Michigan Knowledge Economy Index:

A County-Level Assessment of Michigan's Knowledge Economy

Michigan State University Community and Economic Development Program

July 2004
(Corrected edition, March 2007)

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Acknowledgements

The Michigan State University Community and Economic Development Program (MSU-CEDP), host of the University Center program, has over 30 years of experience in addressing the economic problems of communities throughout Michigan. Strong private, state and local partnerships have been developed over these years, having resulted in the collaborative identification of needs, and implementation of strategies. These partnership strategies have enabled the MSU-CEDP EDA University Center to build the capacity of organizations throughout the state. Through research, technical assistance, and education, the MSU-CEDP EDA University Center assists in developing innovative strategies that are effective in overcoming the barriers to higher-skilled higher-wage jobs, developing successful local economic development strategies which result in the creation of new businesses or jobs in their communities.

The MSU-CEDP EDA University Center seeks to improve the capacity of local economic development agencies and public and private organizations to promote favorable economic conditions. This is accomplished through the cultivation and channeling of resources available through a variety of colleges, departments, and programs at the university. The objectives include targeted technical assistance, training, public policy development for economic development, further applied research, outreach, and dissemination of information.

This research project is the result of the talents of many individuals who have contributed to this work. Contributors to data collection, analysis and presentation include several colleagues from Michigan State University including, Thomas Adelaar, Micheal Hicks, Alexander Jung, Dr. Jongyeul Moon, Olatunbosun Williams, Karan Sighn and Seth Shpargel. We would also like to thank Mary Cotton and Kassandra Ray-Smith for their assistance.

Special thanks are due to our research team colleagues Dr. Kenneth E. Corey and Dr. Mark Wilson for their guidance throughout the conception and implementation of this research project.

While several individuals contributed to this concept, the product presented in the following pages is the direct effort of the following key authors: Kyle Wilkes, Faron Supanich-Goldner, John Melcher and Dr. Rex LaMore.

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MICHIGAN KNOWLEDGE ECONOMY INDEX

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* Indicates sections with changes in the 2007 corrected edition (see *Introduction* for details).

Introduction

Introduction

The role of technology is an increasingly important element of a healthy, globally competitive economy. Technology is strongly linked to the creation of higher-skilled higher-paying jobs. In Michigan the average knowledge economy wage (selected occupations of education/training, computers, life and social science occupation, architects, engineers, and management occupations) is approximately $61,000 per year, while the average wage in Michigan for all occupations is just over $ 37,000 per year. Knowledge-based jobs earn approximately $25,000 per year more in wages.

While some communities are poised to help their citizens benefit from the increasing role of technology in their economy, others are ill-prepared to move forward in the knowledge economy, leaving them vulnerable to economic decline. This research report is intended to assist communities in identifying their position in the knowledge economy and facilitate the development of effective state and local knowledge economy economic development strategies. For the purposes of this study the research team defined the knowledge economy as “the application of new methods or new technologies to the production or distribution of goods and services”. The knowledge economy affects existing enterprises while also offering opportunities for new and emerging enterprises to offer new products and services.

The MSU-CEDP EDA University Center seeks to help communities and industry, particularly those most economically vulnerable, to take an active role in preparing for this knowledge economy and overcoming the barriers to creating higher-skilled higher-wage jobs. This emphasis on the knowledge economy complements existing economic development efforts such as small business development and retention, manufacturing retention and expansion, capital asset development, and community economic development that are ongoing in many communities throughout the state.

The methodology used in this analysis parallels similar research conducted on the national level by Robert D. Atkinson, et. al., of the Progressive Policy Institute (PPI) Technology & New Economy Project. In their pioneering work, The State New Economy Index (1999), PPI provided a state by state comparison of knowledge economy indicators. PPI later conducted a similar metropolitan-level analysis, comparing the largest metro regions on similar variables. The full texts of PPI’s New Economy Index reports are available on-line at www.neweconomyindex.org.

This report applies a similar analysis of knowledge economy indicators, for the State of Michigan at the county level. Significant variations were made in applying the methodology to accommodate data availability at the county level. The authors have made every attempt to use the best available and reliable data to represent the knowledge economy. We recognize that alternative variables may exist for some of the indicators suggesting a different profile for a county in the knowledge economy. We encourage readers to reflect on their understanding of their local community and to construct their own indicators of their local economy. Research by the MSU-CEDP EDA University Center has revealed that, despite the importance of regional

preparation, planning for the knowledge economy is limited. A recent study of the key organizations responsible for economic development planning in Michigan found that these organizations were not fully aware of the opportunities in the knowledge economy, nor the preparation required for their communities to thrive in such an environment.[1] Furthermore, planning for the information and communications technology infrastructure, workforce development, regional predictors of private sector technology investments, and other predictors of competitiveness in the knowledge economy, were not found to be incorporated into the traditional economic development planning that occurs at the local and regional level.

It is our hope that the information presented here will assist local, regional and state leaders in community and economic development to be better prepared to anticipate and plan for economic development in a globally competitive knowledge economy.

***Notes on corrected edition*:**

In March 2007 this publication was updated as follows: on page 34, county rankings for Knowledge Jobs category were changed to insert an omitted Macomb County rank (15) and adjust the remainder of column accordingly; on pages 35 and 36, indicator rankings for Bioscience Jobs were changed to indicate that multiple counties were tied with rank of 18. Also on pages 35 and 36 changes were made to reflect rounding errors in several individual indicators (15 discrete adjustments of exactly one rank in either direction); on pages 33 and 34, changes were made to reflect tied rankings and rounding errors for several category ranks (19 discrete changes, most of only one rank in either direction), including a change in one Overall Index rank (Gogebic County, from 53 to tied at 52). Finally, minor corrections were made to two Category maps: on page 8, Bay County was darkened by one shade on the Innovation Capacity Category map; on page 14, Gladwin County was darkened by one shade on the Digital Economy Category map. Affected pages are indicated by including the date of correction (3/07) in footer text.

[1] Corey, K. (2002). *Survey of Planners*. Unpublished report available from Michigan State University Community and Economic Development Program, 1801 W. Main Street, Lansing, MI 48915.

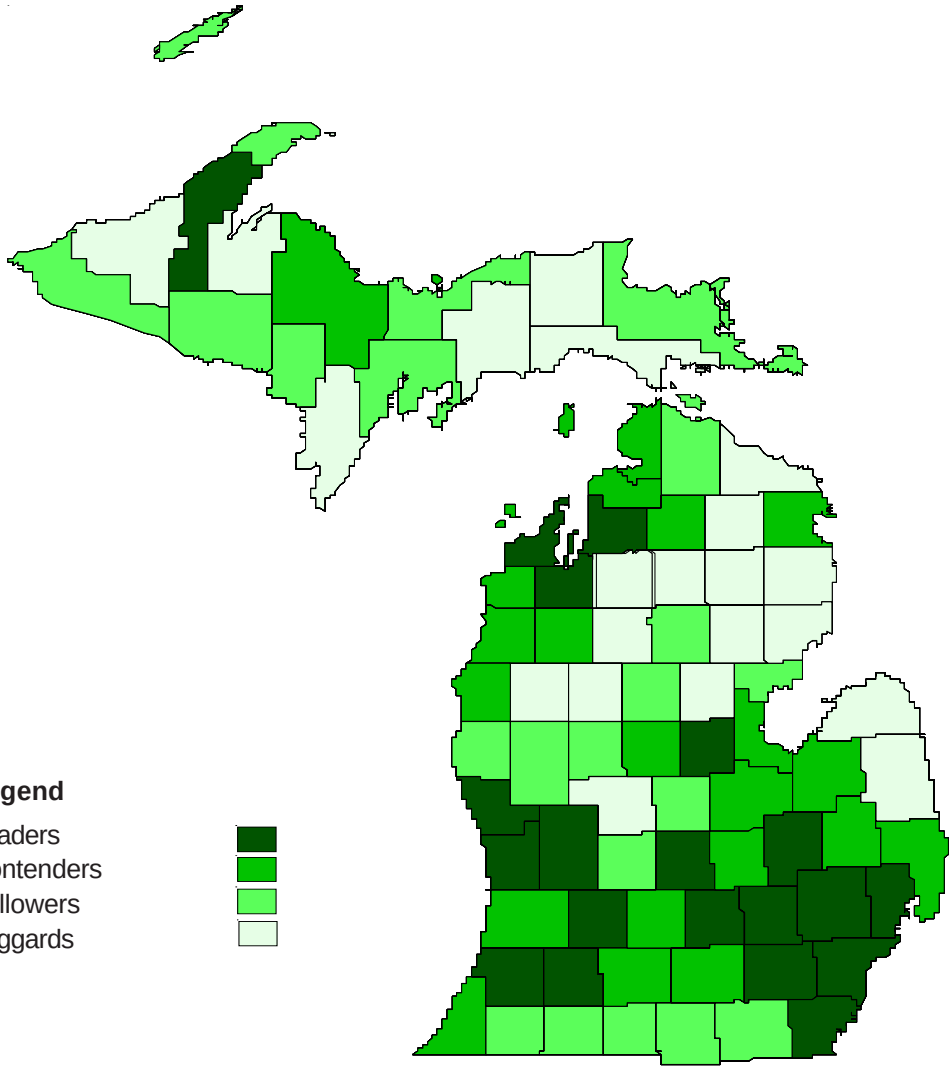
OVERALL KNOWLEDGE ECONOMY INDEX

Description:

The Overall Knowledge Economy Index is calculated as the simple unweighted average of a county's rank for the sixteen individual indicators. Based on this method, Oakland County is indicated as ranking highest overall in the Michigan Knowledge Economy Index, followed by Washtenaw and Ingham Counties.

Top Ten Counties

1. Oakland
2. Washtenaw
3. Ingham
4. Kent
5. Ottawa
6. Wayne
7. Livingston
8. Kalamazoo
9. Barry
10. Clinton



KNOWLEDGE JOBS CATEGORY

Description:

As knowledge and information continue to drive economic growth, providing knowledge jobs is increasingly critical to generating economic growth.

The Knowledge Jobs Category is calculated as the average of a county's rank for three indicators: **Information Technology Jobs**, **Workforce Education**, and **Management and Professional Jobs**. Washtenaw County had the highest average rank, followed by Oakland and Ingham Counties.

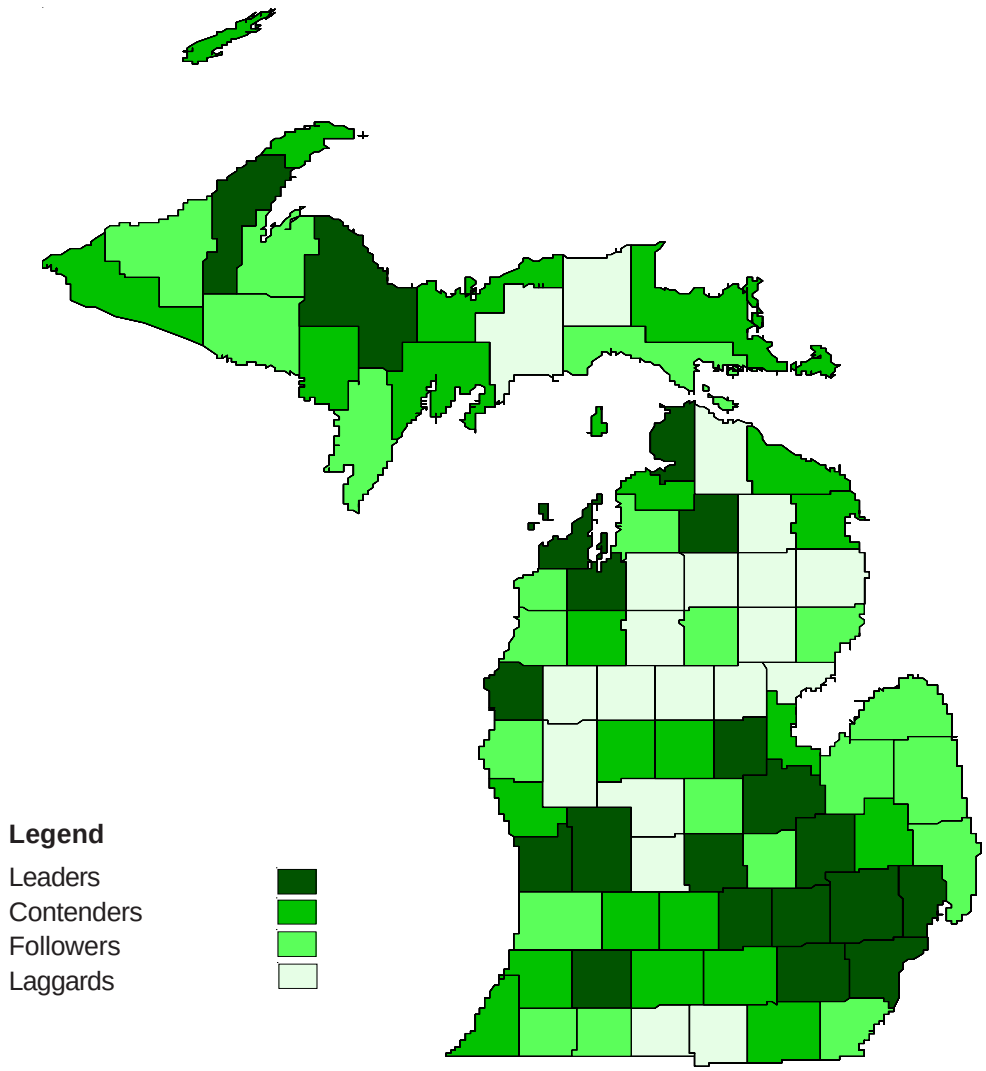
Top Ten Counties

1. Washtenaw
2. Oakland
3. Ingham
4. Kalamazoo
5. Leelenau
6. Grand Traverse

7T. Livingston

7T. Midland

9. Kent
10. Emmet



KNOWLEDGE JOBS
Information Technology Jobs

Description:

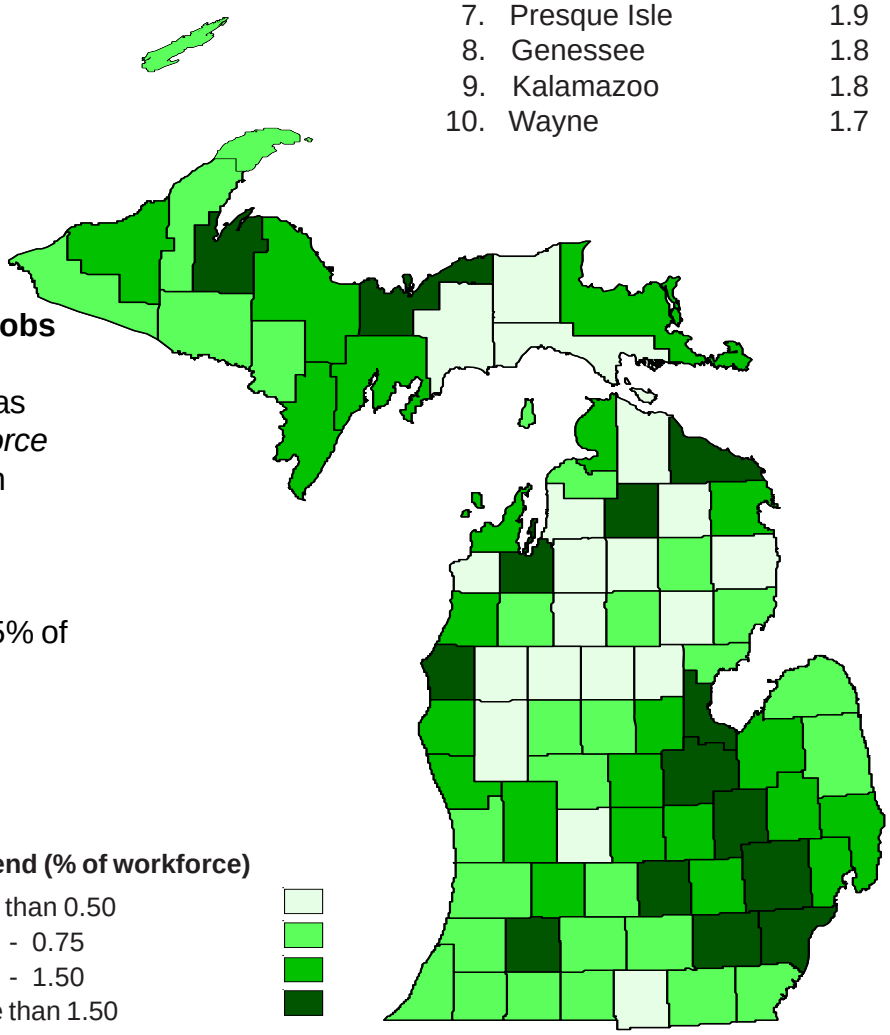
A thriving knowledge economy is characterized by an ample supply of jobs in information and communication technology related industries.

