Iowa Great Lakes Region Pilot Regional Cluster Analysis

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Introduction

Maintaining and growing industry clusters has become a focus for economic development professionals, elected officials and policy makers around the nation. A review of the academic and economic development practitioner literature provides a variety of definitions for what is an industry cluster. In the context of this regional cluster analysis, an appropriate definition for an industry cluster is from Michael Enright (1996) who defines an industry cluster as "a set of industries related through buyer-supplier and supplier-buyer relationships, or by common technologies, common buyers or distribution channels or common labor pools" (p. 191).

In 2000, the Iowa Department of Economic Development released *Iowa Target Industry Cluster Analysis*, a study completed by SRI International which identified three major industry clusters for the state of Iowa: advanced manufacturing, life sciences and information solutions. As the State of Iowa has focused much of its economic development strategy upon an industry cluster approach, many rural communities across Iowa have questioned how their rural areas fit within the State's cluster concept and how they can benefit from this approach.

In the Fall of 2002, the Community Vitality Center (CVC), engaged the Institute for Decision Making (IDM) at the University of Northern Iowa to undertake a research project to assist Iowa communities and regions to better determine how the communities' and regions' economic base ties into industry clusters that have been identified for the State of Iowa. The pilot project involved three regions in rural Iowa. The pilot regions where identified based on input and feedback from the Iowa Department of Economic Development, Iowa Workforce Development, Iowa State University's Department of Economics, the Iowa Area Development Group and MidAmerican Energy. Each of the regions had one or more economic development organizations that already had a long-term working relationship with IDM.

Methodology and Framework

A Framework for Regional Cluster Analysis:

As part of this project, IDM staff has worked closely with Dr. Ken Brown, Associate Professor in UNI's Department of Economics, to identify the most relevant literature and approaches for identifying industry clusters at a sub-regional level. IDM felt it was important that the methodology implemented provide local economic development organizations with useful information about the nature and scope of the industry cluster presence in their area, which they could utilize to shape their economic development strategies. After reviewing much of the literature on industry clusters, it was determined that a national industry cluster template framework initially developed by Edward J. Feser at the University of North Carolina (UNC) and Edward M. Bergman at the University of Austria, and then enhanced and expanded by Feser and fellow UNC researcer Jun Koo, could be replicated for regions in Iowa.

In their initial analysis, Feser and Bergman identified 28 "benchmark value-chain clusters" by conducting a statistical analysis of the *Benchmark Input-Output Accounts of the United States* to identify the trading patterns and technological similarities between industry sectors (Feser &

Bergman, 2000). Value-chain clusters are groups of industries in similar product chains, such as final market producers and their suppliers, or for non-manufacturing industries, groups of industries that utilize similar labor pools, such as banking and advertising. Feser and Koo enhanced the benchmark value-chain clusters by expanding the statistical analysis to include the *U.S. Staffing Patterns Matrix* and detailed occupational characteristics data from the U.S. Department of Labor, which led to the additional identification of eight "technology value-chain clusters" focusing on high-tech businesses (Feser & Koo, 2001). The benchmark value-chain clusters are detailed in Appendix A and the technology clusters are detailed in Appendix B.

Feser and Koo also identified 17 "benchmark labor clusters" by analyzing the *Staff Patterns Matrix* along with data from the Occupational Information Network (ONET), which is a matrix that identifies the knowledge and skills required for over 1,100 occupations. The benchmark labor skills ranged from "low skill, non-durable manufacturing" to "information processing" to "health services." Each benchmark labor cluster consists of industries with similar labor skill demands (see Feser & Koo, 2001). The benchmark labor clusters are detailed in Appendix C.

The advantage of using this framework is that the benchmark value-chain clusters and technology benchmark clusters provide a set of industry clusters based on buyer-supplier linkages of industries. Benchmark labor clusters provide a set of industry clusters based on the utilization of similar workforce skills by industries. For each of the three cluster templates (benchmark value-chain clusters, technology clusters and benchmark labor clusters) the industries within each cluster are identified at the four-digit Standard Industrial Classification (SIC) level. Data was not available in the North American Industry Classification System (NAICS), which is replacing the SIC code system. It is important to keep in mind that many of the industrial sectors have a presence in more than one cluster. An example is that plastics plumbing fixtures (SIC 3088) is in both the chemicals and plastics industry cluster and the motor vehicle manufacturing industry cluster.

