

North Dakota

Profile of the State Economy

Prepared for

Governor John Hoeven

By

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Introduction

This document includes data on the performance and composition of the North Dakota economy. It is intended as an initial overview to motivate further discussions based on the full richness of the data. The data is based on the Cluster Mapping project, a multi-year effort to statistically define clusters and analyze regional economies in the United States. The Institute for Strategy and Competitiveness at Harvard Business School would be happy to support further work in this area in your state.

The work of the Council on Competitiveness, Monitor Company, and the Institute for Strategy and Competitiveness in the Clusters of Innovation project has indicated the importance of regional economies for prosperity. While some important elements of companies' business environments are set at the national level (e.g., federal taxes, rules and regulations governing international trade and investment, antitrust rules), many others are set at the regional state or local level (e.g., state universities, physical infrastructure). These regional differences matter, as the huge differences in economic performance across U.S. regions attest. The aim of our project, and of this short document, is to increase awareness of the specific regional conditions to inform political action at the state level.

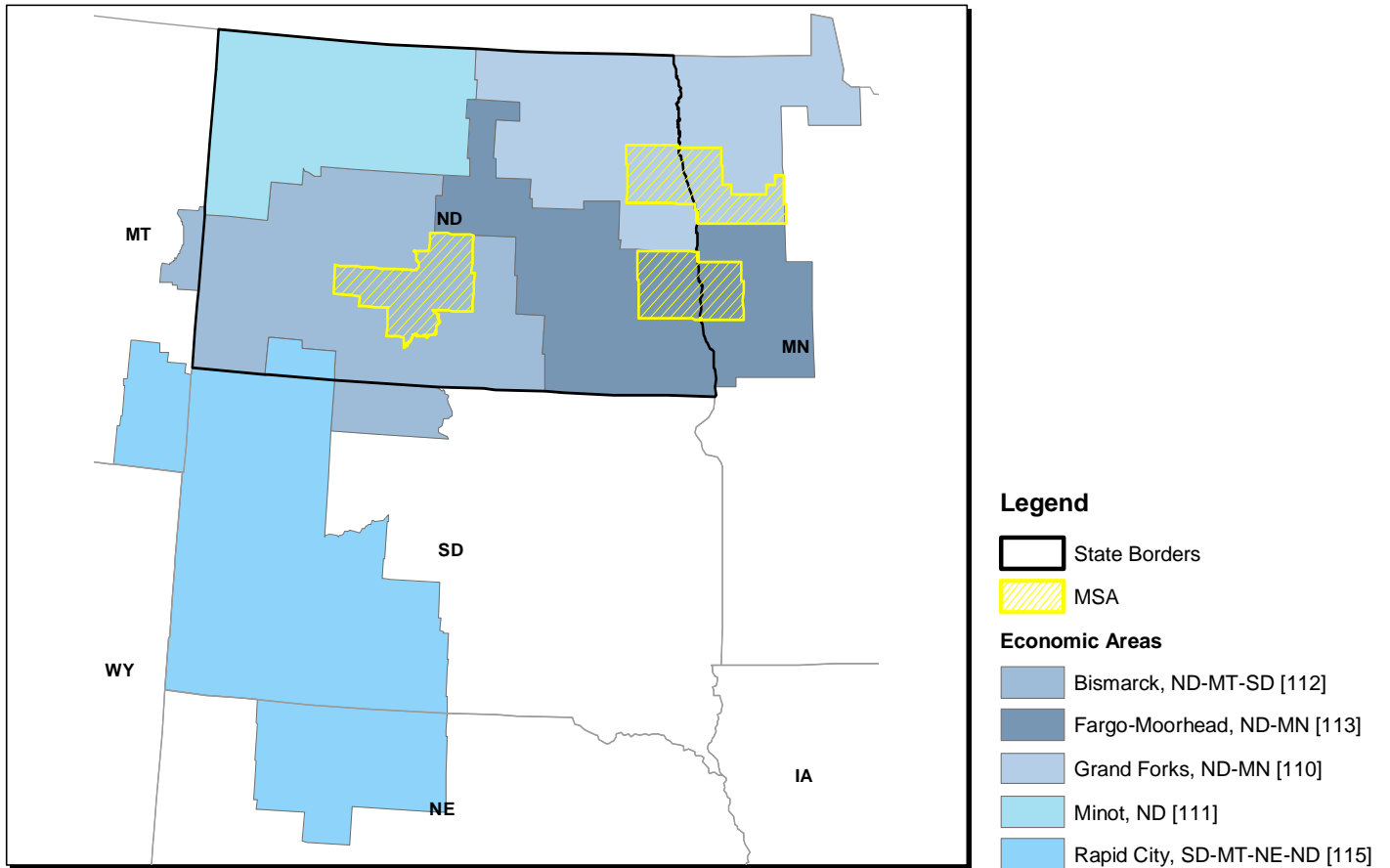
In many states, the relevant economic areas for companies are smaller than the state's boundaries. In others, relevant economic areas include parts of other states. We therefore list the economic areas and the metropolitan economic areas, both defined by the Bureau of Economic Analysis, on the opposite page. Economic performance data on these geographical units can be found at <http://data.isc.hbs.edu/isc/index.jsp>.

This document was prepared under the guidance of Professor Michael E. Porter by Elisabeth de Fontenay, Andrew Funderburk, Christian Ketels, Daniel Vasquez, and Weifeng Weng, all of the Institute for Strategy and Competitiveness.

Helpful links:

www.isc.hbs.edu	Institute for Strategy and Competitiveness
www.compete.org	Council on Competitiveness
www.monitor.com	Monitor Group

North Dakota



Profile of the North Dakota State Economy

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1. Economic Performance and Innovation Output

Description:

This chart presents aggregate measures of the state's economic performance and innovative output. The state is compared to the average of the United States, and its rank among all states is indicated.

Establishment growth refers to growth in traded cluster establishments, which are in fields that compete with other states and countries. Growth in local cluster establishments (e.g. retail stores) is not included.

Interpretation:

These aggregate measures allow an overview of the state's performance relative to the U.S. average. The economic performance measures address current results, while the innovative output measures provide indicators of how prosperity might change in the future.

Economic performance. Comparison of employment growth and wages reveals the extent to which growth translates to higher prosperity. Gross state product per employee gives an indicator of the state's productivity. Export growth reveals the extent to which the state can meet the test of international markets.

Innovation output. Patenting measures the vitality of invention, while the other measures capture various aspects of commercialization. Mismatch of these indicators can signal flaws in the institutions linking those two stages of the innovation process.

State of North Dakota

State Economic Performance and Innovation Output

Economic Performance	Innovation Output
<p>Employment growth per year, 1990 to 1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: 2.71% (rank 16) ▪ in the US: 1.90% <p>Average wages in 1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: \$23,129 (rank 50) ▪ in the US: \$32,109 <p>Wage growth per year, 1990 to 1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: 3.72% (rank 35) ▪ in the US: 4.03% <p>Gross state product per employee in 1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: \$38,183 (rank 50) ▪ in the US: \$56,882 <p>Annual growth in exports, 1995-1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: 6.76% (rank 15) ▪ in the US: 4.41% 	<p>Patents per 10,000 employees</p> <ul style="list-style-type: none"> ▪ in North Dakota: 2.4 (rank 45) ▪ in the US: 6.3 <p>Patents growth per year, 1990 to 1998</p> <ul style="list-style-type: none"> ▪ in North Dakota: 1.65% (rank 42) ▪ in the US: 3.19% <p>New establishment formation*, 1990 to 1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: 3.13% (rank 47) ▪ in the US: 4.60% <p>Fast growth firms (Inc 500), 1991 to 2000</p> <ul style="list-style-type: none"> ▪ in North Dakota: 2 (rank 50) <p>Venture capital investments, \$ per worker</p> <ul style="list-style-type: none"> ▪ in North Dakota: \$0 (rank 40) <p>Initial public offering proceeds per 1,000 firms, 1999</p> <ul style="list-style-type: none"> ▪ in North Dakota: \$0 (rank 41)

Note: Excludes government and agricultural employment. * This refers to the formation of establishments in traded industries, which trade with other regions and internationally.
 Data Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu) ; Bureau of Labor Statistics; Bureau of Economic Analysis; International Trade Administration; U.S. Patent and Trademark Office; CHI Research, Price Waterhouse Cooper Money Tree; Hoover's IPO Central; Inc. Magazine; Fast Forward, Inc., Baker Thompson Associates

2. Patents by Organization, 1995-1998

Description:

This table lists the top 50 patentors in the state by organization name and type (corporation, government, university, or institute). Patents are assigned to regions according to the inventor's address of residence. In the case of multiple inventors from different locations, the patent is assigned fractionally to the various regions.