Top Ten Counties (percent of workforce)

1.	Oakland	4.7 %
2.	Washtenaw	3.1
3.	Ingham	2.7
4.	Saginaw	2.2
5.	Otsego	2.2
6.	Baraga	2.0
7.	Presque Isle	1.9
8.	Genessee	1.8
9.	Kalamazoo	1.8
10.	Wayne	1.7

Information Technology Jobs are represented in the Knowledge Economy Index as *the percentage of the workforce employed* in four information technology related industry categories.

Statewide in 2000, about 0.5% of Michigan's workers were employed in such industries.



Source: 2000 County Business Patterns (NAICS), U. S. Census Bureau.

Online at http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl

Information on employment for high technology industries was derived from U. S. Census data. Four NAICS industry codes were identified to represent industries providing IT jobs (5132 Cable Networks and Program Distribution; 5133 Telecommunications; 514 Information Services and Data Processing Services; and 5415 Computer Systems Design and Related Services). The number of jobs for each code and the total number of jobs was determined for each county. For each county, the combined number of jobs in the IT categories was divided by the total number of jobs to determine the percentage of the workforce employed in IT jobs.

KNOWLEDGE JOBS
Workforce Education

Top Ten Counties (percent of workforce)

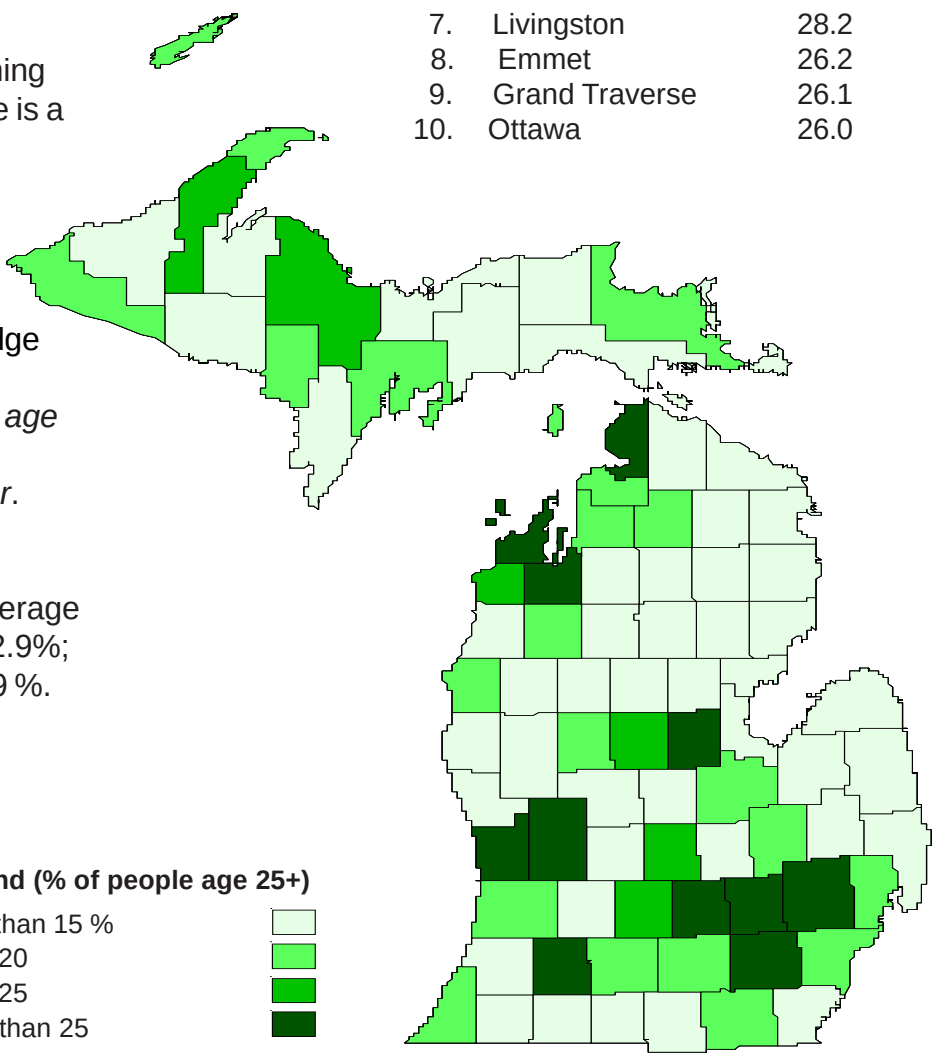
1.	Washtenaw	48.1 %
2.	Oakland	38.2
3.	Ingham	33.0
4.	Leelanau	31.4
5.	Kalamazoo	31.2
6.	Midland	29.3
7.	Livingston	28.2
8.	Emmet	26.2
9.	Grand Traverse	26.1
10.	Ottawa	26.0

Description:

To compete in the knowledge economy, a community must offer an innovative, well-trained workforce. One common measure of the level of training among a modern workforce is a college education.

Workforce Education is represented in the Knowledge Economy Index as *the percentage of people over age 25 who have completed a bachelor's degree or higher*.

The statewide average for Michigan is 21.8%. The average for the Midwest region is 22.9%; the national average is 23.9 %.



Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P19, P36, P37, P38, PCT24, and PCT25

Online at http://factfinder.census.gov/servlet/BasicFactsTable?_lang=en&_vt_name=DEC_2000_SF3_U_GCTP11_ST2&_geo_id=04000US26

Data for county and statewide averages were derived from the Census Bureau's American Factfinder, which provides summary tables at the county level for selected 2000 Census responses, including educational attainment. Table GCT-P11 includes the percentage of each county's population age 25 and above having completed at least a bachelor's degree. National and regional averages were obtained using American Factfinder (online at http://factfinder.census. gov).

KNOWLEDGE JOBS
Management and Professional Jobs

Top Ten Counties (percent of workforce)

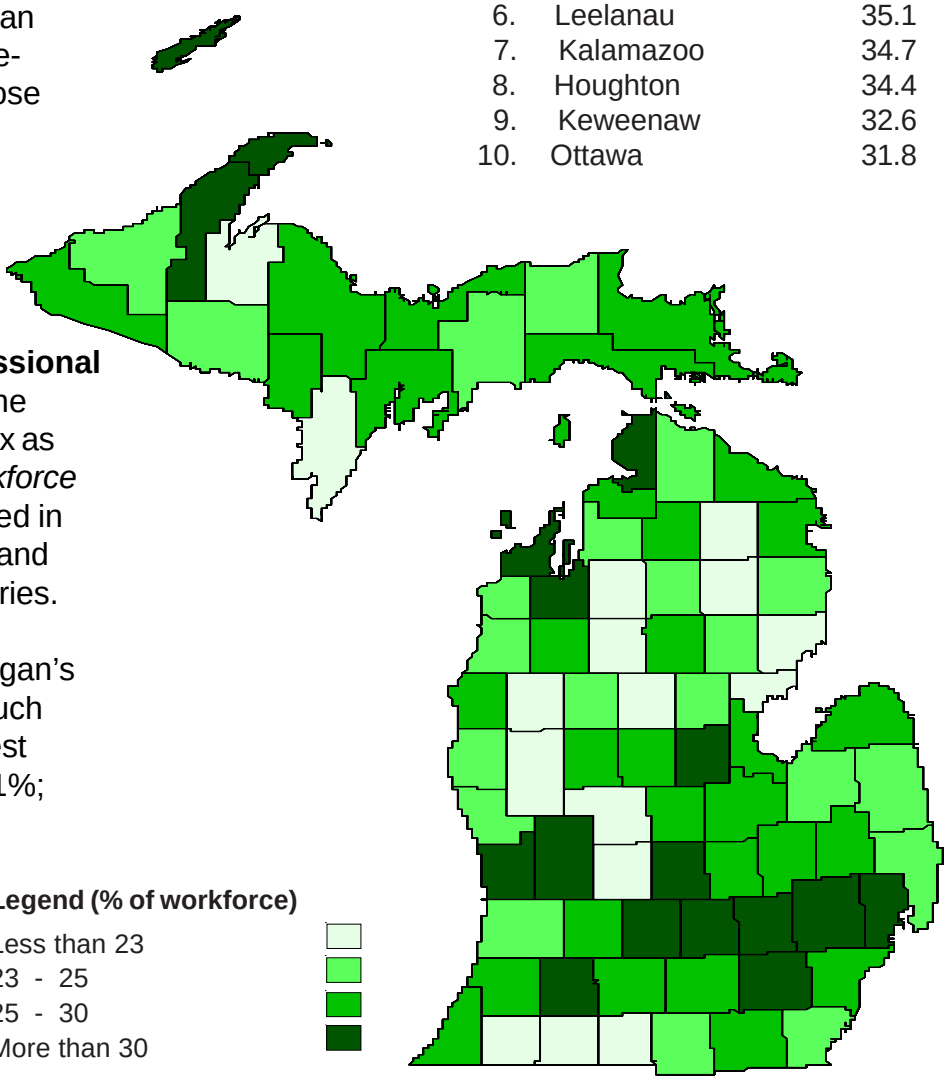
1.	Washtenaw	48.3 %
2.	Oakland	44.6
3.	Midland	37.4
4.	Ingham	36.9
5.	Livingston	36.8
6.	Leelanau	35.1
7.	Kalamazoo	34.7
8.	Houghton	34.4
9.	Keweenaw	32.6
10.	Ottawa	31.8

Description:

As economic growth continues to shift toward information and service related industries, an important set of knowledge-based occupations are those classified as managerial, professional and related knowledge occupations.

Management and Professional Jobs are represented in the Knowledge Economy Index as *the percentage of the workforce aged 16 and over* employed in managerial, professional, and related occupation categories.

Statewide, 31.5% of Michigan's workforce is engaged in such occupations. In the Midwest region, the average is 32.1%; nationwide, the average is 33.6%.



Source: U.S. Census Bureau, Census 2000 Summary File 3, Matrices P49, P50, and P51.

Online at http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_SF3_U_GCTP13_ST2_geo_id=_04000US26.html

Data for county and statewide averages were derived from the Census Bureau's American Factfinder, which provides summary tables at the county level for selected 2000 Census responses, including distribution of employment by occupation. Table GCT-P13 includes the percentage of each county's civilian workforce age 16and above employed in each of six occupation categories (Management, professional, and related; Service; Sales and office; Farming, fishing and forestry; Construction, extraction, and mainenance; and Production, transportation, and material moving). National and regional averages were also obtained using American Factfinder (online at http://factfinder.census.gov).

INNOVATION CAPACITY CATEGORY

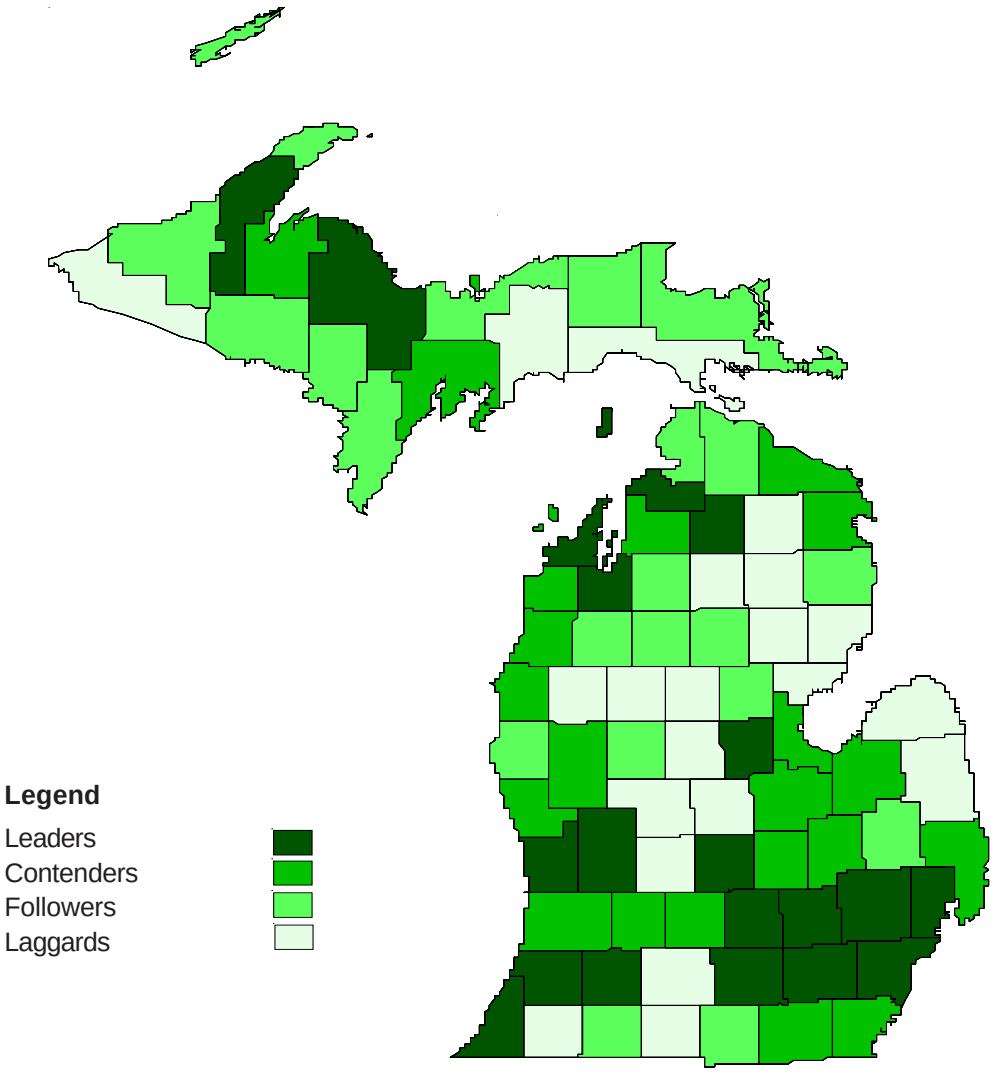
Description:

In a knowledge economy, the ability of communities to transform new ideas into economic opportunities for new firms and skilled workers is critical to continued vitality.

The Innovation Capacity Category is calculated as the simple average of a county's rank for five indicators: **High Technology Jobs**, **Venture Capital Firms**, **Patents**, **Engineers**, and **Bioscience Jobs**. Washtenaw County had the highest rank, followed by Oakland and Ingham Counties.