Data for Analysis:

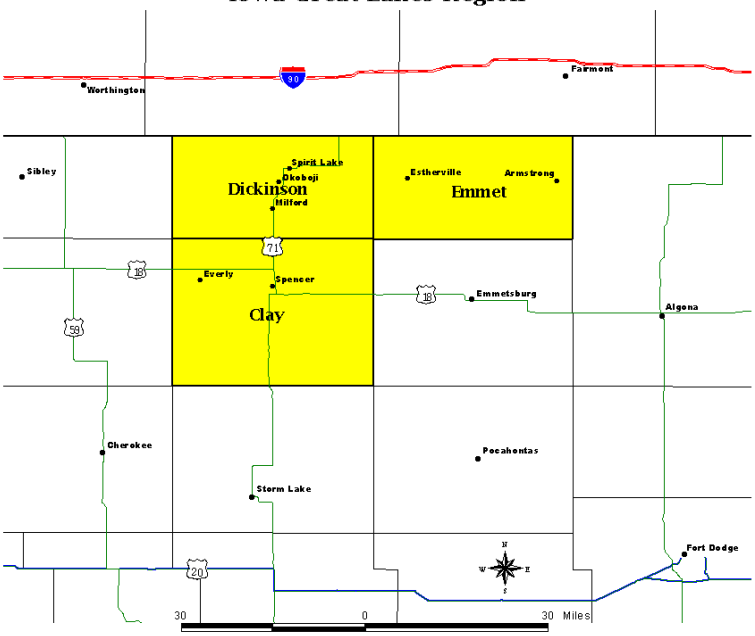
To apply the cluster template framework and conduct regional cluster analysis for the Iowa Great Lakes Region required IDM to acquire U.S., state and county level employment and wage data at the 4-digit SIC Code level from the Minnesota IMPLAN Group (MIG). This data was required since there was no available government data for many industry sectors at the county level, and to a lesser extent at the state level, due to federal data suppression requirements that protect the identity of businesses. MIG uses statistical modeling to estimate employment and wages for all industries present within a specific county. In order to examine cluster trends, IDM obtained data for 1990 and 2000 (the latest data available).

The IMPLAN data was then aggregated into the various benchmark value-chain clusters, technology benchmark clusters and benchmark labor clusters to determine the level of cluster presence in the region. What follows is an analysis of that data for the Iowa Great Lakes Region to determine what clusters have a presence in the region and how the region compares at the U.S. level and Iowa statewide.

Geography of the Iowa Great Lakes Region:

The Iowa Great Lakes Region consists of three Iowa counties: Clay, Dickinson and Emmet counties (see Map 1). The region had a population of just over 44,800 in the 2000 Census. A quarter of the Region's population resides in Spencer, which had a population of 11,317 in 2000. Nearly 30 percent of the population resides in three other communities: Estherville (6,656), Spirit Lake (4,261) and Milford (2,474). The geography of the Iowa Great Lakes Region was determined based on the nature of the functional economies of the major communities in three counties, but with special attention paid to Spencer due to its size.

Map 1
Iowa Great Lakes Region



To determine which counties were logical, several different data sources were reviewed including the Spencer Laborshed Study completed by IDM, 2000 Census data on worker commuting patterns, research completed by David Swenson and Liesl Eathington with the Department of Economics at Iowa State University and updated laborshed maps developed by Iowa Workforce Development for Spencer, Spirit Lake and Milford. In addition, IDM staff had discussions with Chad Shryock, Executive Director of the Iowa Great Lakes Corridor of Opportunity.