Interpretation:

Regions with a healthy level of innovation should have patents originating from a wide variety of corporations in a wide variety of fields. Healthy regions also tend to have significant patenting from universities and institutes. Concerns about innovative capacity arise when patents originate principally from a government agency, for instance, or when the vast majority of patents are generated by very few entities.

Top 50 Patent Holders in North Dakota Total of 1995-1998

Rank	Organization Title	Patentor Type	Total Patents, 1995-1998	Rank	Organization Title	Patentor Type	Total Patents, 1995-1998
1	CLARK EQUIPMENT COMPANY, INC.	Corporation	19	26	HOCKEY ACCELERATION, INC.	Corporation	1
2	PIONEER HI-BRED INTERNATIONAL, INC.	Corporation	10	27	RED RIVER SERVICE CENTER INC.	Corporation	1
3	CASE CORPORATION	Corporation	9	28	RDO SPECIALTY FOODS CO.	Corporation	1
4	NORTH DAKOTA STATE UNIVERSITY	University	7	29	RANSOMES AMERICA CORPORATION	Corporation	1
5	NORTH DAKOTA STATE UNIVERSITY RESEARCH FOUNDATION	University	5	30	POMA INDUSTRIES, INC.	Corporation	1
6	PHOENIX INTERNATIONAL CORPORATION	Corporation	4	31	SIOUX MANUFACTURING CORPORATION	Corporation	1
7	DAKOTA GASIFICATION COMPANY	Corporation	3	32	NEW VISION FIBERGLASS INC.	Corporation	1
8	DEERE + COMPANY	Corporation	3	33	GLENMAC INC.	Corporation	1
9	AGRI-COVER, INC.	Corporation	2	34	VASICHEK ENTERPRISES LLC	Corporation	1
10	M BAR D RAILCAR TECH, INC.	Corporation	2	35	ACCELERATION PRODUCTS, INC.	Corporation	1
11	BARKLEY SEED, INC.	Corporation	2	36	DAKOTA WAY	Corporation	1
12	CONCORD, INC.	Corporation	2	37	STRINGLINER COMPANY	Corporation	1
13	UNIVERSITY OF NORTH DAKOTA ENERGY AND ENVIRONMENT RESEARCH	University	2	38	WASTECO MANUFACTURING	Corporation	1
14	GARST SEED COMPANY	Corporation	2	39	NATIONAL FEEDING SYSTEMS, INC.	Corporation	1
15	MINNESOTA MINING AND MANUFACTURING COMPANY	Corporation	2	40	UNIVERSITY OF NORTH DAKOTA MEDICAL EDUCATION RESEARCH	University	1
16	GAS RESEARCH INSTITUTE	Institute	1	41	CLOVERDALE FOODS COMPANY	Corporation	1
17	J. R. SIMPLOT COMPANY	Corporation	1	42	TIP TOP MOBILITY, INC.	Corporation	1
18	MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH	Institute	1	43	DAKOTA TECHNOLOGIES, INC.	Corporation	1
19	REXWORKS INC.	Corporation	1				
20	UNITED STATES OF AMERICA, DEPARTMENT OF AGRICULTURE	U.S. Government	1				
21	WHITE CONSOLIDATED INDUSTRIES, INC.	Corporation	1				
22	HARVEST FUEL, INC.	Corporation	1				
23	THERMO-COOL PRODUCTS INC.	Corporation	1				
24	CENTER FOR INNOVATION AND BUSINESS DEVELOPMENT FOUNDATION	Institute	1				
25	AGCO CORPORATION	Corporation	1				

Data Source: CHI Research, USPTO

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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3. Overall Composition of Employment and Wages

Description:

A state's economy can be divided into traded clusters, local clusters, and natural resource industries. This table gives employment share and average wages for each of the three groups compared to national benchmarks.

Interpretation:

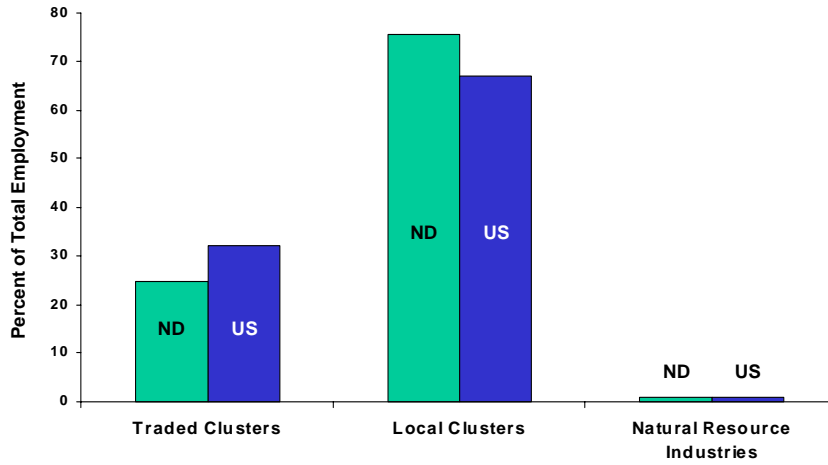
Traded clusters include those industries that compete across regions, and which tend to concentrate in a small number of locations. Traded clusters tend to be the engines of regional economic competitiveness, accounting for only about a third of employment but achieving much higher wages and productivity levels.

Local clusters involve activities serving almost exclusively local markets. These industries are present in every region in roughly the same proportions. Local clusters employ the majority of people in any regional economy, so their efficiency is critical for competitiveness in traded clusters to turn into regional prosperity. However, they cannot prosper over the long run without success in the traded clusters.

Natural-resource industries concentrate at natural resource sites. They account for a very small share of national employment.

Overall state economic performance can be decomposed into the contributions of the three different types of activities. Traded clusters provide particular insight. Underperformance in traded clusters or lower traded cluster wages may be signs of competitiveness difficulties.