Top Ten Counties

1.	Washtenaw
2.	Oakland
3.	Ingham
4.	Midland
5.	Houghton
6.	Ottawa
7T.	Berrien
7T.	Wayne
9.	Kent
10.	Kalamazoo



INNOVATION CAPACITY
High Technology Jobs

Top Ten Counties (percent of workforce)

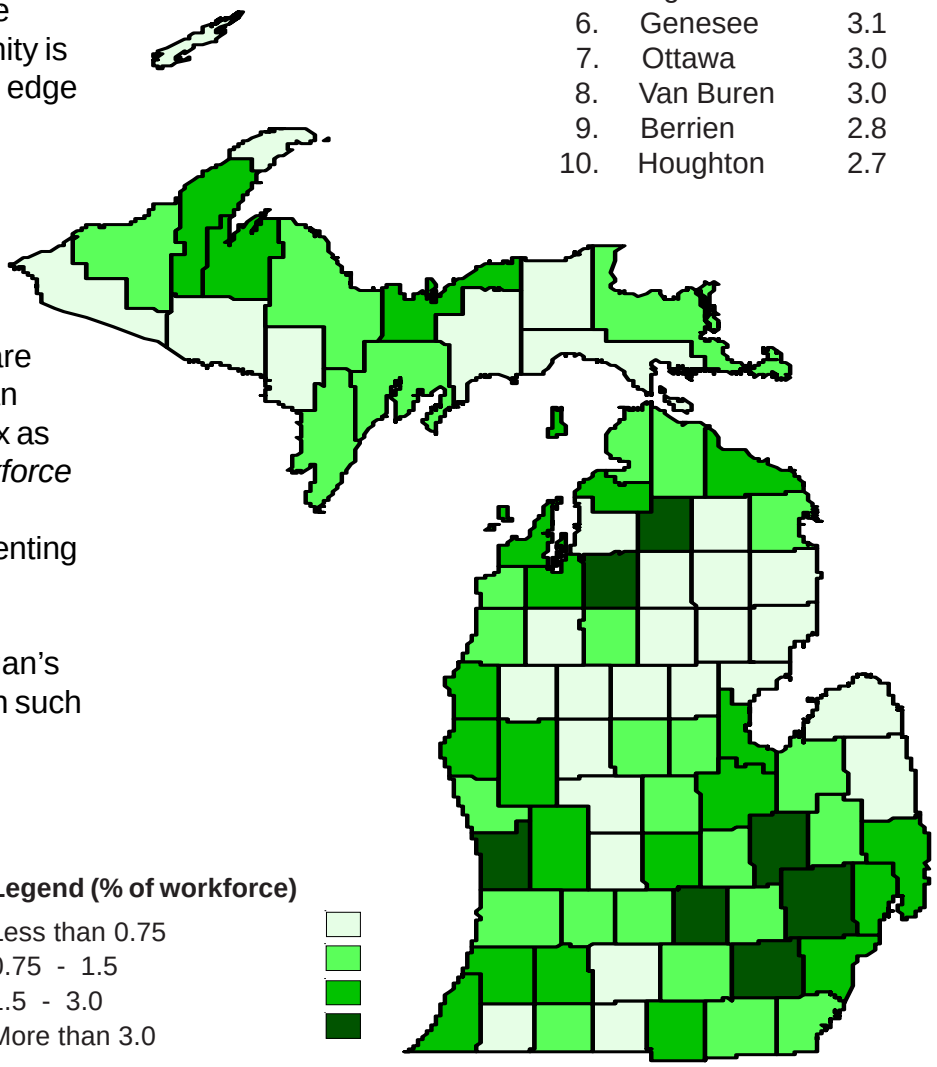
1.	Otsego	6.7
2.	Oakland	6.2
3.	Washtenaw	5.9
4.	Kalkaska	5.8
5.	Ingham	3.3
6.	Genesee	3.1
7.	Ottawa	3.0
8.	Van Buren	3.0
9.	Berrien	2.8
10.	Houghton	2.7

Description:

The prevalance of jobs in industries that rely on advanced technologies can reflect the degree to which a community is participating in the leading edge of economic activity.

High Technology Jobs are represented in the Michigan Knowledge Economy Index as *the percentage of the workforce employed* in one of seven industry categories representing high technology firms.

Statewide, 2.8 % of Michigan's workforce was employed in such enterprises in 2000.



Source: 2000 County Business Patterns (NAICS), U. S. Census Bureau.

Online at http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl

Information on employment for high technology industries was derived from U. S. Census data. Seven NAICS industry codes were identified to represent industries providing high technology related jobs (334 Computer and Electronic Product Manufacturing; 5112 Software Publishers; 5132 Cable Networks and Program Distribution; 5133 Telecommunications; 514 Information Services and Data Processing Services; 5415 Computer Systems Design and Related Services; and 5417 Scientific Research and Development). The number of jobs for each code and the total number of jobs was determined for each county. For each county, the combined number of jobs in the high technology categories was divided by the total number of jobs to determine the percentage of the workforce employed in such jobs.

Venture Capital

Top Counties (number of firms)

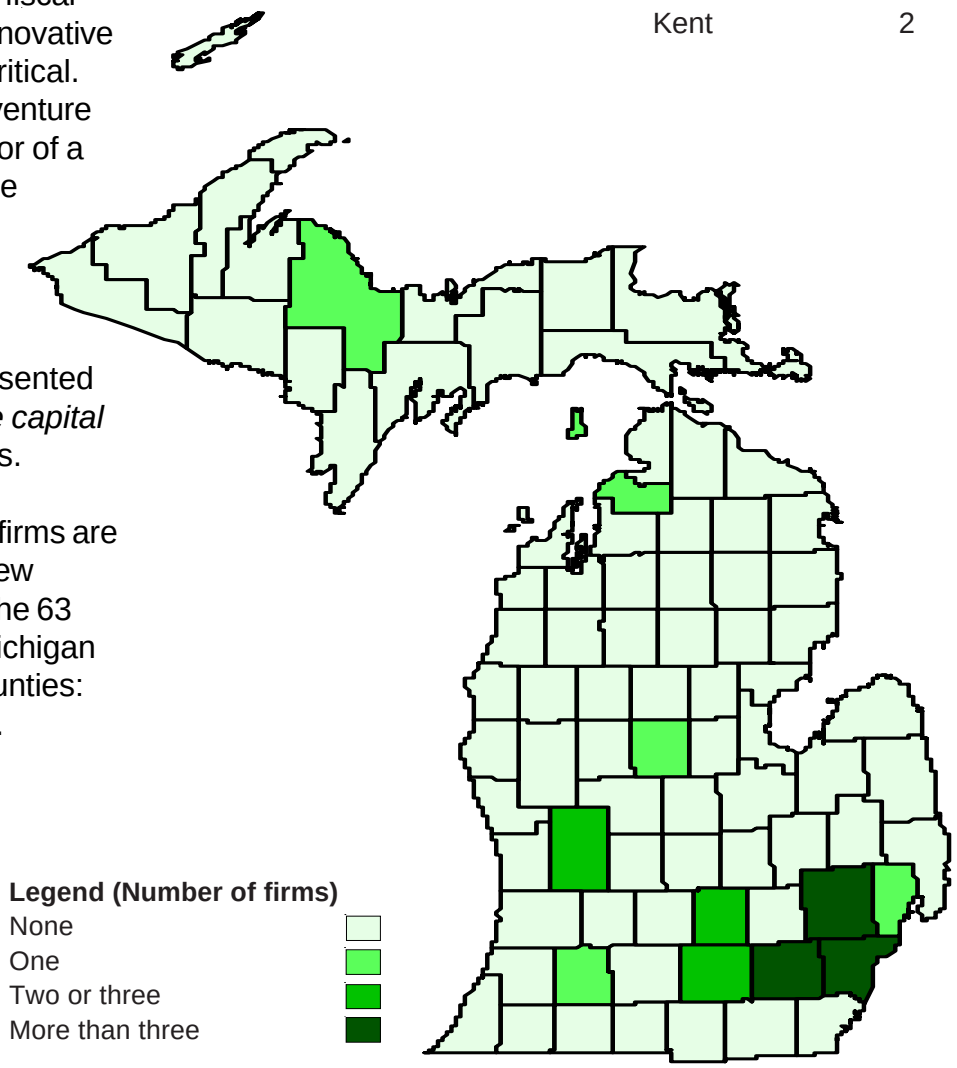
1.	Washtenaw	23
2.	Oakland	20
3.	Wayne	9
4.	Ingham	3
5T.	Jackson	2
	Kent	2

Description:

In an economy that relies on innovation for growth, the fiscal capacity for supporting innovative business enterprises is critical. Geographic proximity to venture capital firms is an indicator of a community's access to the necessary capital for innovation to take place.

Venture Capital is represented by the *number of venture capital firms* in Michigan counties.

Michigan venture capital firms are highly concentrated in a few counties. Forty-three of the 63 venture capital firms in Michigan are located in just two counties: Oakland and Washtenaw.



Source: Michigan Economic Development Corporation (MEDC), 2003.

Online at http://www.medc.michigan.org.

The MEDC maintains a database of venture capital firms located in Michigan. The number of firms included in the database as of March 2003 were identified, and their home office locations included in this indicator.

Patents

Top Ten Counties (per 100,000 residents)

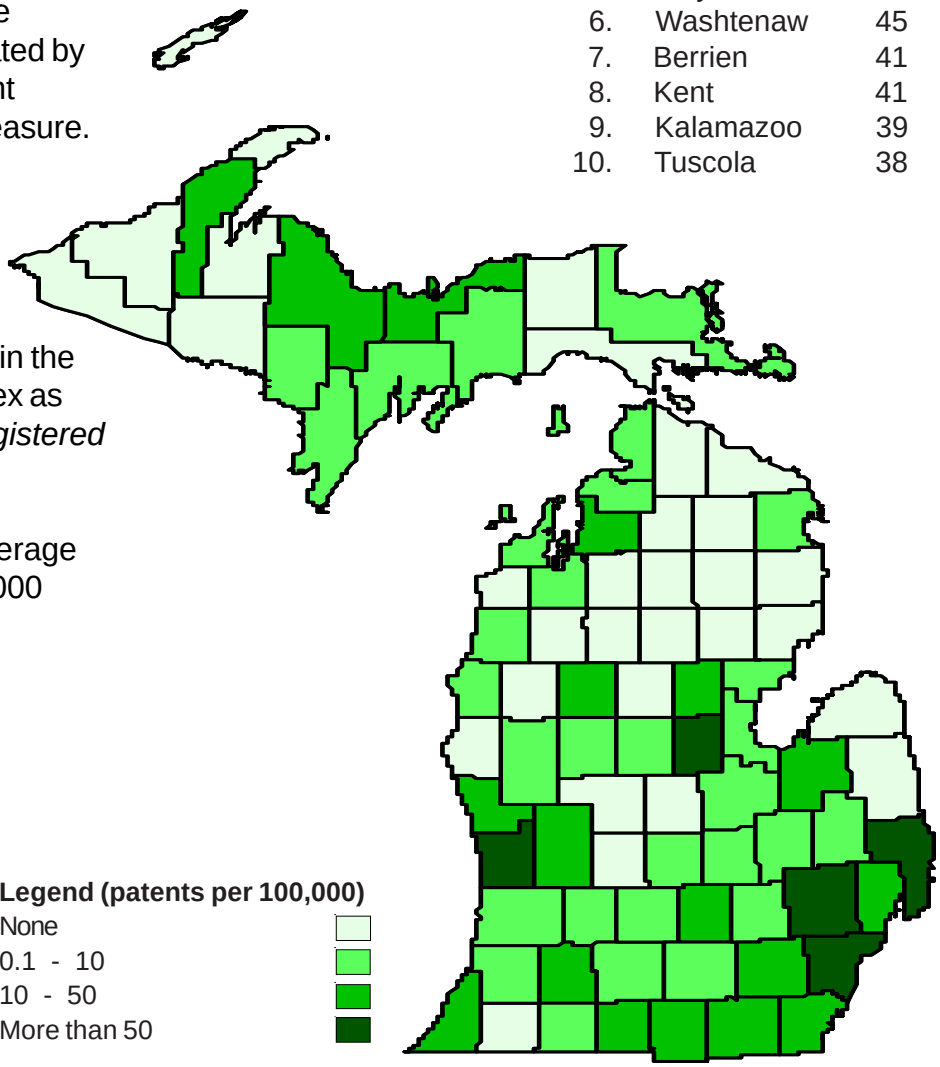
1.	Midland	258
2.	Oakland	139
3.	St. Clair	103
4.	Ottawa	81
5.	Wayne	54
6.	Washtenaw	45
7.	Berrien	41
8.	Kent	41
9.	Kalamazoo	39
10.	Tuscola	38

Description:

In an economy in which innovation and intellectual capital are crucial for continuing success, the number of patents generated by research and development activity is an important measure.

Patents are represented in the Knowledge Economy Index as *the number of patents registered per 100,000 population*.

Statewide in 2002, the average was 4.1 patents per 100,000 population.



Source: United States Patent Bureau, 2002.

Online at http://patft.uspto.gov/netahtml/search-adv.htm

Using the online U.S. Patent and Trade Office (USPTO) database, all new patents registered in calendar year 2002 were identified by the geographic location of the patent assignee. For those patents with assignees located in Michigan,each patent was associated with the county in which the assignee address is located.

Engineers in the Workforce

Top Ten Counties (per 10,000 workers)

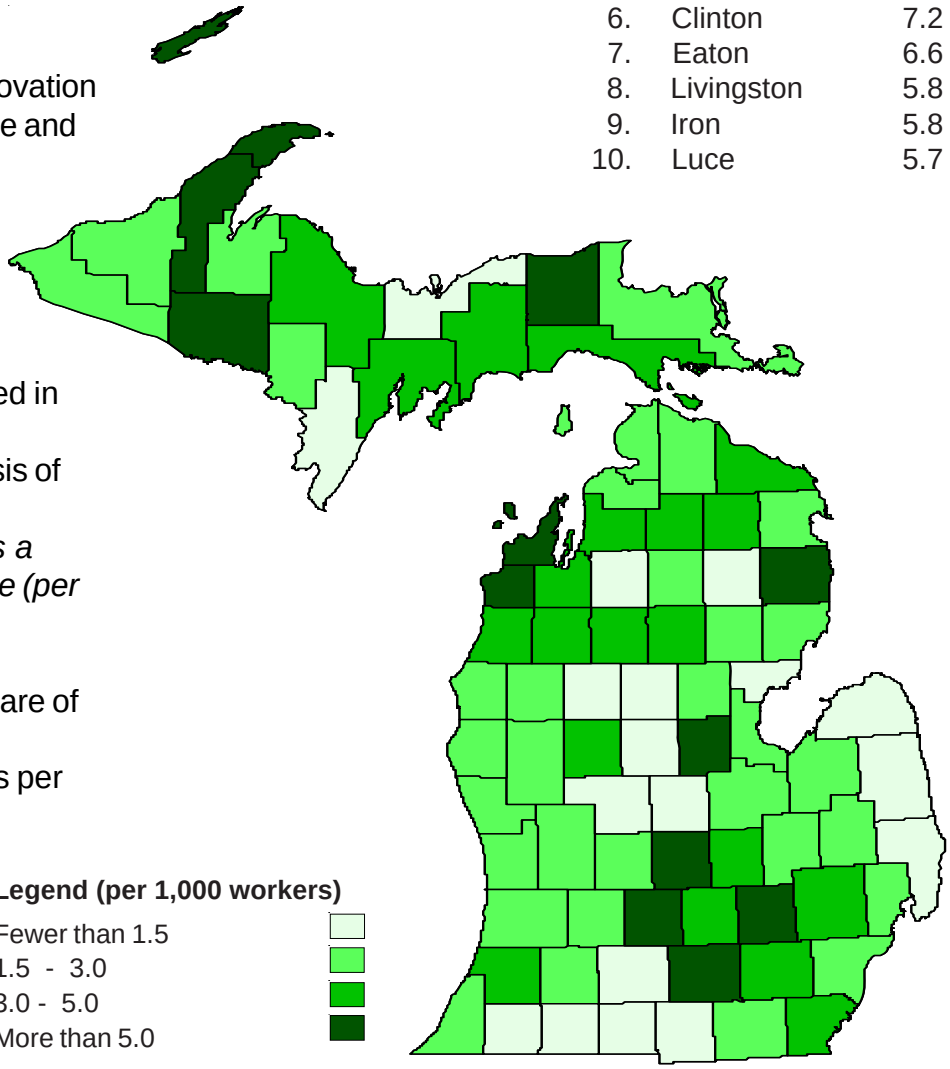
1.	Keweenaw	15.8
2.	Alcona	9.0
3.	Houghton	8.9
4.	Benzie	8.7
5.	Midland	7.3
6.	Clinton	7.2
7.	Eaton	6.6
8.	Livingston	5.8
9.	Iron	5.8
10.	Luce	5.7

Description:

Professional engineers comprise a high-wage, high-skill occupation category, and therefore can serve as an indicator of the level of innovation of a community's workforce and industry base.

Engineers are represented in the Michigan Knowledge Economy Index on the basis of *the number of licensed professional engineers as a share of the total workforce (per 10,000 workers).*

Statewide, the average share of the workforce made up by engineers is 2.7 engineers per 10,000 workers.



Source: Michigan Department of Consumer and Industry Services (CIS), 2002.