Benchmark Value-Chain Clusters

As described previously, the 28 benchmark value-chain clusters are based on buyer and supplier linkages of various industries. Table 1 provides a breakdown of employment and employment concentrations of the benchmark value-chain clusters for the Iowa Great Lakes Region, Iowa and the United States. The table is sorted by total employment in the Iowa Great Lakes Region in the year 2000. The Iowa Great Lakes Region did not have all of the benchmark value-chain clusters present. The metalworking and industrial machinery industry cluster had the highest employment in 2000 with slightly over 1,335 employees followed by the fabricated textiles industry cluster and the construction materials industry cluster.

Of the 21 value-chain clusters which have a presence in the Iowa Great Lakes Region, all but four clusters experienced growth in employment from 1990 to 2000. At the national level for the same timeframe, for the same 21 clusters, 14 clusters experienced employment growth and six clusters experienced a decline in employment. Many of the clusters present in the Iowa Great Lakes Region had employment trends which did not mirror U.S. or Iowa trends. Four clusters in the Iowa Great Lakes Region grew in employment while those clusters declined at the national level (leather goods cluster, food oil mills cluster, aluminum cluster and canned and bottled beverage cluster). Two clusters experienced increases in employment at the national level while in the Iowa Great Lakes Region those clusters had employment declines (securities and insurance cluster and transportation, shipping and logistics cluster). Of the six clusters which where not present in 2000 in the region, only one cluster, the pharmaceuticals cluster experienced employment growth at the U.S. level, yet all but two of those six industry clusters grew statewide.

Table 1
Iowa Great Lakes Region
Employment Change and Location Quotients

	Employment							
		% Change			Location Quotients			
Cluster	IA GL 2000	IA GL '90-'00	IA '90-'00	US '90-'00	IA GL 2000	IA GL '90-'00	IA 2000	IA '90-'00
Metalworking and industrial machinery	1,335	2.0%	-0.1%	0.6%	1.4	0.36	1.67	0.19
Fabricated textiles	1,033	-5.5%	0.0%	-3.5%	5.2	-0.29	0.63	0.26
Construction materials	948	1.9%	0.3%	1.2%	1.5	0.31	1.11	0.11
Transportation, shipping, and logistics	706	-0.8%	0.2%	2.8%	1.1	-0.25	1.06	-0.08
Printing and publishing	532	1.2%	0.2%	3.4%	0.5	-0.03	0.93	-0.12
Banking and advertising	527	0.6%	0.1%	1.2%	0.8	0.08	0.91	0.07
Hospitals, labs, and specialized medical services	406	0.0%	0.3%	3.5%	0.3	-0.06	0.82	-0.12
Chemicals and plastics	319	0.9%	0.1%	1.2%	0.6	0.08	0.97	0.08
Packaged food products	274	0.3%	-0.1%	0.1%	0.9	0.15	2.33	0.35
Primary nonferrous metals	251	1.0%	0.3%	0.8%	2.4	0.39	1.16	0.15
Motor vehicle manufacturing	147	2.2%	0.0%	1.4%	0.3	0.06	1.16	0.05
Wood products and furniture	116	1.1%	0.7%	0.6%	0.6	0.12	1.32	0.23
Canned and bottled beverages	97	0.5%	-0.4%	-1.6%	2.8	0.87	4.37	1.14
Leather goods	97	6.9%	-0.3%	-6.7%	8.8	6.86	0.59	0.34
Legal services	89	0.0%	-0.1%	1.0%	0.5	0.03	0.59	0.05
Securities and insurance	75	-0.8%	0.3%	2.1%	0.2	-0.03	1.25	0.01
Information technology and instruments	40	1.1%	0.0%	2.7%	0.0	0.00	0.68	-0.06
Aluminum	30	1.1%	0.2%	-2.9%	0.9	0.40	1.90	0.74
Food oil mills	13	6.4%	0.3%	-1.0%	2.5	1.48	4.65	1.24
Apparel	9	0.0%	-1.1%	-4.6%	0.0	-2.41	0.28	0.12
Boat building	3	0.0%	-1.9%	0.3%	0.1	0.01	0.68	-0.03
Aerospace	0	NA	-0.2%	-5.1%	0.0	0.00	1.35	0.67
Jewelry	0	NA	1.2%	-2.4%	0.0	0.00	0.03	0.01
Petroleum products	0	NA	0.9%	-2.1%	0.0	0.00	0.36	0.14
Pharmaceuticals	0	NA	0.3%	2.7%	0.0	0.00	0.65	-0.04
Platemaking and typesetting	0	NA	0.1%	-1.8%	0.0	0.00	1.27	0.40
Stone, clay, and glass products	0	NA	-1.7%	-1.3%	0.0	0.00	1.24	0.16