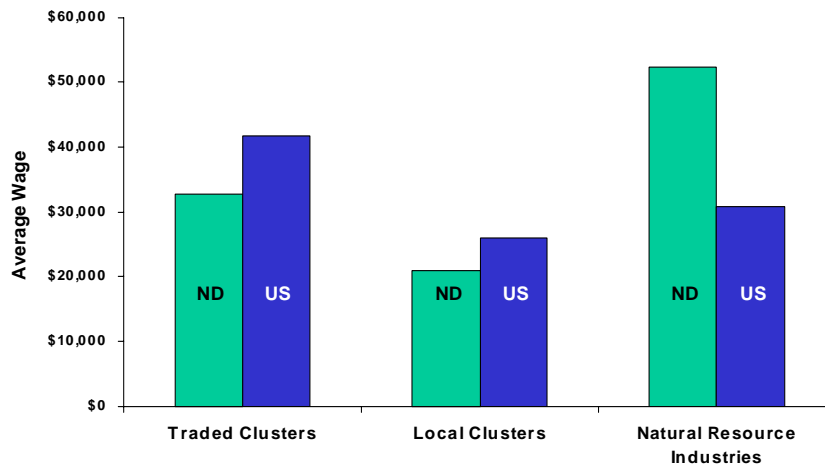
North Dakota Broad Composition of the Economy by Employment, 1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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North Dakota Broad Composition of the Economy by Average Wage, 1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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4. Employment by Cluster

Description:

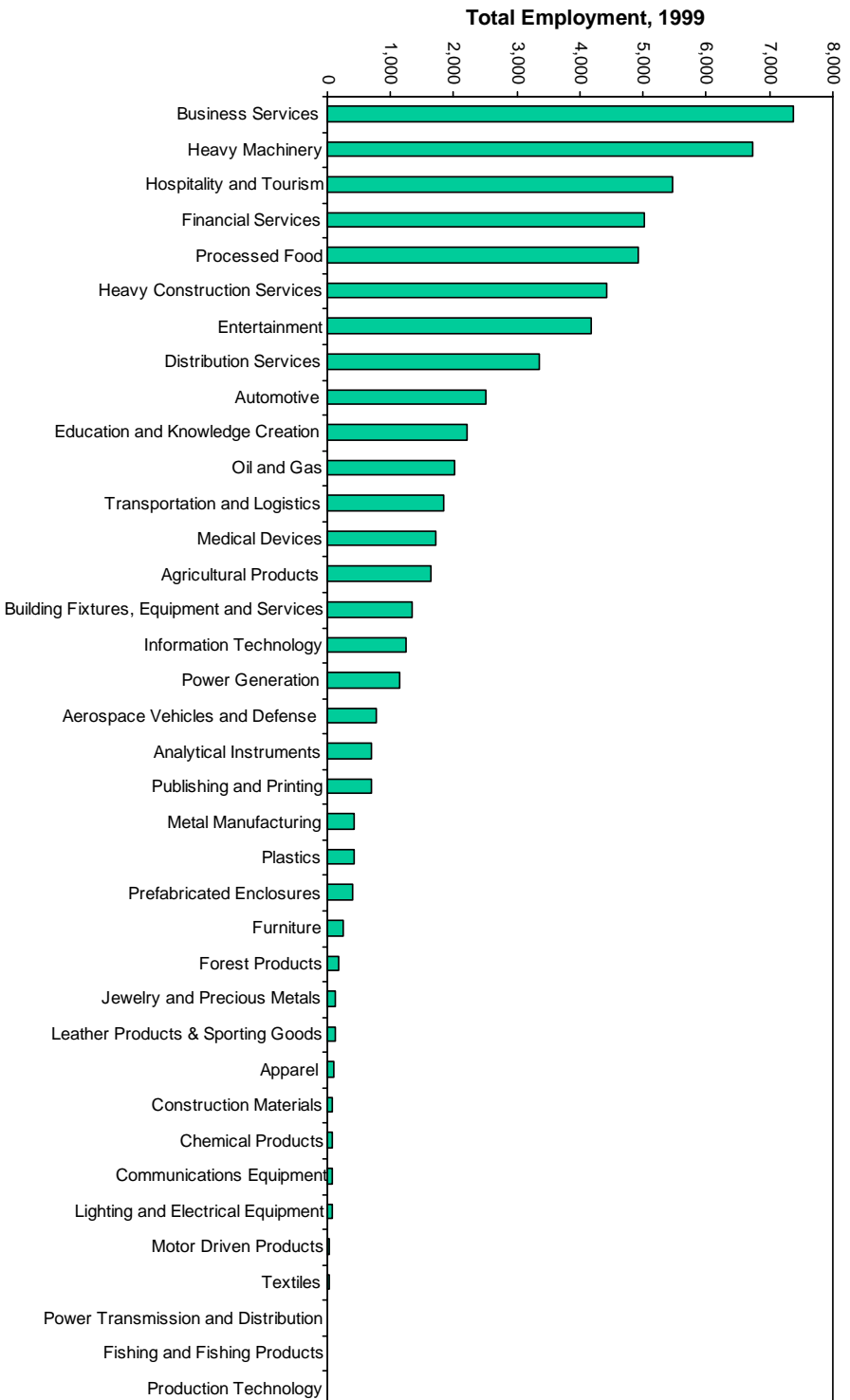
Within the broad categories of traded and local clusters, a state's economy can be divided into the individual clusters. Clusters are geographically proximate groups of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. 41 traded clusters and 19 local clusters in the US economy, listed in the appendix, were defined in the Cluster Mapping Project at the Institute for Strategy and Competitiveness at HBS.

This table gives total employment in the state economy by each traded and local cluster.

Interpretation:

The employment by cluster gives a more detailed profile of the activities in the state economy contributing to overall prosperity. They can be used to test whether policies targeted at specific, for example so-called high tech, industries have a chance of creating a material impact on overall living conditions in the state.

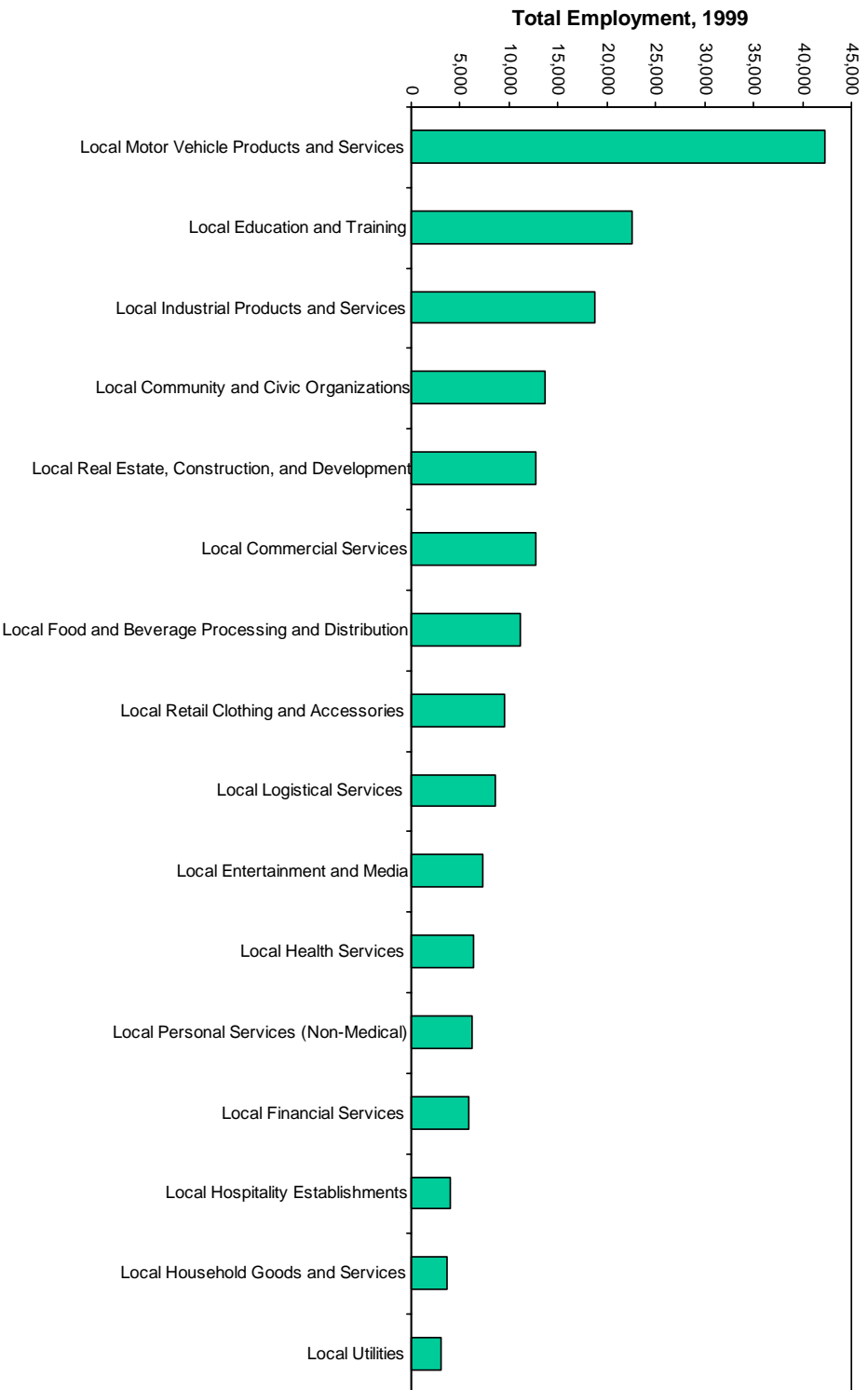
North Dakota Employment By Traded Cluster, 1999