Professional engineers are licensed by the State of Michigan. The Licensing Division of the Michigan Department of Labor and Economic Growth (formerly Consumer and Industry Services) maintains a database of registered engineers, including residential address. Using a hard copy printout of the database, addresses of licensed engineers were aggregated to the county level, and are reported as a share of the total county workforce (private, nonfarm workers over 16) as reported by the United States Census Bureau, 2000.

Bioscience Jobs

Description:

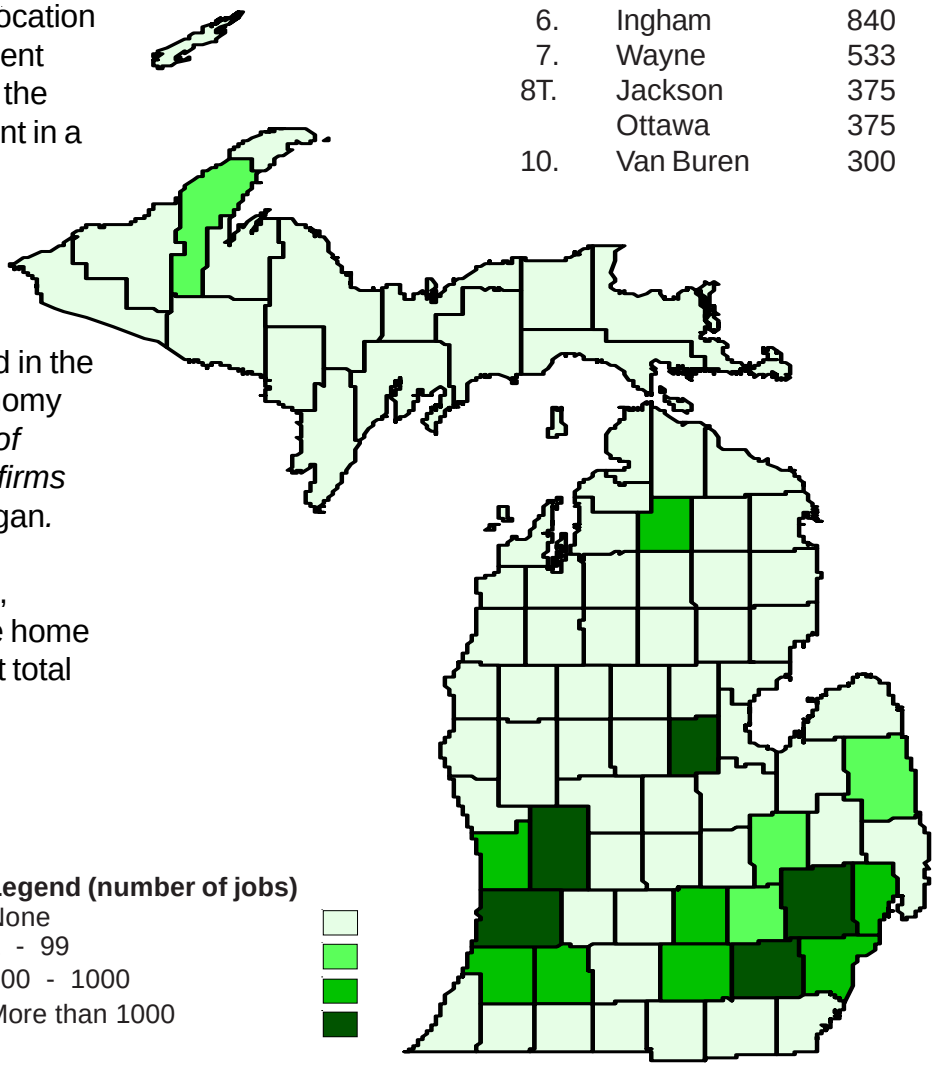
Bioscience firms comprise a business sector that relies on scientific innovation. The location of such firms and employment opportunities can indicate the degree of innovation evident in a community's economy.

Bioscience is represented in the Michigan Knowledge Economy Index as *the total number of employees in bioscience firms* with headquarters in Michigan.

Among Michigan Counties, Midland and Oakland were home to the firms with the highest total numbers of bioscience employees.

Top Ten Counties (number of jobs)

1.	Midland	50,200
2.	Oakland	12,503
3.	Kent	9,905
4.	Allegan	5,513
5.	Washtenaw	2,036
6.	Ingham	840
7.	Wayne	533
8T.	Jackson	375
	Ottawa	375
10.	Van Buren	300



Source: Dun and Bradstreet's Million Dollar Database, 2002.

Online at http://www.dnb.com

The Dun and Bradstreet Million Dollar Database was searched for companies in five industry codes as defined in the 1997 Economic Census - Medicinals/Botanicals (325411), Pharmaceuticals (325412), Diagnostic Substances (325413), Biolocial Products except Diagnostic (325414), Research and Development in the Life Sciences (55417102) - that may be considered bioscience industries. For companies with headquarters locatedin Michigan, the total number of employees (worldwide) were included in the county totals for this indicator.

DIGITAL ECONOMY CATEGORY

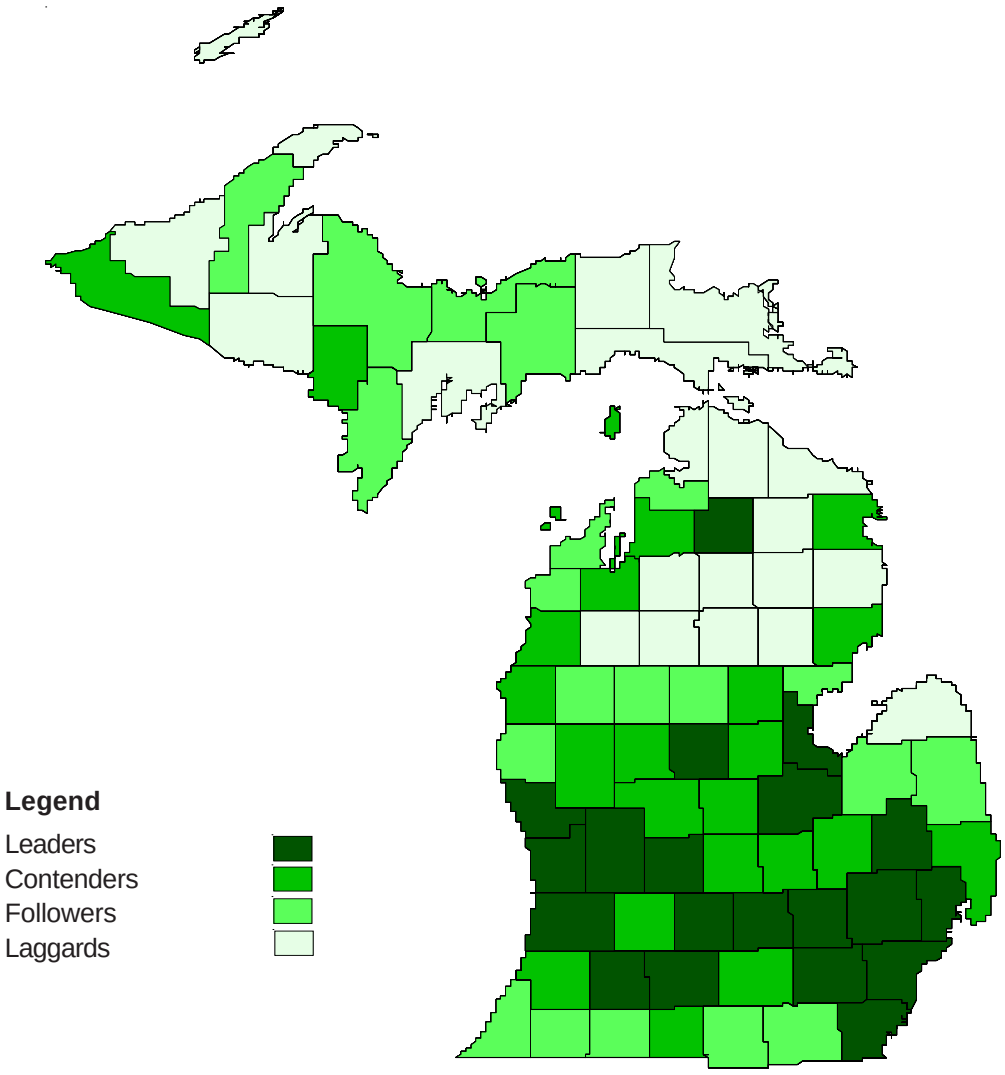
Description:

New technologies facilitate the increasingly rapid communication of ideas and exchange of information. Economic development relies on effective uses of such technology by citizens, governments, and businesses.

The Digital Economy Category is calculated as the average of a county's rank for three indicators: **Internet Use**, **Digital Government**, and **Cable Modem Access**. Ingham County had the highest rank, followed by Kalamazoo and Bay Counties.

Top Ten Counties

1.	Ottawa
2.	Kent
3T.	Allegan
3T.	Muskegon
5.	Bay
6.	Ionia
7.	Wayne
8.	Saginaw
9.	Ingham
10.	Kalamazoo



Internet Use

Top Counties*
(percent online at least 3x per week)

Allegan	Manistee	Newaygo
Barry	Mason	Oceana
Ionia	Mecosta	Osceola
Kent	Montcalm	Ottawa
Lake	Muskegon	

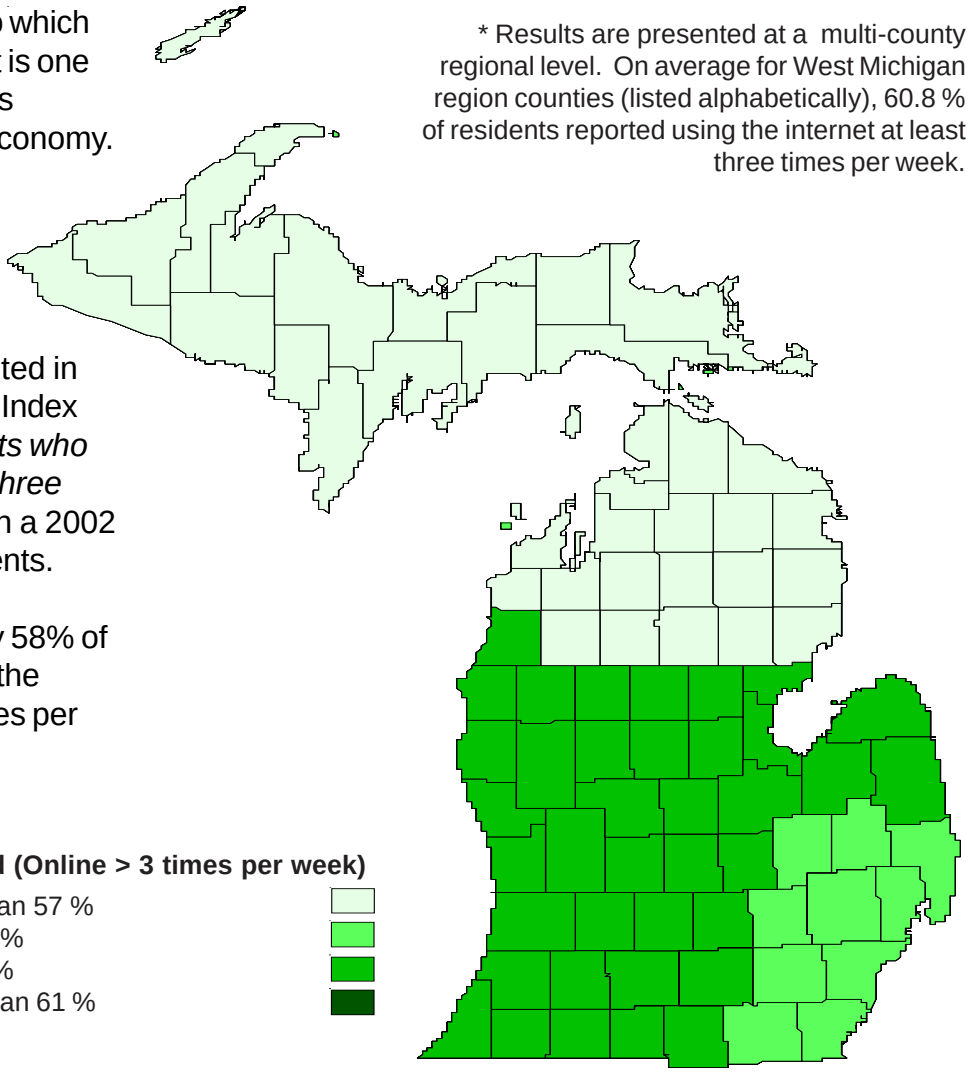
* Results are presented at a multi-county regional level. On average for West Michigan region counties (listed alphabetically), 60.8 % of residents reported using the internet at least three times per week.

Description:

In an economy in which the Internet is increasingly used for both social and commercial transactions, the extent to which residents use the Internet is one indicator of a community's integration in the digital economy.

Internet Use is represented in the Knowledge Economy Index as *the percent of residents who use the Internet at least three times per week*, based on a 2002 survey of Michigan residents.

Statewide, approximately 58% of residents reported using the Internet at least three times per week.



Source: Institute for Public Policy and Social Research. 2002. State of the State Survey-28 (Fall-2). Michigan State University. East Lansing.

Online at http://www.ippsr.msu.edu/SOSS

The 28th round of the State of the State Survey (SOSS) was conducted by MSU's Institute for Public Policy and Social Research (IPPSR) from October 19 through December 31, 2002. The quarterly survey is administered by telephone by IPPSR's Office for Survey Research. This round of the survey reached 989 Michigan adults. Results were aggregated to MSU Extension regions, which include six multi-county regions (responses from the City of Detroit are incorporated into Southeast Michigan results).

Regarding Internet use, respondents were asked, "How often, if at all, do you access the Internet, either for the purposes of sending e-mail or visiting or browsing the "world wide web?"

Digital Government

Description:

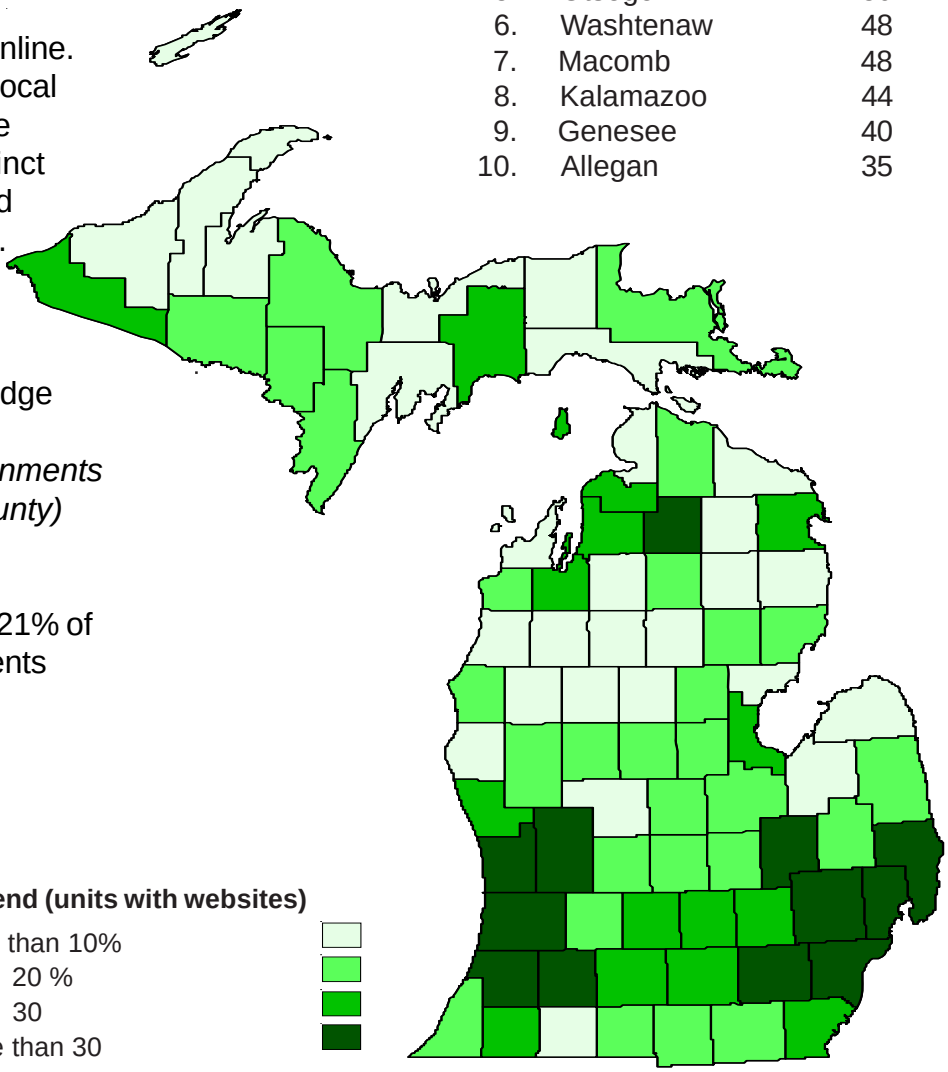
Residents and businesses increasingly expect local governments to provide information and services online. In a knowledge economy, local governments with an online presence may be at a distinct advantage in attracting and retaining people and firms.

