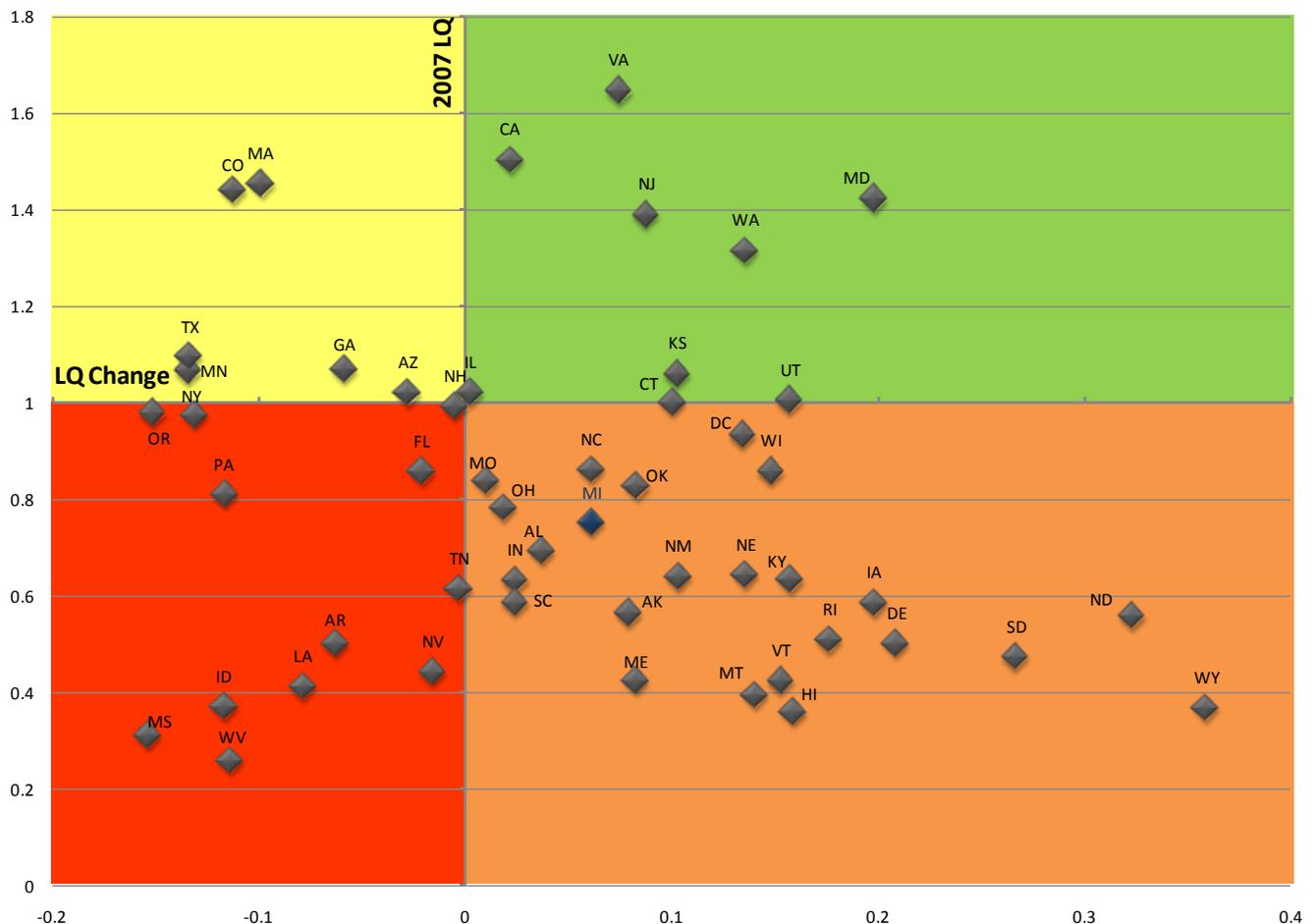
The X axis on the location quotient graphs represents the change in an industry cluster's concentration in an area. Positive change indicates that a cluster is becoming more concentrated in that area relative to either the state or the nation (depending on which graph is being read).

When presented on a two axis graph the clusters fall into one of four quadrants.

- **Quadrant 1-** where the current location quotient is above the national average and the change in location quotient is positive indicates an industry cluster that is relatively mature, and one that is growing.
- **Quadrant 2-** where the current location quotient is above average, but change in location quotient is negative indicates a large industry cluster that is losing ground relatively.
- **Quadrant 3-** where the location quotient is below average and change in location quotient is negative indicates a troubled industry cluster.
- **Quadrant 4-** where the current location quotient is negative, but change in location quotient is positive indicates a cluster that may be an up and coming economic opportunity.

Reading State Location Quotient Graphs

Information Technology State LQ Chart



The state location quotient graphs are a scatterplot of the LQ and change in LQ for each of the 50 states in each cluster. Location quotient is calculated using 2007 (the most recent year available) County Business Patterns data collected by the United States Census Bureau. Change in LQ is the difference between the location quotient of a cluster between 2003 and 2007.

Michigan's data point is blue in each of the graphs. In the sample above, Michigan's IT cluster is shown to be an "up and comer," as it has an LQ below 1, but the change in LQ is positive.

In these graphs, an LQ value of 1 means a state has the same proportion of total state employment involved in a cluster as the United States as a whole.