Note: Chart utilizes narrow cluster definitions to eliminate overlapping employment across clusters.
 Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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North Dakota Employment By Local Cluster, 1999



Note: Chart utilizes narrow cluster definitions to eliminate overlapping employment across clusters.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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5. Job Creation by Traded Cluster

Description:

This chart plots the net gain or loss in jobs by traded cluster from 1990 to 1999 using narrow, non-overlapping cluster definitions. The clusters are arranged in order of net jobs created. The chart also gives the overall net gain or loss in traded jobs (i.e. total for all 41 traded clusters). Data for the United States overall is given below.

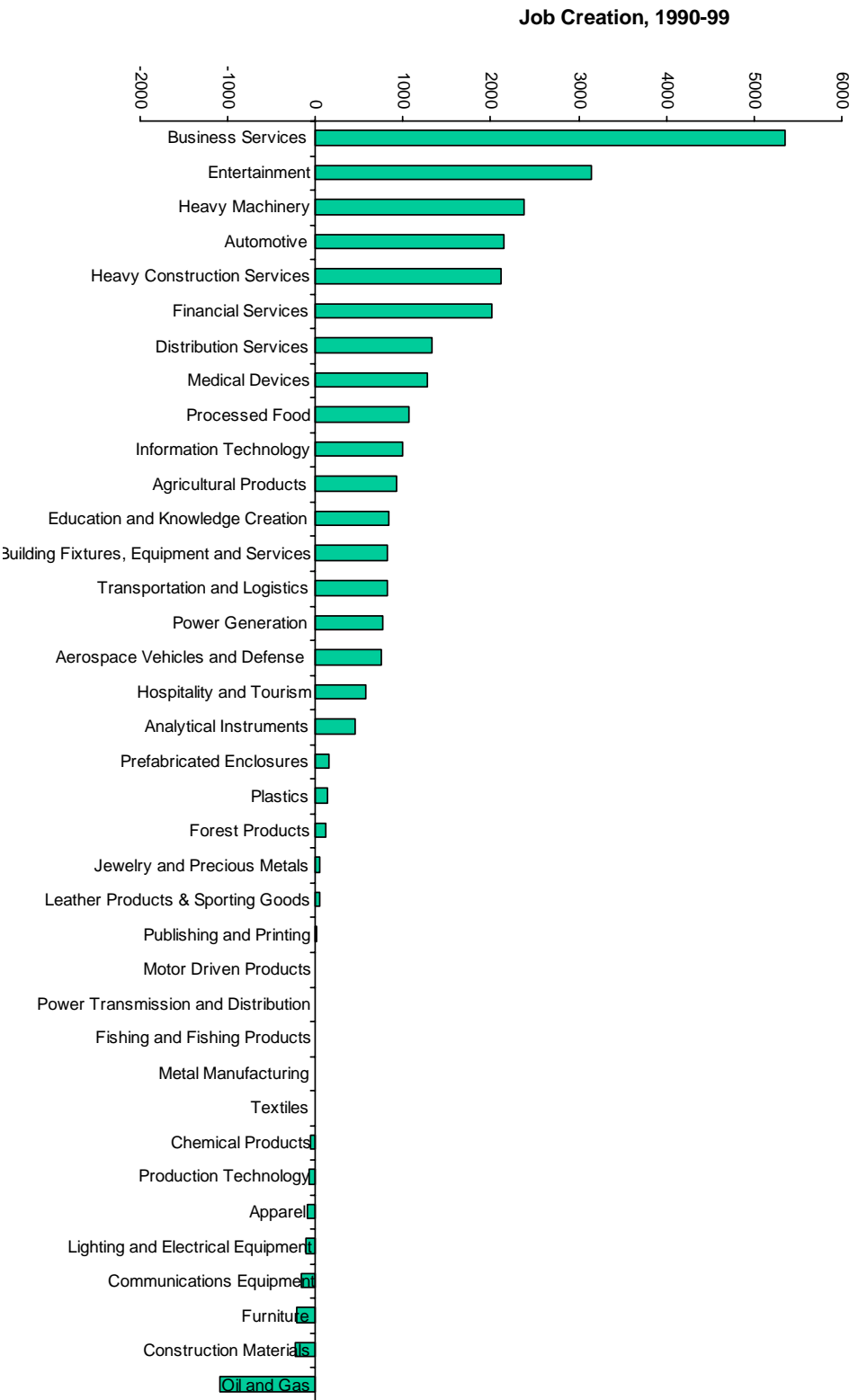
Interpretation:

This chart allows a region to identify its biggest job generators as well as job losers among traded clusters over the last decade. A few clusters often account for a large majority of the overall employment gain. It is helpful to compare these clusters with the priorities a state has set in its policies.

Comparison of job growth by cluster in the state relative to the U.S. can give insights into strengths and weaknesses in the state's economy. A state might be participating in a cluster which is surging nation-wide, or it might be gaining market position.