Digital Government is represented in the Knowledge Economy Index as the *percentage of local governments (city, village, township, county) that have a website*.

Statewide, approximately 21% of Michigan's local governments had websites as of 2000.

Top Ten Counties (percent with websites)

1.	Oakland	72 %
2.	Ottawa	60
3.	Wayne	57
4.	Kent	54
5.	Otsego	50
6.	Washtenaw	48
7.	Macomb	48
8.	Kalamazoo	44
9.	Genesee	40
10.	Allegan	35



Source: Cyber-state.org, Local Government & Community Initiative.

Online at http://www.cyber-state.org/1_0/govt2001/mi_localgov.html

As part of its Local Government and Community Initiative, Cyber-state of Ann Arbor conducts an annual study of Michigan local government websites. Cyber-state provides a list of all local units of government (county, township, city, and village) that have websites. This information was used in conjunction with a list of all local units of government generated from the U.S. Census to calculate the percentage of total units in each county with a website.

Cable Modem Access

**Top Counties*
(extent of coverage)**

1. Leelanau
2. Grand Traverse

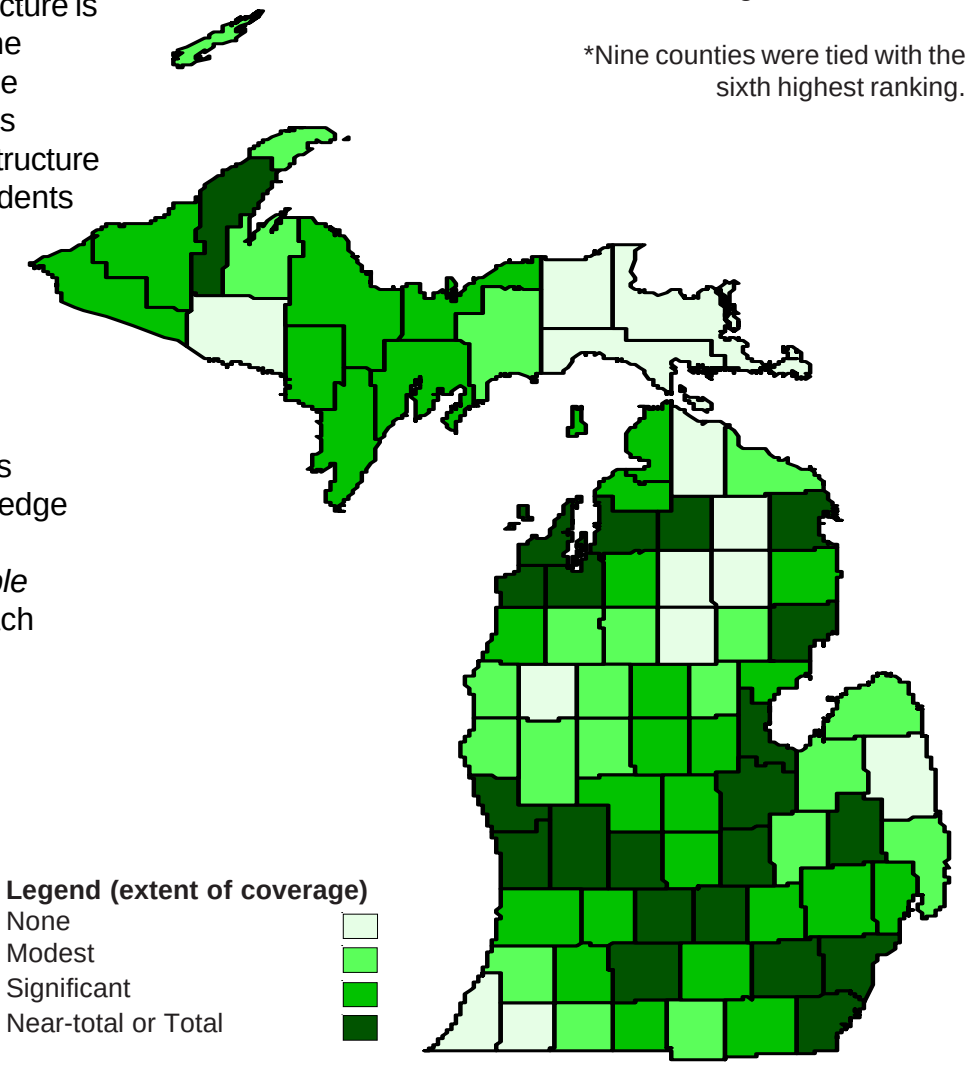
3T. Alpena
Lapeer
Otsego

*Nine counties were tied with the sixth highest ranking.

Description:

In a digital age, access to a high-speed information and communications infrastructure is essential for advancing the knowledge economy. One measure of a community's telecommunication infrastructure is the extent to which residents and business firms have access to broadband technologies including DSL and cable.

Cable Modem Access is represented in the Knowledge Economy Index as the *geographic extent of cable modem access* within each county (projected through January, 2002).



Source: Michigan Economic Development Corporation, 2000.

Online at http://www.michigan.org.

In January 2000 MEDC released a map of cable modem infrasturcture coverage, including existing coverage as of January 2000 and projected coverage to January 2002. Using the map's projected 2002 area coverage, independent raters estimated the extent of geographic coverage in each county and classified coverage into twelve categories (total coverage, no coverage, and ten intermediate stages). After comparing the independent ratings, the raters discussed differences until reaching consensus on the rankings, which were then consolidated into the four categories presented.

GLOBALIZATION CATEGORY

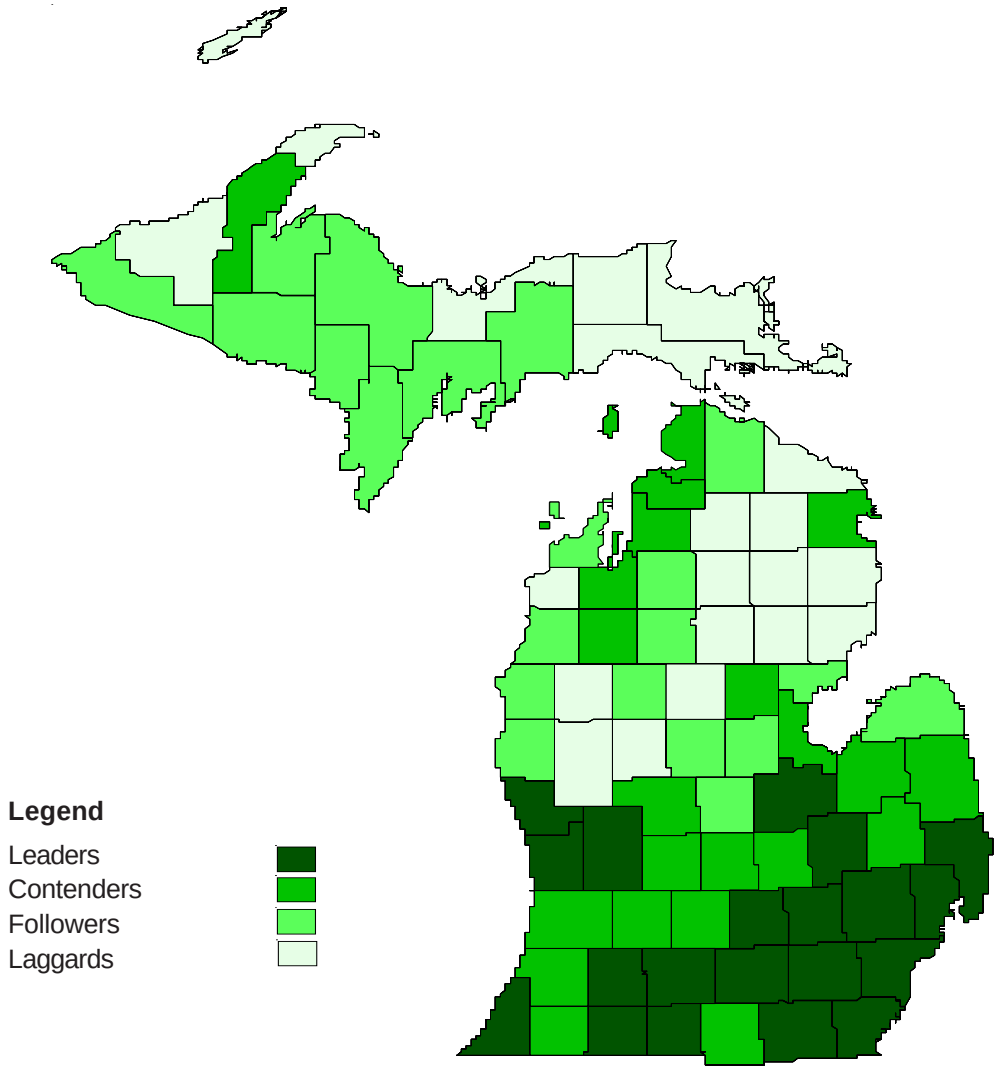
Description:

To be competitive in the new economy, cities and regions must operate in the global economy.

The Globalization Category is calculated as the average of a county's rank for two indicators: **Firms with Foreign Parents** and **Exporting Firms**. Oakland County had the highest average rank, followed by Wayne and Kent Counties.

Top Ten Counties

1. Oakland
2. Wayne
3. Kent
4. Macomb
5. Washtenaw
6. Ingham
7. Ottawa
8. Kalamazoo
9. Muskegon
10. Jackson



GLOBALIZATION

GLOBALIZATION

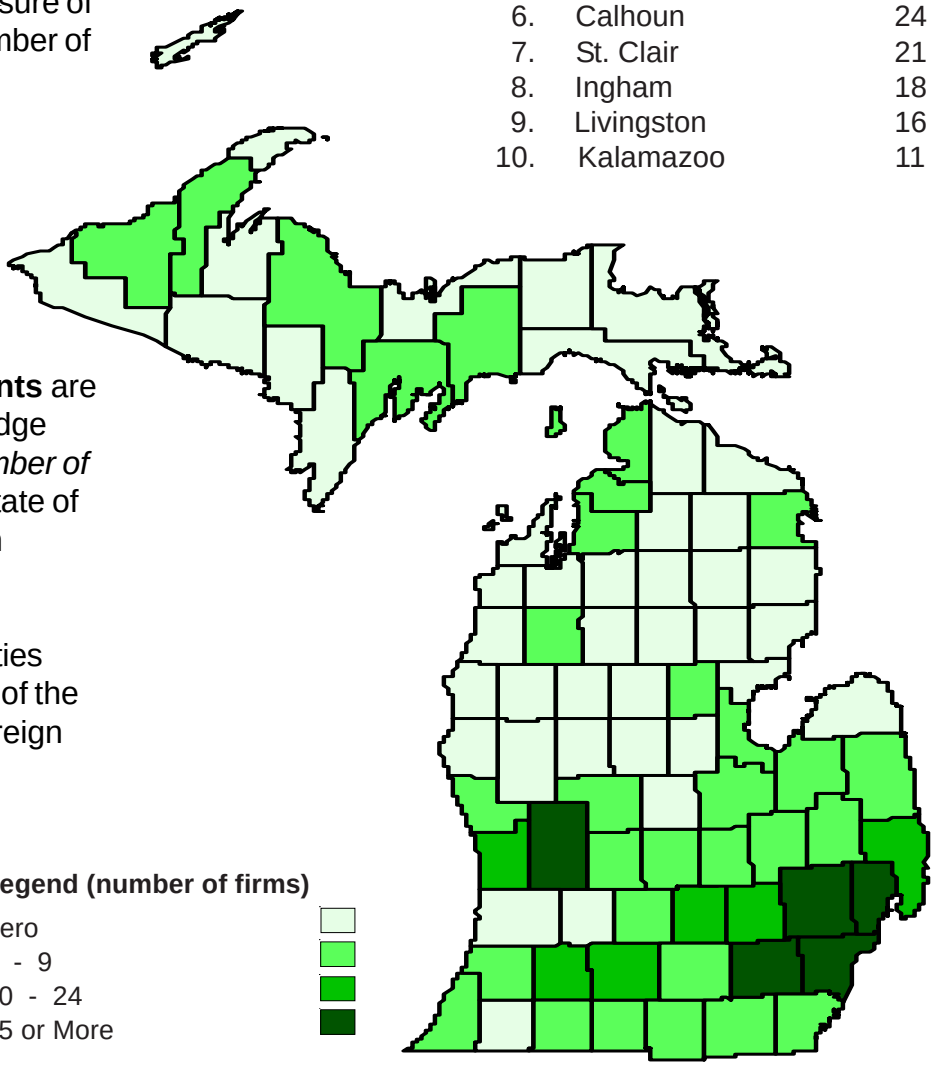
Firms with Foreign Parents

Description:

To succeed in a global market, communities must have a strong global presence. One measure of this globalization is the number of firms with foreign parents.

Top Ten Counties (number of firms)

1.	Oakland	359
2.	Wayne	170
3.	Kent	51
4.	Washtenaw	47
5.	Macomb	43
6.	Calhoun	24
7.	St. Clair	21
8.	Ingham	18
9.	Livingston	16
10.	Kalamazoo	11



Firms with Foreign Parents are represented in the Knowledge Economy Index as *the number of firms* registered with the State of Michigan as having foreign parents.

Oakland and Wayne Counties together had a total of 529 of the 860 Michigan firms with foreign parents.

GLOBALIZATION

Source: Michigan Economic Development Corporation (MEDC), 2001.

The MEDC International and National Business Development division maintains a database of Michigan Companies with Foreign Parents, including information about both the Michigan company and the parent company. From a hard copy database printout issued June 19, 2001, companies were assigned to counties based on their reported Michigan address.