Data source: U.S. Bureau of Labor Statistics ES-202 files (from Minnesota IMPLAN Group, Inc). The tobacco products cluster has been left out. IA GL = the Iowa Great Lakes Region.

Table 2 compares the wage and employment data for each of the value-chain clusters at the national level, state level and at the Iowa Great Lakes Region level for 1990 and 2000.

Table 2
Iowa Great Lakes Region
Benchmark Value-Chain Clusters
Employment and Average Wages

	Employment					Average Wage			
			% Change				% Change		
Cluster	2000	Per Estab.	IA GL '90-'00	IA '90-'00	US '90-'00	2000	GL IA '90-'00	IA '90-'00	US '90-'00
Metalworking and industrial machinery	1,335	31.0	2.0%	-0.1%	0.6%	32,129	0.8%	0.4%	4.1%
Fabricated textiles	1,033	258.3	-5.5%	0.0%	-3.5%	35,381	1.7%	0.2%	5.9%
Construction materials	948	29.6	1.9%	0.3%	1.2%	34,146	0.4%	0.4%	5.1%
Transportation, shipping, and logistics	706	10.4	-0.8%	0.2%	2.8%	26,996	-0.4%	0.4%	3.4%
Printing and publishing	532	11.6	1.2%	0.2%	3.4%	27,929	0.6%	0.7%	8.7%
Banking and advertising	527	9.2	0.6%	0.1%	1.2%	32,919	0.2%	0.6%	10.3%
Hospitals, labs, and specialized medical services	406	10.4	0.0%	0.3%	3.5%	26,115	0.3%	0.6%	8.1%
Chemicals and plastics	319	8.9	0.9%	0.1%	1.2%	29,883	0.1%	0.6%	4.1%
Packaged food products	274	30.4	0.3%	-0.1%	0.1%	27,060	0.1%	0.3%	4.2%
Primary nonferrous metals	251	41.8	1.0%	0.3%	0.8%	34,535	0.8%	0.1%	4.0%
Motor vehicle manufacturing	147	12.3	2.2%	0.0%	1.4%	34,530	0.8%	0.5%	4.6%
Wood products and furniture	116	9.7	1.1%	0.7%	0.6%	21,501	0.6%	0.4%	3.5%
Canned and bottled beverages	97	19.4	0.5%	-0.4%	-1.6%	43,557	-0.2%	0.5%	6.2%
Leather goods	97	97.0	6.9%	-0.3%	-6.7%	20,551	0.6%	0.4%	6.6%
Legal services	89	3.4	0.0%	-0.1%	1.0%	22,041	0.1%	0.9%	5.0%
Securities and insurance	75	2.3	-0.8%	0.3%	2.1%	16,984	-1.8%	0.5%	8.1%
Information technology and instruments	40	3.6	1.1%	0.0%	2.7%	37,027	2.3%	0.6%	10.2%
Aluminum	30	30.0	1.1%	0.2%	-2.9%	41,336	0.3%	0.3%	4.0%
Food oil mills	13	6.5	6.4%	0.3%	-1.0%	53,382	1.0%	0.4%	4.1%
Apparel	9	4.5	0.0%	-1.1%	-4.6%	20,948	-1.3%	0.1%	5.3%
Boat building	3	3.0	0.0%	-1.9%	0.3%	27,274	0.6%	2.0%	4.0%
Aerospace	0	NA	NA	-0.2%	-5.1%	NA	NA	0.4%	5.2%
Jewelry	0	NA	NA	1.2%	-2.4%	NA	NA	0.2%	6.8%
Petroleum products	0	NA	NA	0.9%	-2.1%	NA	NA	0.1%	5.3%
Pharmaceuticals	0	NA	NA	0.3%	2.7%	NA	NA	0.6%	4.3%
Platemaking and typesetting	0	NA	NA	0.1%	-1.8%	NA	NA	1.1%	10.2%
Stone, clay, and glass products	0	NA	NA	-1.7%	-1.3%	NA	NA	0.4%	4.4%