North Dakota

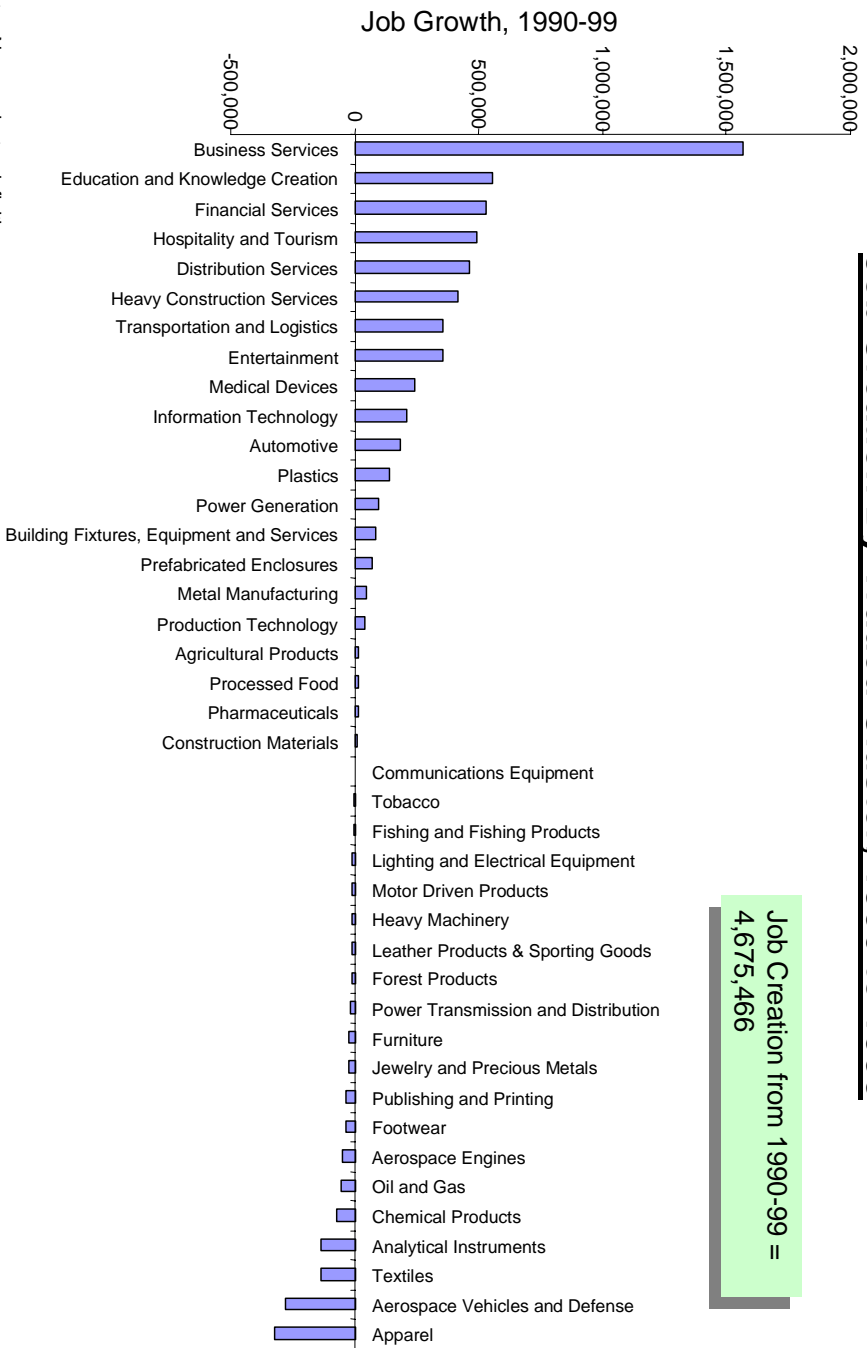
Job Creation By Traded Cluster, 1990 to 1999



Note: Chart utilizes narrow cluster definitions to eliminate overlapping Job Creation across clusters.
 Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu). Copyright © President and Fellows of Harvard College.

United States

Job Creation By Traded Cluster, 1990 to 1999



Note: Narrow cluster definitions
Source: Institute for Strategy and Competitiveness, Harvard Business School

6. Top 10 Highest Wage Traded Clusters, 1999

Description:

The ten highest wage traded clusters in the state are shown in decreasing order, with the width of the columns proportional to the number of workers in each cluster. The area of each cluster is thus equivalent to the overall wage sum the cluster generated in the state.

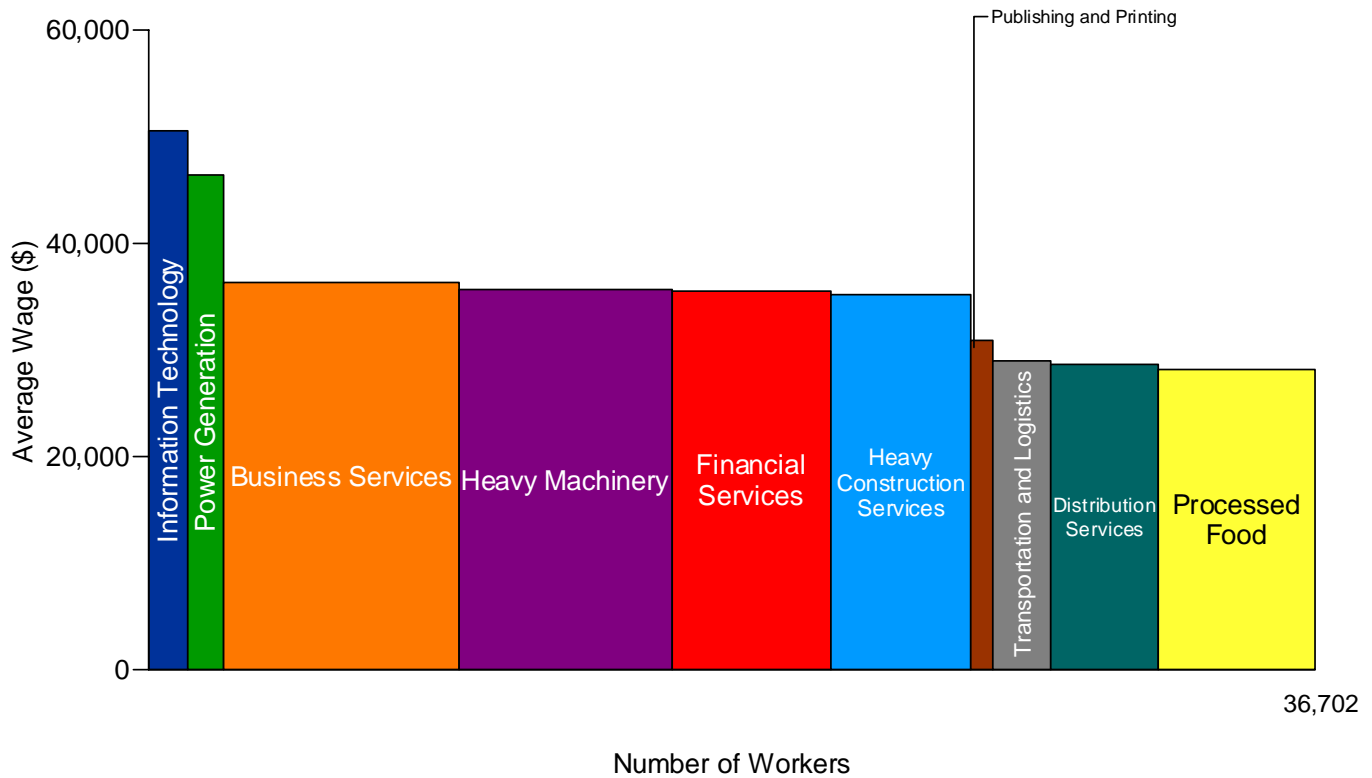
Interpretation:

The chart displays how the average wage in the state's traded clusters is built up by highest wage clusters. Some high wage clusters may have a small impact on overall wage levels because of their small size, the case in some high wage clusters. Some large, high wage clusters are often those in services.

The comparison to the U.S. average wages by cluster gives an initial benchmark to evaluate the composition of average wages in the state economy. States can increase wages in two different ways: (1) increase the employment in high wage clusters relative to low wage clusters and/or (2) increase the state's relative wages in given clusters. In practice, the second effect dominates as the explanation for why state wages differ.