GLOBALIZATION
Exporting Firms

Description:

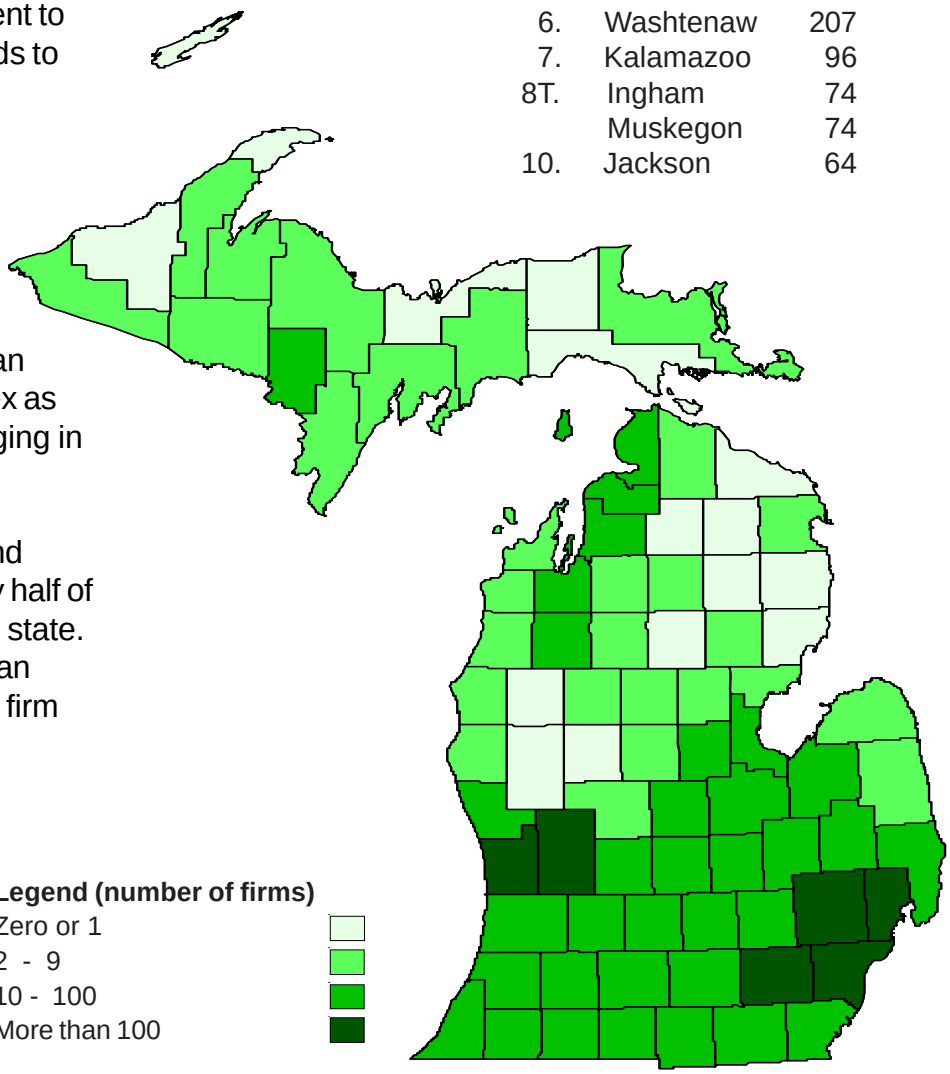
One important measure of how fully a region participates in the global economy is the extent to which its firms export goods to foreign markets.

Exporting Firms are represented in the Michigan Knowledge Economy Index as the *number of firms* engaging in production for export.

Two counties - Oakland and Wayne - account for nearly half of the 3,450 such firms in the state. However, nearly all Michigan counties have at least one firm engaged in exporting.

Top Ten Counties (number of firms)

1.	Oakland	765
2.	Wayne	410
3.	Macomb	377
4.	Kent	291
5.	Ottawa	237
6.	Washtenaw	207
7.	Kalamazoo	96
8T.	Ingham	74
	Muskegon	74
10.	Jackson	64



GLOBALIZATION

Source: Michigan Economic Development Corporation (MEDC), 2002.

Online at http://www.medc.michigan.org

The MEDC maintains a database of firms that export goods in the following categories: Agriculture, Computers, Machine Tools, Other, Automotive, Environmental, Medical, and Plastics. Companies were associated with the county identified by the business address, and the number of firms were counted in each county.

ECONOMIC DYNAMISM CATEGORY

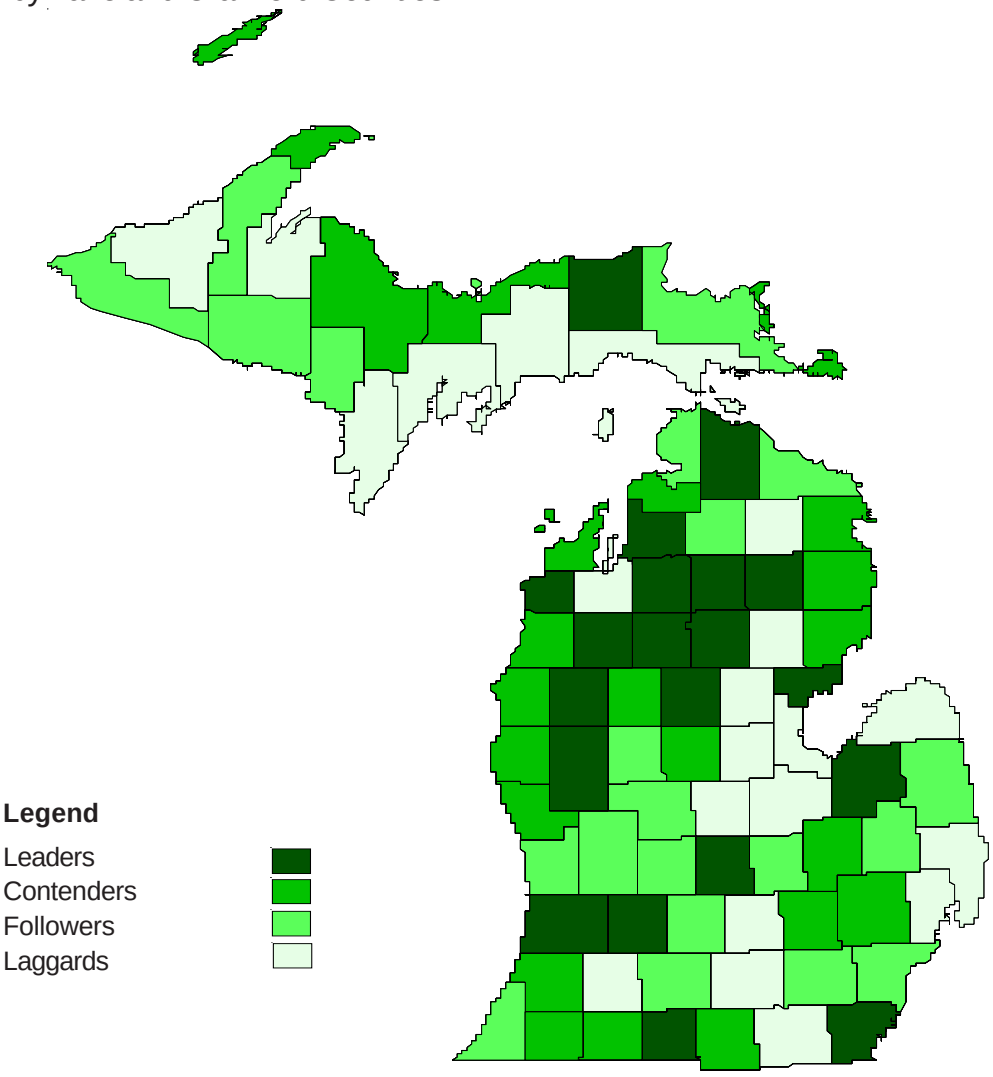
Description:

In an environment marked by rapid changes, adaptation to a changing environment is crucial. Such adaptation is often evidenced by "churn" in the workforce, as new jobs replace old jobs in the economy, and new enterprises form and aging enterprises transform themselves.

The Economic Dynamism Category is calculated as the average of a county's rank for three indicators: **Manufacturing Employment Change**, **Service Sector Employment Change**, and **Sole Proprietership Employment Change**. Clare County had the highest average rank, followed by Lake and Crawford Counties.

Top Ten Counties

1. Clare
2. Lake
3. Crawford
4. Barry
5. Benzie
6. Antrim
7. Arenac
8. Kalkaska
9. Branch
10. Missaukee



Manufacturing Employment Change

Top Ten Counties (absolute change)

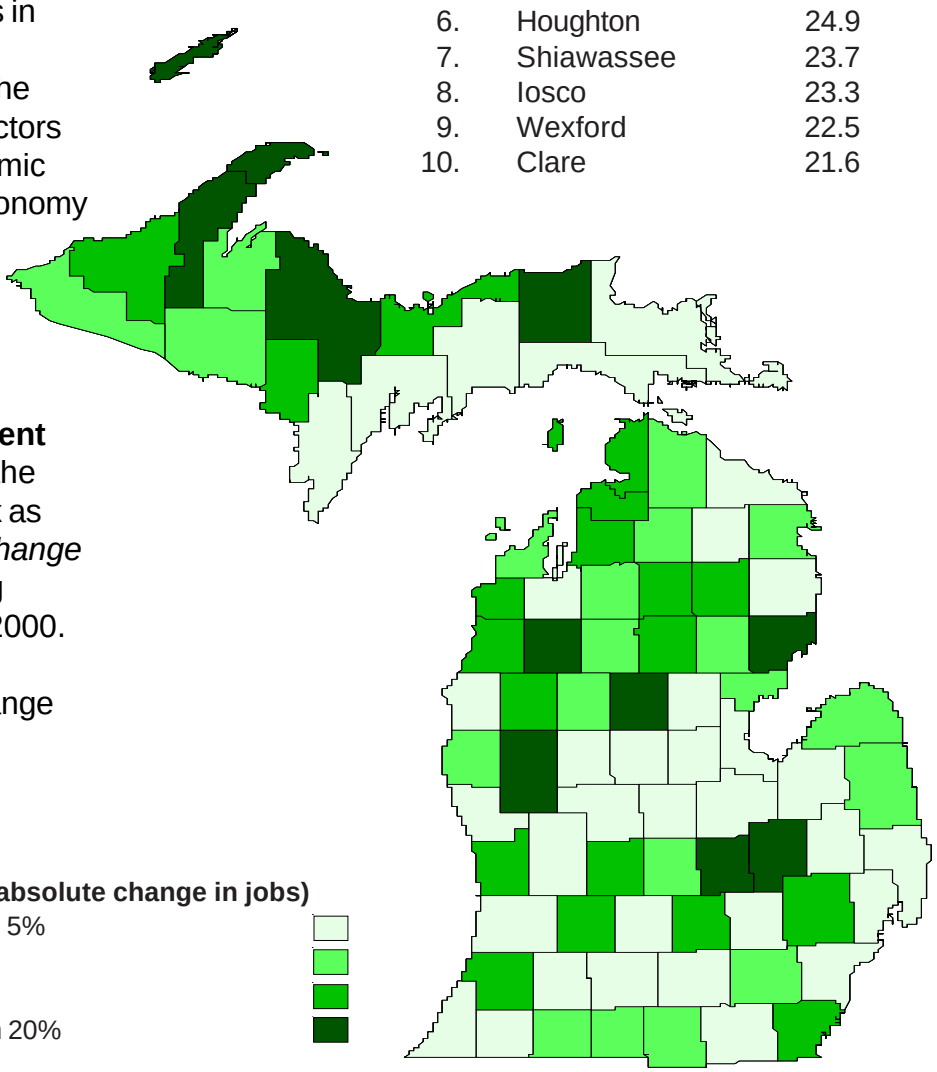
1.	Marquette	45.4 %
2.	Newaygo	38.1
3.	Keweenaw	33.3
4.	Luce	29.2
5.	Genesee	25.9
6.	Houghton	24.9
7.	Shiawassee	23.7
8.	Iosco	23.3
9.	Wexford	22.5
10.	Clare	21.6

Description:

Manufacturing employment has historically provided a significant share of the high wage jobs in Michigan. In a knowledge economy, rapid change in the employment mix across sectors is often evident, and economic transformation in a local economy may depend on harnessing the opportunities this rapid change may present.

Manufacturing Employment Change is represented in the Knowledge Economy Index as *the absolute percentage change in jobs* in the manufacturing sector between 1997 and 2000.

Statewide, the average change was about one percent.



Source: Michigan Economic Development Corporation Economic Profiler.

Online at http://medc.michigan.org/MiInfo/Places/

County employment totals for the manufacturing sector were used to determine the net gain or loss of such jobs in each county. The change from 1997 to 2000 totals (gain or loss) was calculated as a percentage of the 1997 figure, and the absolute value of that change is represented in this indicator.

Service Employment Change

Top Ten Counties (absolute change)

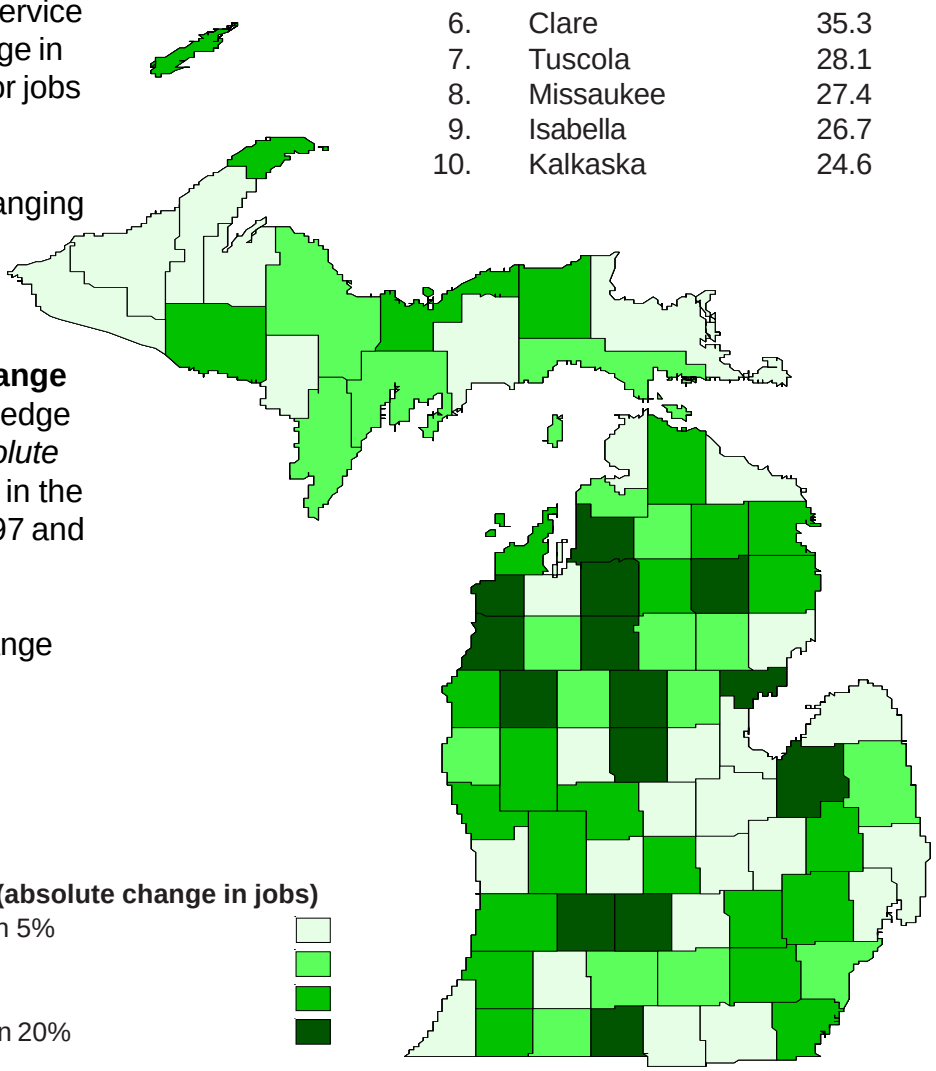
1.	Lake	72.4 %
2.	Arenac	70.4
3.	Barry	46.9
4.	Benzie	40.2
5.	Manistee	36.0
6.	Clare	35.3
7.	Tuscola	28.1
8.	Missaukee	27.4
9.	Isabella	26.7
10.	Kalkaska	24.6

Description:

One characteristic of the knowledge economy is a shift from a manufacturing to a service economy. The rate of change in the number of service sector jobs is one factor to consider in seeking to understand the implications of a rapidly changing economic environment

Service Employment Change is represented in the Knowledge Economy Index as *the absolute percentage change in jobs* in the service sector between 1997 and 2000.

Statewide, the average change was 7.6%.



Source: Michigan Economic Development Corporation Economic Profiler.

Online at http://medc.michigan.org/MiInfo/Places/

County employment totals for the service sector were used to determine the net gain or loss of such jobs in each county. The change from 1997 to 2000 totals (gain or loss) was calculated as a percentage of the 1997 figure, and the absolute value of that change is represented in this indicator.