North Dakota

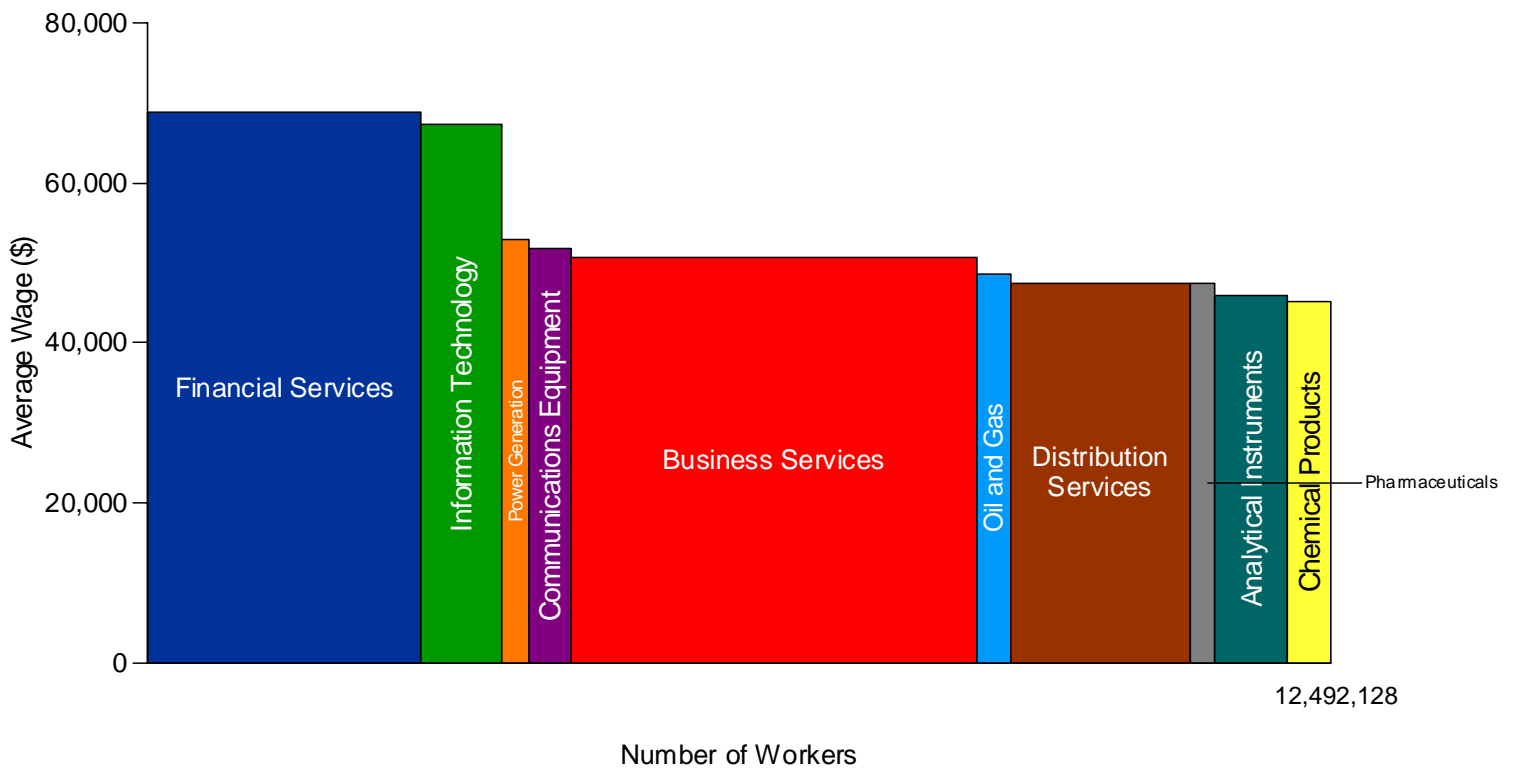
Top 10 Highest Wage Traded Clusters, 1999



Note: Graph utilizes narrow cluster definitions to eliminate overlapping employment across clusters

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United States Top 10 Highest Wage Traded Clusters, 1999



Note: Graph utilizes narrow cluster definitions to eliminate overlapping employment across clusters

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7. Specialization of the State Economy by Traded Clusters

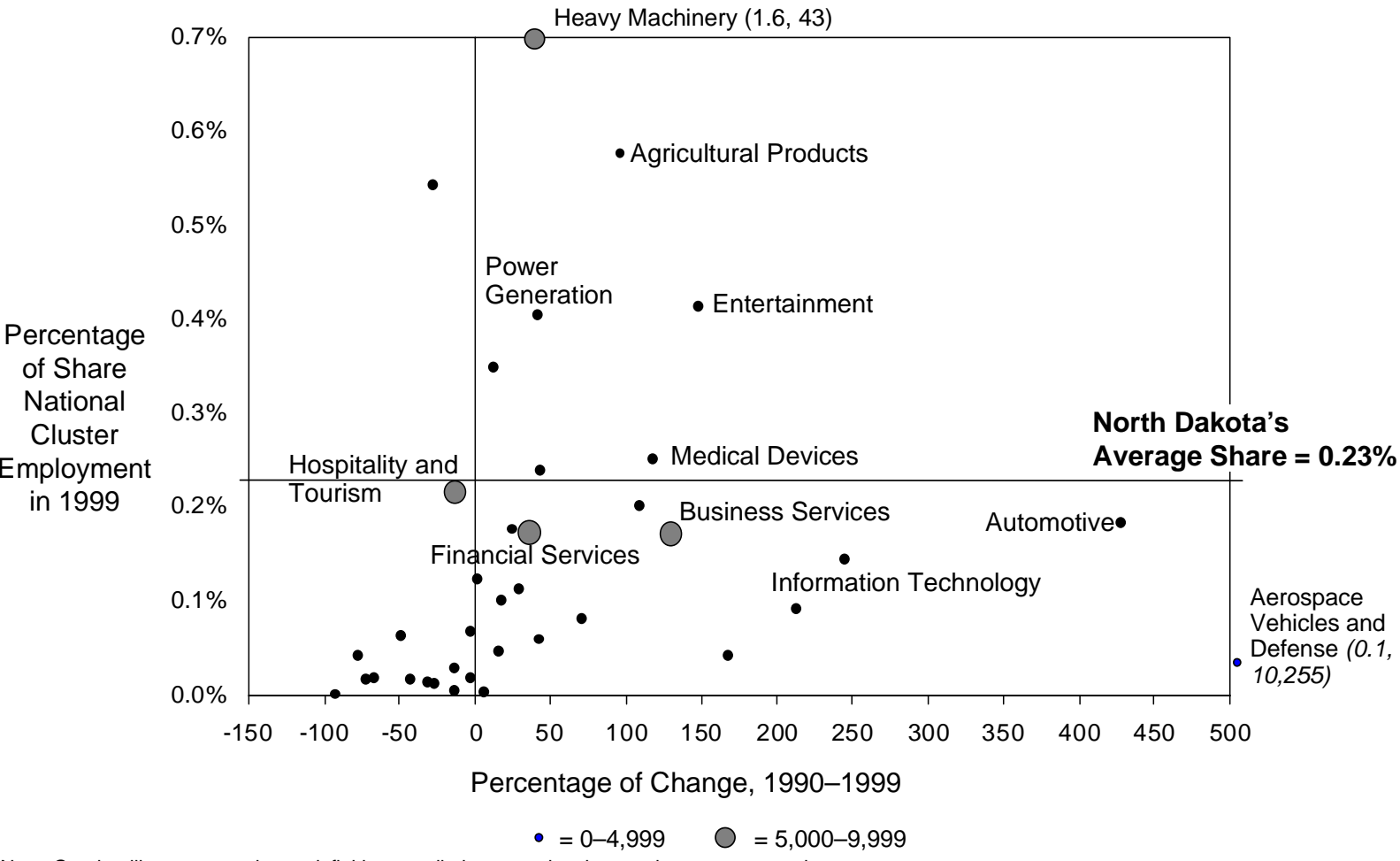
Description:

The slide plots all traded clusters in a state by regional employment share and change in share between 1990 and 1999. Narrow cluster definitions are utilized which eliminates cluster overlaps. The chart is divided into four quadrants, based on state's average share of traded employment, and whether the cluster is growing or losing share.

Interpretation:

This chart gives a snapshot of a region's competitive position by cluster. All 41 clusters are positioned according to current share and change in share over the last decade. The upper right-hand quadrant contains the region's strongest, most dynamic clusters, where the state has both a stronger than proportional share of national cluster employment and is adding share. Ideally, a number of significant clusters will appear in that quadrant. The lower right-hand quadrant contains clusters where the state is gaining employment share but which do not yet have a strong position. These clusters might present opportunities for the future. The upper-left hand quadrant indicates clusters that are strong but are losing relative position. These clusters might be traditionally important pillars of the state economy that are in need of revitalization. Finally, the lower-left hand quadrant indicated clusters with apparently limited competitiveness in the state.

North Dakota Specialization By Traded Cluster



Note: Graph utilizes narrow cluster definitions to eliminate overlapping employment across clusters.
 Data points too large to fit on the graph are placed on the borders and the values are given as: (y-axis, x-axis).
 Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

8. State Ranking by Leading Sub-Clusters

Description:

The slide gives the state's top 50 sub-clusters, or subunits within overall clusters, by national rank. Each cluster is divided into a number of subclusters which represent different subunits in which a region can be stronger or weaker.

Interpretation:

The slide provides additional information on areas of unique competitiveness in a state. Top ranking subclusters may signal the potential for a cluster to grow over time. Also, the pattern of subcluster strength may reveal opportunities at the intersection of clusters.

North Dakota

Top 50 Sub-Clusters By National Rank

Cluster	Sub-Cluster	National Rank	State Share of National Sub-Cluster Employment	Cluster	Sub-Cluster	National Rank	State Share of National Sub-Cluster Employment
Heavy Construction Services	Construction Materials	30	1.1	Building Fixtures, Equipment and	Oil and Gas Exploration and Drilling	17	0.6
	Equipment Distribution	43	0.4		Petroleum Processing	29.5	0.3
	Other Materials	40.5	0.3		Plumbing	36	0.5
	Fabricated Metal	43.5	0.3		Wood Products	42	0.4
Processed Food	Final Construction	50	0.2	Business Services	Data Processing	38	0.4
	Milling	18	2.0	Computer Programming	38	0.2	
	Meat and Related Products	36	0.4	Distribution Services	Farm Material and Supplies Wholesaling	37	0.7
	Flour	32	0.4	Catalog and Mail-order	42	0.2	
Heavy Machinery	Packaged Foods	41	0.3	Entertainment	Recorded Products	13	1.9
	Processed Dairy and Related Products	29	0.3	Entertainment Venues	37	0.7	
	Construction Machinery	13	2.4	Financial Services	Banking	44	0.2
	Farm Machinery	15	2.3	Insurance Products	41	0.2	
Hospitality and Tourism	Equipment and Parts	31	0.5	Prefabricated Enclosures	Trucks and Trailers	36	0.4
	Mining Machinery	26.5	0.4	Office Furniture	33	0.2	
	Specialized Inputs	43	0.5	Publishing and Printing	Professional Services	42	0.3
	Tour Services	38	0.3	Marketing Services	41	0.2	
Agricultural Products	Local Transportation	42	0.3	Transportation and Logistics	Transportation Arrangement	40	0.3
	Accommodations	49	0.2	Airports	45	0.2	
	Specialized Services	26	1.2	Aerospace Vehicles and Defense	Aircraft	25.5	0.2
	Packaged Foods	20	1.0	Analytical Instruments	Electronic Components	41	0.3
Automotive	Farm Management and Services	37	0.4	Education and Knowledge Creation	Related Professional Services	39	0.2
	Motor Vehicles	26	0.7	Information Technology	Software	31	0.4
	Transportation Equipment	35	0.2	Jewelry and Precious Metals	Specialty Materials	9.5	1.1
	Automotive Components	37.5	0.2	Medical Devices	Related Services	42	0.6
Oil and Gas	Hydrocarbons	14.5	0.9	Power Generation	Electric Services	34	0.5

Note: Using narrow cluster definitions to eliminate overlapping employment across clusters.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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Appendix a.

Clusters of Traded Industries

Upstream Sectors	Industrial and Supporting Functions	Final Consumption Goods and Services
<p><i>Materials and Metals</i></p> <ul style="list-style-type: none"> • Construction Materials • Metal Manufacturing <p><i>Forest Products</i></p> <ul style="list-style-type: none"> • Forest Products <p><i>Petroleum/Chemicals</i></p> <ul style="list-style-type: none"> • Oil and Gas • Chemical Products • Plastics <p><i>Semiconductors/Computers</i></p> <ul style="list-style-type: none"> • Information Technology 	<p><i>Transportation and Logistics</i></p> <ul style="list-style-type: none"> • Automotive • Motor Driven Products • Transportation and Logistics <p><i>Power</i></p> <ul style="list-style-type: none"> • Power Generation • Power Transmission and Distribution <p><i>Office</i></p> <ul style="list-style-type: none"> • Publishing and Printing <p><i>Telecommunications</i></p> <ul style="list-style-type: none"> • Communications <p><i>Defense</i></p> <ul style="list-style-type: none"> • Aerospace Engines • Aerospace Vehicles and Defense <p><i>Multiple Businesses</i></p> <ul style="list-style-type: none"> • Education and Knowledge Creation • Business Services • Distribution Services • Heavy Machinery • Financial Services • Prefabricated Enclosures • Production Technology • Analytical Instruments • Heavy Construction Services 	<p><i>Food/Beverages</i></p> <ul style="list-style-type: none"> • Agricultural Products • Processed Foods • Fishing and Fishing Products <p><i>Housing/Household</i></p> <ul style="list-style-type: none"> • Building Fixtures, Equipment and Services • Lighting and Electrical Equipment • Furniture <p><i>Textiles/Apparel</i></p> <ul style="list-style-type: none"> • Textiles • Apparel • Sporting and Leather Goods • Footwear <p><i>Health Care</i></p> <ul style="list-style-type: none"> • Medical Devices • Pharmaceuticals / Biotech <p><i>Personal</i></p> <ul style="list-style-type: none"> • Tobacco • Jewelry and Precious Metals <p><i>Entertainment/Leisure</i></p> <ul style="list-style-type: none"> • Entertainment • Hospitality and Tourism

Source: Institute for Strategy and Competitiveness, Harvard Business School

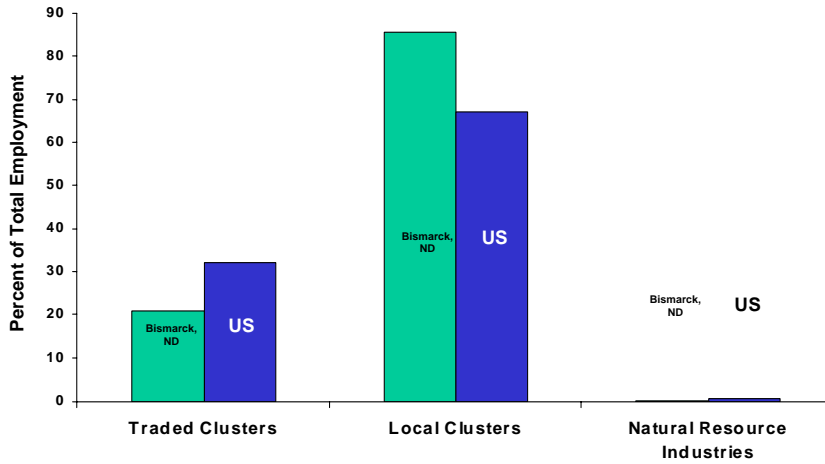
Clusters of Local Industries

Industrial and Supporting Functions	Final Consumption Goods and Services
<p><i>Multiple Businesses</i></p> <ul style="list-style-type: none"> • Local Industrial Products and Services • Local Commercial Services • Local Construction and Development • Local Financial Services • Local Insurance • Local Packaging Materials • Local Community and Civic Organizations • Local Education and Training <p><i>Transportation and Logistics</i></p> <ul style="list-style-type: none"> • Local Logistical Services • Local Personal Transportation <p><i>Power</i></p> <ul style="list-style-type: none"> • Local Utilities 	<p><i>Food/Beverages</i></p> <ul style="list-style-type: none"> • Local Agriculture • Local Food and Beverage Processing <p><i>Housing/Household</i></p> <ul style="list-style-type: none"> • Local Housing and Household Goods and Services <p><i>Textiles/Apparel</i></p> <ul style="list-style-type: none"> • Local Retail Clothing and Accessories <p><i>Health Care</i></p> <ul style="list-style-type: none"> • Local Health Services <p><i>Personal</i></p> <ul style="list-style-type: none"> • Local Personal Services (Non-medical) <p><i>Entertainment/Leisure</i></p> <ul style="list-style-type: none"> • Local Entertainment and Media • Local Hospitality and Establishments