Sole Proprietership Employment Change

Top Ten Counties (absolute change)

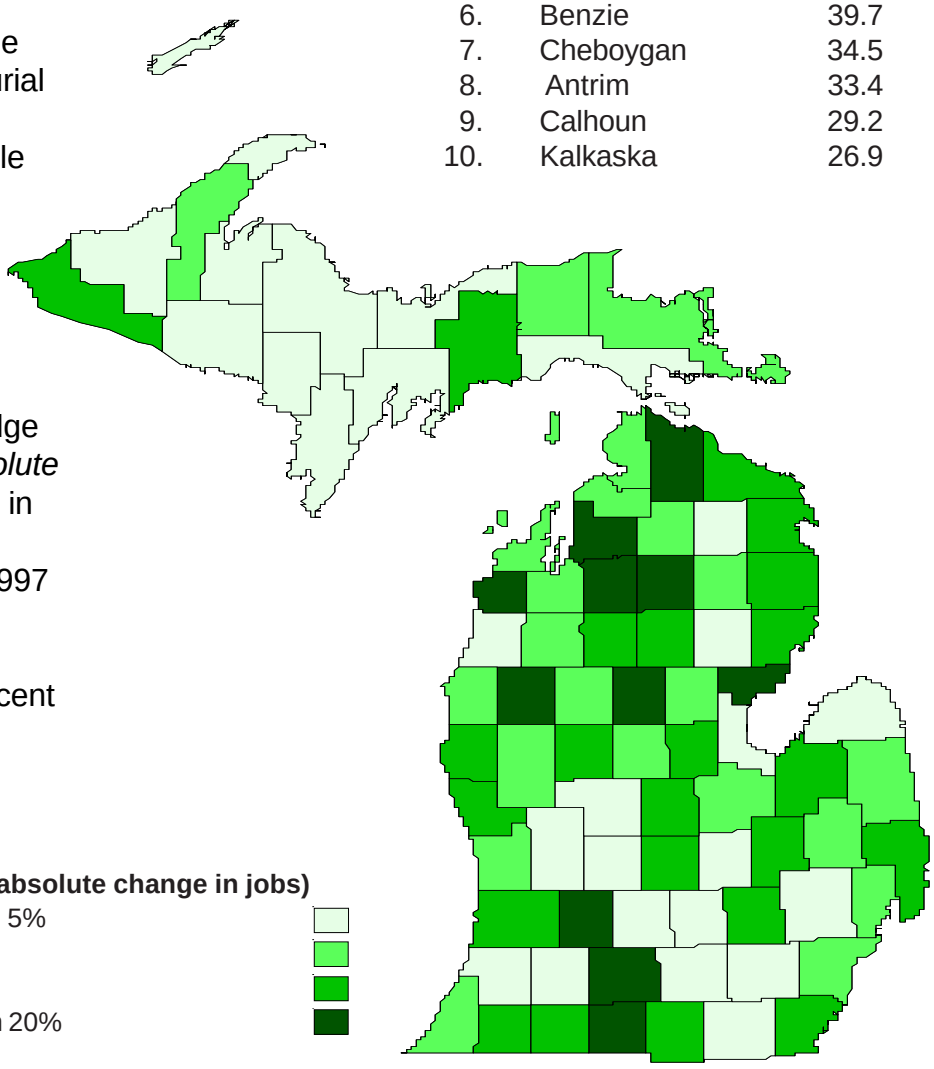
1.	Clare	72.8 %
2.	Barry	61.1
3.	Lake	60.0
4.	Arenac	57.3
5.	Crawford	46.6
6.	Benzie	39.7
7.	Cheboygan	34.5
8.	Antrim	33.4
9.	Calhoun	29.2
10.	Kalkaska	26.9

Description:

In a knowledge economy, innovation and entrepreneurial activity are veiwed as increasingly significant. One outcome of the entrepreneurial culture is an emphasis on businesses operated as sole proprietorships.

Sole Propreietership Employment Change is represented in the Knowledge Economy Index as *the absolute percentage change in jobs* in firms classifed as sole proprieterships, between 1997 and 2000.

Statewide, the average percent change was 4.7%.



Source: Michigan Economic Development Corporation Economic Profiler.

Online at http://medc.michigan.org/MiInfo/Places/

County totals of jobs in businesses classified as sole proprieterships were used to determine the net gain or loss of such jobs in each county. The change from 1997 to 2000 totals (gain or loss) was calculated as a percentage of the 1997 figure, and the absolute value of that change is represented in this indicator.

Conclusion

The promise of technology to aid humankind in the securing of our basic needs and releasing us from the drudgery of meaningless toil has been the hope and aspiration of modern civilization. Evidence of our technological cleverness is pervasive in our daily lives, and our potential to actualize a civil society in which our economic and democratic prosperity are assured almost seems within our grasp.

Technology-led economic development offers great wealth generation potential for those individuals and communities who are creative, talented, have a modern IT infrastructure, and have the foresight to plan for the new economy. Many of these characteristics are present in "university towns" where public and private investments in knowledge generation and application have been a long-term priority. Communities with a research and development capacity will likely do relatively well in the knowledge, technology-led economy that is emerging globally. However, those communities that do not succeed as research and development or other high-knowledge centers will probably find themselves competing with the rest of the world to be the cheap labor pool of choice, and thus may join the widening disparity between winner and loser communities worldwide.

While Michigan has a number of public and private higher education/research institutions (depending on how one counts we estimate there are between 116-175 post K-12 education and research facilities throughout the state), many Michigan communities do not have this historic intellectual infrastructure. As a result, for many Michigan communities the strongest economic development opportunities in technology-led development will most likely be in the later phases of the innovation-commercialization continuum (see Figure 1).

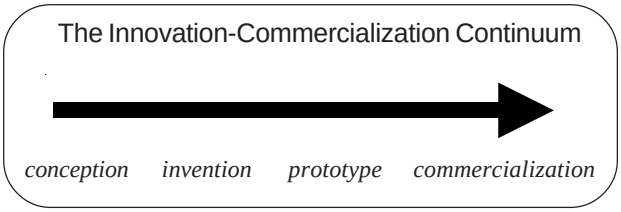


Figure 1. The Innovation-Commercialization Continuum

For publicly funded technology-led economic development to have a broad economic impact beyond just creating a few highly-skilled, highly-paid jobs for professionals in gifted communities, economic development practitioners and public policy officials must have a basic grasp of the creative process that supports innovation and commercialization. This creative and commercialization process can be described as the innovation-commercialization continuum.

Current practice suggests that in the early phases of conceptualizing and prototyping an innovation, it is often critical for the "inventor" to be near a university/research institute where the necessary intellectual mass (human capital), technological infrastructure, financial capital, and creative environment are in place to support the incubation of a new idea/method. However,

once the innovation has been prototyped and is ready for commercialization, the routine production of the new "product" can conceivably occur anywhere that a labor force, transportation/information system, business environment, and community amenities are conducive to the production of that "product". At this point in the continuum, Michigan incubated inventions can actually shop globally for a production home. It is a rather curious potential consequence of the technology-led innovation-commercialization continuum that a state or other public institution might make all the initial up-front investments in the innovative process only to see the "pay-offs" in terms of jobs go to other places.

Communities without a university or technology center can compete for the jobs related to technology in this and later phases of the product life-cycle. These communities must pursue strategies designed to enhance their competitive advantage in a technology driven economy and improve their features that would attract and develop industries in the knowledge economy. Communities with the desired infrastructure, labor pool, amenities, quality of life and other factors can compete for the high-skilled high-wage jobs in the knowledge economy.

Strategic Community and Economic Development Actions

The selection of appropriate economic development strategies must be done in the context of your local situation. The unique social, economic, environmental, political, institutional, and individual character of a community will in a large part determine the "apply-ability" of each or any combination of these strategies. The following are potential strategic actions communities can pursue to enhance their competitive advantage in creating and retaining jobs in the globally competitive knowledge economy:

Establish a shared vision: Public/private partnerships that are committed to a shared community vision have the highest potential to succeed. Broad-based inclusive participation in establishing a set of shared objectives is critical to community mobilization and goal attainment. Work together to address your shared concerns. Identify key leaders who can "spread the word" on the challenges and opportunities for the community.

Continuously develop your workforce: The most critical resource in the knowledge economy is our human capital. A community that fails to educate and retrain its residents does so at its economic peril! Worker retraining, proactive lifelong learning, and an effective K-12 education system are basic elements of a globally competitive community economy.

Analyze your current strengths and capacities: An assessment of your current abilities and resources is an important first step in the community and economic development process. Business "Cluster analysis", community resource and individual skill inventories and other asset based assessment methods are useful in targeting limited resources to actions that may have immediate and significant pay offs. The capacity for business innovation is often facilitated by industry "clusters"; these are broad network of producers, suppliers, and organizations that can bring new products to the market.

Support creativity and entrepreneurship: Sir Francis Bacon is credited with saying "If we are to achieve results never before accomplished, we must employ methods never before

attempted." A new economy is based on new ideas! Support creativity in all its forms, support reasoned risk takers, create an environment that encourages the development and implementation of new ways of producing and distributing goods and services. Change is an important of the knowledge economy. Look for those who seek to innovate and support their creative endeavors where appropriate.

Provide access to capital: Access to venture, equity and debt capital are critical to the development and implementation of new enterprises. A community needs a broad set of financial resources to provide for the creation and development of new economic enterprises. Assess your current financial institutional capacity and mobilize to address gaps in your capital resources.

Develop and maintain infrastructure: The knowledge-based global economy requires both the traditional public works of the 20th century, roads, sewers, water etc. and a unique set of new infrastructure requirements. Access to the internet, and related telecommunications technologies are as essential to economic development as roads were in the mid-20th century. Assess your 21st century infrastructure capacity and invest strategically in those areas that are critical and underdeveloped.

Promote quality of life: Place is still critical in the global knowledge-based economy. Knowledge workers and knowledge based industries in considering location decisions consider the overall quality of life available in a community. Examine and promote your cultural and environmental amenities. Where necessary support the development of a diverse quality life that will attract high-skilled, high-paid workers. Place makes a difference – make your place different!

Summary

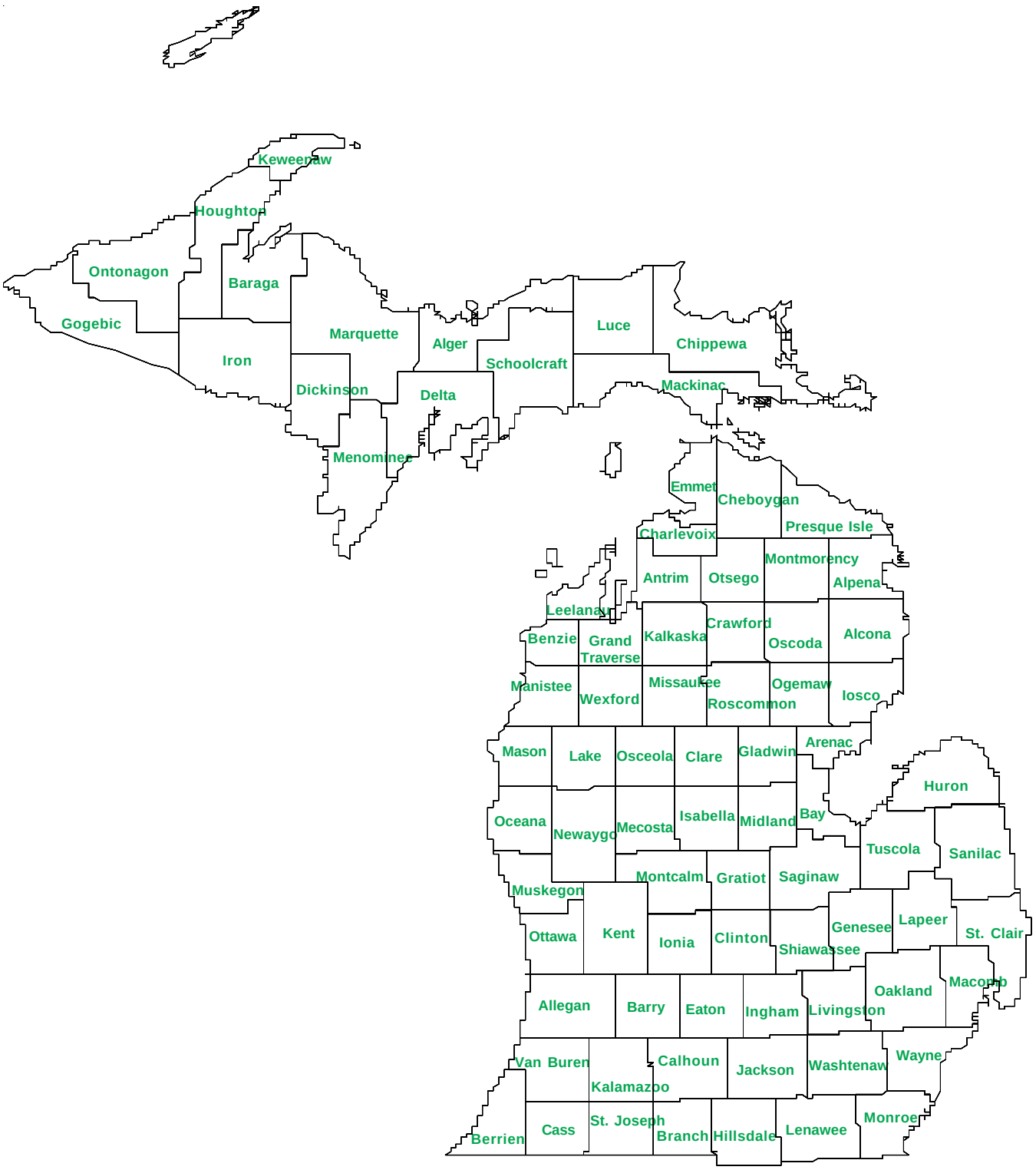
The challenge confronting policy makers in pursuing a publicly funded technology-led economic development strategy, is to not only support the elusive creative process but to insure that the benefits (jobs/revenues) of that process accrue to those communities or public institutions that made the crucial investments in the first place. In an integrated global economy this is a particularly daunting task.

Private investors and higher education institutions often seek to secure, through patents and other property rights protections, some rate of return on their investment in innovation. There are few, if any, tools available to state and local governments to realize a reasonable rate of return on their public investments in technology-led economic development, particularly if after the incubation period and during the commercialization of the "product" the production moves to a foreign shore.

Technology-led economic development offers a great opportunity for economic growth and an improved quality of life for a few well-positioned communities. But for many others, isolated rural areas, abandoned or distressed urban/suburban neighborhoods, publicly supported technology-led economic development strategies raise a new set of challenges for practitioners and policymakers alike. As with the publicly funded economic development strategies of the past millennium, a new set of tools to enhance and secure an improved quality of life, particularly for distressed communities, needs to be developed and implemented. We owe it to ourselves, and our posterity, to seek out these tools and apply them appropriately.

MICHIGAN KNOWLEDGE ECONOMY INDEX

County Reference Map



A Checklist of Possible Strategic Actions for Local Communities and Regions

Planning for Knowledge Jobs

- ☐ In the knowledge economy, an educated citizenry is critical to success. If a community does not get smarter it **will** get poorer.
- ☐ A community should provide educational opportunities across the life-span of the workforce.
- ☐ Begin with early childhood development with a seamless transition to k-12, higher education, career development and retraining programs.
- ☐ Establish a business/education roundtable as a regular forum for businesses to discuss education and training needs and for education to discuss program challenges, curriculum options and resources
- ☐ Develop "technology education centers" designed to train participants on relevant technologies of interest to the local community.
- ☐ Recapture high school graduates that leave the area for higher education through strategies such as forgiving student loans, promote local alumni networks, and welcome home events.

Planning for Innovation

- ☐ Establish a technology business incubator.
- ☐ Create flexible investment funds to make capital available to emerging enterprises/ technologies/entrepreneurs.
- ☐ Support and entrepreneurial environment that values risk takers and innovators.
- ☐ Provide broadband access.
- ☐ Host business/community "innovation fairs."
- ☐ Provide patent assistance.
- ☐ Establish links to higher education technology centers in your region to facilitate the location/expansion of innovative enterprises to your community.
- ☐ Establish a "speaker's bureau" of informed community leaders who can help spread the word on the global knowledge economy and its potential challenges and opportunities for your community.
- ☐ Create a "technical assistance network" that can provide low or no cost preliminary consultation to local businesses on incorporating technology within their enterprise.

Planning for a Digital Economy

- ☐ Link homes, schools, businesses and government to the global internet and to each other.
- ☐ Create a community/business/government web presence.
- ☐ Provide broadband access where currently not available.
- ☐ Provide wireless access where appropriate.
- ☐ Provide non-formal adult education programs for residents on the global communications network.
- ☐ Map your community's global communications network.
- ☐ Use digital communications to support democratic governance in you community.
- ☐ Provide technical and financial assistance for residents and businesses to improve and expand their access to the digital economy.
- ☐ Require "open capacity" on any fiber optic infrastructure that is constructed, which may be used in the future to expand your e-commerce capacity.