Source: Institute for Strategy and Competitiveness, Harvard Business School

Appendix b:

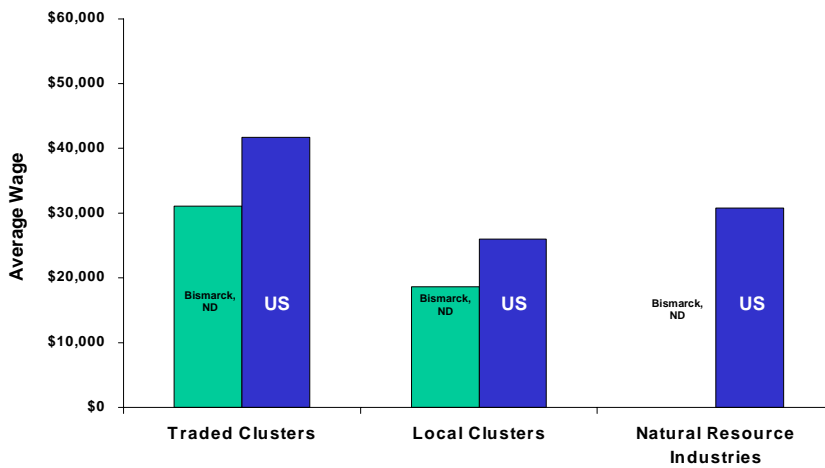
Bismarck, ND
Broad Composition of the Economy by Employment, 1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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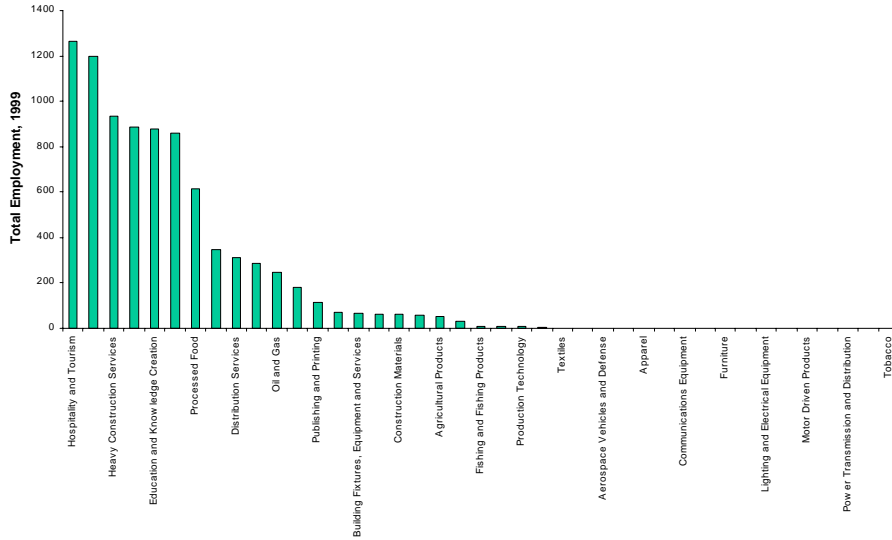
Bismarck, ND
Broad Composition of the Economy by Average Wage, 1999



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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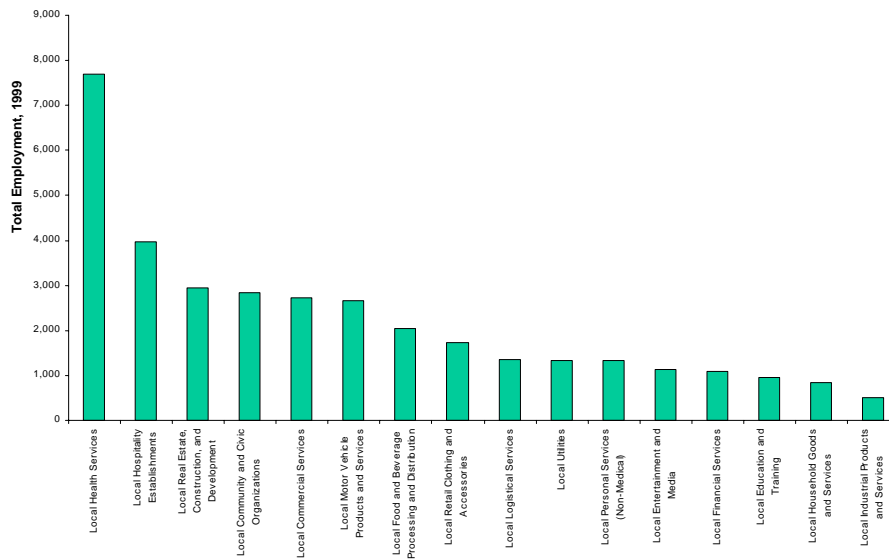
Bismarck, ND Employment By Traded Cluster, 1999



Note: Chart utilizes narrow cluster definitions to eliminate overlapping employment across clusters.
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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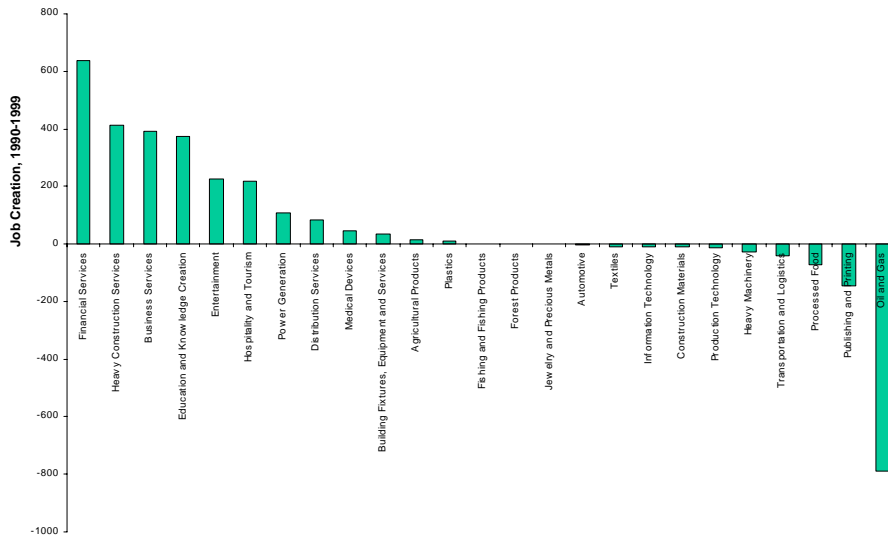
Bismarck, ND Employment By Local Cluster, 1999



Note: Chart utilizes narrow cluster definitions to eliminate overlapping employment across clusters.
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School (www.isc.hbs.edu).

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Bismarck, ND Job Creation By Traded Cluster, 1990 to 1999



Note: Chart utilizes narrow cluster definitions to eliminate overlapping employment across clusters.
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