Planning for Globalization

- ☐ Facilitate export trade and global markets for existing products and services in your community (remember Canada is a Michigan neighbor)
- ☐ Identify existing exporting firms and identify related local industries that may also export to similar markets
- ☐ Consider attracting foreign based firms to your community in strategic and complementary industries
- ☐ Link to Michigan foreign trade zones.
- ☐ Identify and describe your community's global transportation capacity and share that with your local businesses.
- ☐ Identify and celebrate local ethnic/cultural heritages and explore possible international social capital opportunities.
- ☐ Conduct an "Industry Cluster Analysis" to assess possible global linkages and opportunities
- ☐ Organize and conduct training for key industry personnel and entrepreneurs on international trade and working in a culturally diverse economy

Planning for Dynamism

- ☐ Establish effective communications amongst firms to **anticipate** change and develop responses.
- ☐ Supportive transition strategies for your community's workforce.
- ☐ Identify "new enterprises" in your community to assess potential emerging trends in your local economy.
- ☐ Implement "safety net" strategies for displaced workers and families to reduce personal stress and improve retention of skilled workers.
- ☐ Run business "birth announcements" in the local paper.
- ☐ Support strong entrepreneurial development programs to help new businesses form and expand locally.
- ☐ Provide access to a variety of types of capital for businesses.
- ☐ Build or rebuild "flexible space" environments that can be reused for a variety of production and services.
- ☐ Support local business incubator programs.
- ☐ Identify leakages in the local economy that may provide opportunities for business development.
- ☐ Examine alternative forms of business ownership in potential business closures.

MICHIGAN KNOWLEDGE ECONOMY INDEX
Worksheet

To use this worksheet:

Use this worksheet to track your county's ranking for each indicator and index in the Michigan Knowledge Economy Index.

First, complete the table to the right with the rankings of each category and indicator for your county (rankings for each county are listed alphabetically in the Appendix).

Next, ask yourself the following questions:

Which one or two rankings surprise you the most?

Which rankings most closely match your expectations?

Which indicators do you find the most meaningful?

Indicator	Rank
Overall Index	_____
Knowledge Jobs	_____
IT Jobs	_____
Workforce Education	_____
Management and Prof. Jobs	_____
Digital Economy	_____
Internet Use	_____
Digital Government	_____
Cable Modem Access	_____
Innovation Capacity	_____
High Tech Jobs	_____
Venture Capital	_____
Patents	_____
Engineers	_____
BIoscience Jobs	_____
Globalization	_____
Firms with Foreign Parents	_____
Exporting Firms	_____
Economic Dynamism	_____
Manufacturing Change	_____
Service Change	_____
Sole Proprietorship Change	_____

Notes:

County Rankings - Overall Index and Categories of Indicators

County	Overall Rank	Knowledge Jobs	Innovation Capacity	Digital Economy	Globalization	Economic Dynamism
Alcona	77	74	59	69	70	28
Alger	44	25	48	62	70	33
Allegan	21	56	36	3	33	19
Alpena	28	33	41	30	40	21
Antrim	18	46	31	25	34	6
Arenac	52	68	69	48	57	7
Baraga	76	53	31	75	57	74
Barry	9	22	21	22	37	4
Bay	33	24	25	5	21	83
Benzie	35	50	29	57	65	5
Berrien	26	25	7	56	13	61
Branch	42	69	71	37	19	9
Calhoun	31	35	68	14	11	43
Cass	58	62	79	43	38	36
Charlevoix	29	34	11	48	32	39
Cheboygan	62	64	56	73	61	11
Chippewa	60	29	61	66	65	62
Clare	56	78	82	45	65	1
Clinton	10	12	19	23	35	17
Crawford	66	66	72	73	68	3
Delta	51	31	35	64	49	63
Dickinson	43	25	60	41	46	57
Eaton	23	25	22	12	31	49
Emmet	38	10	43	70	27	57
Genesee	14	20	38	35	16	21
Gladwin	67	72	50	36	40	73
Gogebic	52	38	69	33	61	52
Grand Traverse	19	6	17	21	28	78
Gratiot	57	43	77	34	43	69
Hillsdale	54	70	45	54	28	38
Houghton	15	19	5	44	38	45
Huron	78	48	75	65	47	70
Ingham	3	3	3	9	6	72
Ionia	55	80	75	6	25	48
Iosco	63	62	73	40	70	28
Iron	59	54	47	67	55	43
Isabella	31	21	66	19	52	30
Jackson	29	36	13	26	10	78
Kalamazoo	8	4	10	10	8	77
Kalkaska	68	82	57	68	61	8
Kent	4	9	9	2	3	60
Keweenaw	49	23	43	77	77	24

County Rankings - Overall Index and Categories of Indicators

County	Overall Rank	Knowledge Jobs	Innovation Capacity	Digital Economy	Globalization	Economic Dynamism
Lake	71	83	74	59	77	2
Lapeer	34	37	50	18	22	53
Leelanau	17	5	13	55	52	35
Lenawee	47	41	25	52	15	81
Livingston	7	7	16	19	11	27
Luce	73	65	57	79	77	14
Mackinac	81	54	67	75	77	82
Macomb	12	15	20	16	4	67
Manistee	36	45	29	31	57	25
Marquette	22	12	12	52	45	37
Mason	27	17	28	28	49	40
Mecosta	45	29	45	31	70	56
Menominee	72	58	42	60	47	80
Midland	13	7	4	27	43	75
Missaukee	69	79	49	77	55	9
Monroe	16	48	25	15	20	13
Montcalm	79	75	83	38	40	54
Montmorency	83	81	64	82	77	63
Muskegon	11	38	23	3	9	33
Newaygo	50	70	36	28	77	20
Oakland	1	2	2	12	1	31
Oceana	48	52	53	46	49	31
Ogemaw	82	76	78	72	68	70
Ontonagon	65	43	53	63	64	63
Osceola	74	72	65	50	57	40
Oscoda	80	77	80	82	70	15
Otsego	25	11	18	17	70	50
Ottawa	5	17	6	1	6	54
Presque Isle	64	32	24	80	77	59
Roscommon	60	50	53	81	70	15
Saginaw	24	16	38	8	17	76
Sanilac	70	59	81	58	36	46
Schoolcraft	75	66	63	46	54	68
Shiawassee	39	57	38	24	23	51
St. Clair	40	46	31	41	14	63
St. Joseph	46	61	62	61	18	21
Tuscola	37	60	34	50	28	11
Van Buren	20	41	13	39	23	26
Washtenaw	2	1	1	11	5	42
Wayne	6	14	7	7	2	47
Wexford	41	40	52	71	26	18

County Rankings for Individual Indicators - Part 1

County	IT Jobs	Workforce Education	Profess./ Managerial	Hi Tech Jobs	Venture Capital	Patents	Engineers	Bioscience Jobs
Alcona	80	66	60	82	12	54	2	18
Alger	14	39	38	28	12	23	77	18
Allegan	62	34	57	38	12	29	62	4
Alpena	30	49	29	44	12	29	46	18
Antrim	70	20	47	76	12	19	13	18
Arenac	39	79	74	58	12	32	78	18
Baraga	6	66	79	16	12	54	38	18
Barry	20	39	25	35	12	26	34	18
Bay	13	43	32	26	12	36	39	18
Benzie	71	17	55	48	12	54	4	18
Berrien	55	19	17	9	12	7	40	18
Branch	58	72	68	69	12	20	82	18
Calhoun	48	31	32	55	12	28	80	18
Cass	46	57	70	62	12	54	72	18
Charlevoix	63	18	29	15	7	25	33	18
Cheboygan	65	45	64	39	12	54	43	18
Chippewa	29	37	35	42	12	48	50	18
Clare	66	80	70	72	12	54	70	18
Clinton	26	16	13	27	12	52	6	18
Crawford	83	51	52	83	12	54	36	18
Delta	33	26	43	49	12	48	17	18
Dickinson	42	27	22	60	12	42	37	18
Eaton	60	15	16	36	12	53	7	18
Emmet	17	8	15	32	12	45	45	18
Genesee	8	30	31	6	12	50	65	15
Gladwin	69	78	56	75	12	15	41	18
Gogebic	47	34	37	57	12	54	57	18
Grand Traverse	11	9	11	14	12	42	24	18
Gratiot	35	51	46	54	12	54	74	18
Hillsdale	78	58	65	21	12	21	81	18
Houghton	44	14	8	10	12	17	3	14
Huron	40	66	35	59	12	54	67	18
Ingham	3	3	4	5	4	13	20	6
Ionia	79	70	73	77	12	54	49	18
Iosco	37	62	74	56	12	54	64	18
Iron	57	47	48	64	12	54	9	18
Isabella	38	12	20	50	7	45	69	18
Jackson	64	28	23	46	5	31	11	8
Kalamazoo	9	5	7	18	7	9	47	11
Kalkaska	82	76	83	4	12	54	79	18
Kent	15	11	12	17	5	8	54	3
Keweenaw	56	21	9	67	12	54	1	18

County Rankings for Individual Indicators - Part 1

County	IT Jobs	Workforce Education	Profess./ Managerial	Hi Tech Jobs	Venture Capital	Patents	Engineers	Bioscience Jobs
Lake	77	83	82	81	12	54	42	18
Lapeer	32	53	32	45	12	33	53	18
Leelanau	19	4	6	23	12	36	12	18
Lenawee	53	28	43	29	12	11	61	18
Livingston	24	7	5	33	12	34	8	17
Luce	67	59	51	73	12	54	10	18
Mackinac	76	38	38	79	12	54	27	18
Macomb	23	23	14	24	7	22	58	12
Manistee	28	43	63	41	12	40	25	18
Marquette	25	13	17	40	7	16	18	18
Mason	12	32	19	11	12	44	48	18
Mecosta	54	21	26	66	12	35	22	18
Menominee	16	65	80	30	12	24	66	18
Midland	27	6	3	34	12	1	5	1
Missaukee	73	74	72	53	12	54	23	18
Monroe	52	41	48	51	12	18	32	18
Montcalm	61	70	77	71	12	54	73	18
Montmorency	68	81	78	73	12	54	21	18
Muskegon	21	45	52	30	12	11	55	18
Newaygo	72	61	68	13	12	39	63	18
Oakland	1	2	2	2	2	2	29	2
Oceana	34	55	60	25	12	54	56	18
Ogemaw	75	77	57	78	12	54	52	18
Ontonagon	22	50	60	37	12	54	44	18
Osceola	74	62	67	70	12	14	68	18
Oscoda	50	82	80	63	12	54	76	18
Otsego	5	24	23	1	12	54	31	13
Ottawa	43	10	10	7	12	4	35	8
Presque Isle	7	60	40	19	12	54	26	18
Roscommon	51	66	26	65	12	54	16	18
Saginaw	4	32	26	12	12	47	59	18
Sanilac	59	55	48	68	12	54	75	16
Schoolcraft	81	53	52	80	12	51	15	18
Shiawassee	36	75	45	52	12	38	28	18
St. Clair	18	62	57	22	12	3	83	18
St. Joseph	49	47	76	47	12	26	71	18
Tuscola	31	72	66	43	12	10	60	18
Van Buren	41	41	42	8	12	41	30	10
Washtenaw	2	1	1	3	1	6	14	5
Wayne	10	25	21	20	3	5	51	7
Wexford	45	36	41	61	12	54	19	18

County Rankings for Individual Indicators - Part 2

County	Internet Use	Cable Modem	Digital Govt.	Foreign Parents	Exporting Firms	Manuf. Dyn.	Service Dyn.	Sole Prop Dyn.
Alcona	64	32	73	43	69	55	21	24
Alger	49	32	61	43	69	18	17	74
Allegan	1	23	10	43	20	50	18	19
Alpena	64	3	24	28	47	31	29	32
Antrim	64	6	14	28	38	23	14	8
Arenac	15	37	73	43	55	42	2	4
Baraga	49	62	73	43	55	37	65	80
Barry	1	37	42	43	28	28	3	2
Bay	15	6	17	20	22	82	76	73
Benzie	64	15	54	43	63	24	4	6
Berrien	28	71	33	13	12	57	67	38
Branch	28	32	42	13	26	40	13	11
Calhoun	28	15	22	6	18	77	49	9
Cass	28	71	19	43	29	60	24	28
Charlevoix	64	37	24	28	33	16	54	56
Cheboygan	64	71	48	43	59	38	28	7
Chippewa	49	71	35	43	63	72	56	37
Clare	15	37	70	43	63	10	6	1
Clinton	15	37	29	28	40	34	34	15
Crawford	64	71	48	43	67	11	16	5
Delta	49	32	67	28	59	59	41	68
Dickinson	49	37	31	43	38	14	59	81
Eaton	28	15	20	23	36	71	12	61
Emmet	64	37	70	28	27	27	78	49
Genesee	39	51	9	20	13	5	57	30
Gladwin	15	51	34	28	47	83	53	44
Gogebic	49	23	24	43	59	46	74	27
Grand Traverse	64	2	13	43	14	79	63	54
Gratiot	15	37	46	43	33	68	79	25
Hillsdale	28	62	38	28	29	33	70	22
Houghton	49	15	57	28	44	6	77	53
Huron	15	66	73	43	41	41	64	70
Ingham	28	6	16	8	8	29	71	79
Ionia	1	15	30	24	25	20	58	64
Iosco	64	6	45	43	69	8	66	26
Iron	49	71	36	43	52	35	25	75
Isabella	15	23	38	43	47	53	9	41
Jackson	28	37	20	13	10	63	55	78
Kalamazoo	28	23	8	10	7	73	62	60
Kalkaska	64	23	73	43	59	30	10	10
Kent	1	6	4	3	4	54	31	76
Keweenaw	49	66	73	43	76	3	20	71

County Rankings for Individual Indicators - Part 2

County	Internet Use	Cable Modem	Digital Govt.	Foreign Parents	Exporting Firms	Manuf. Dyn.	Service Dyn.	Sole Prop Dyn.
Lake	1	71	67	43	76	19	1	3
Lapeer	39	3	32	24	21	76	36	39
Leelanau	64	1	65	43	47	44	23	43
Lenawee	39	37	51	12	16	65	81	62
Livingston	39	23	14	9	15	61	15	23
Luce	49	71	73	43	76	4	35	40
Mackinac	49	71	64	43	76	74	52	83
Macomb	39	23	7	5	3	64	61	45
Manistee	1	37	56	43	55	25	5	65
Marquette	49	32	46	28	52	1	44	77
Mason	1	51	38	43	44	58	37	36
Mecosta	1	51	42	43	69	75	60	18
Menominee	49	37	54	43	41	81	51	67
Midland	15	37	37	43	33	70	82	33
Missaukee	64	51	73	43	52	39	8	17
Monroe	39	6	23	17	23	22	26	29
Montcalm	1	37	65	28	47	56	33	63
Montmorency	64	71	73	43	76	80	19	69
Muskegon	1	15	18	13	8	66	30	13
Newaygo	1	51	38	43	76	2	38	50
Oakland	39	23	1	1	1	15	32	58
Oceana	1	51	72	43	44	45	39	21
Ogemaw	64	62	52	43	67	43	50	82
Ontonagon	49	23	73	28	76	13	83	72
Osceola	1	66	59	43	55	32	47	52
Oscoda	64	71	73	43	69	21	11	48
Otsego	64	3	5	43	69	48	46	51
Ottawa	1	6	2	11	5	26	80	46
Presque Isle	64	62	69	43	76	78	69	12
Roscommon	64	71	63	43	69	12	48	20
Saginaw	15	6	28	24	11	67	72	55
Sanilac	15	71	48	28	41	47	43	47
Schoolcraft	49	51	24	28	63	69	68	34
Shiawassee	15	15	53	18	29	7	73	66
St. Clair	39	66	12	7	19	62	75	31
St. Joseph	28	51	62	20	17	36	40	16
Tuscola	15	51	60	28	29	52	7	14
Van Buren	28	66	11	24	23	17	22	59
Washtenaw	39	15	6	4	6	49	27	57
Wayne	39	6	3	2	2	51	45	42
Wexford	64	51	57	18	36	9	42	35

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