Data source: U.S. Bureau of Labor Statistics ES-202 files (from Minnesota IMPLAN Group, Inc). The tobacco products cluster has been left out. IA GL = the Iowa Great Lakes Region.

Table 3 shows that the food oil mills cluster had the highest average wage in 2000 for the Iowa Great Lakes Region. All but four of the benchmark clusters present in the Iowa Great Lakes Region experienced an increase in their annual average wage from 1990 to 2000. However, none of the clusters at the U.S. and Iowa levels had a decline in wages over the decade of the 1990s. Of the benchmark clusters with a significant employment presence in 2000 in the region,

only one of the clusters had an annual wage growth of one percent or higher, the fabricated textiles industry cluster. This is considerably different from the wage growth rates for the clusters at the national level where every single one experienced an annual percentage increase in wages in 2000 over 1990, with the highest annual percentage being 10.3 percent for the banking and advertising cluster and the lowest being 3.4 percent for the transportation, shipping and logistics cluster. Wage growth rates statewide in Iowa are comparable to the Iowa Great Lakes Region's growth rates.

Table 3
Iowa Great Lakes Region
Benchmark Value-Chain Clusters
Employment and Average Wages – 1990-2000

	U.S.			Iowa			Region		
	Average Wage		%Chg	Average Wage		%Chg	Average Wage		%Chg
Cluster	1990	2000	'90-'00	1990	2000	'90-'00	1990	2000	'90-'00
Metalworking and industrial machinery	29,114	41,192	4.1%	37,261	38,880	0.4%	29,581	35,381	0.8%
Fabricated textiles	17,729	28,165	5.9%	25,753	26,255	0.2%	29,863	35,381	1.7%
Construction materials	28,703	43,416	5.1%	33,873	35,300	0.4%	32,662	34,146	0.4%
Transportation, shipping, and logistics	27,515	36,805	3.4%	29,386	30,482	0.4%	27,970	26,996	-0.4%
Printing and publishing	31,867	59,668	8.7%	35,207	37,632	0.7%	26,255	27,929	0.6%
Banking and advertising	30,759	62,451	10.3%	35,754	37,860	0.6%	32,233	32,919	0.2%
Hospitals, labs, and specialized medical services	26,639	48,194	8.1%	29,221	31,073	0.6%	25,297	26,115	0.3%
Chemicals and plastics	29,979	42,372	4.1%	32,930	34,938	0.6%	29,556	29,883	0.1%
Packaged food products	24,283	34,361	4.2%	30,665	31,559	0.3%	26,738	27,060	0.1%
Primary nonferrous metals	27,708	38,688	4.0%	31,261	31,683	0.1%	31,850	34,535	0.8%
Motor vehicle manufacturing	30,082	43,859	4.6%	32,758	34,284	0.5%	31,858	34,530	0.8%
Wood products and furniture	24,879	33,692	3.5%	28,780	29,901	0.4%	20,187	21,501	0.6%
Canned and bottled beverages	33,613	54,468	6.2%	45,778	48,304	0.5%	44,269	43,557	-0.2%
Leather goods	40,054	66,364	6.6%	25,493	26,595	0.4%	19,412	20,551	0.6%
Legal services	39,997	59,969	5.0%	35,727	38,958	0.9%	21,851	22,041	0.1%
Securities and insurance	29,722	53,939	8.1%	42,045	44,206	0.5%	20,370	16,984	-1.8%
Information technology and instruments	36,003	72,579	10.2%	38,959	41,180	0.6%	29,622	37,027	2.3%
Aluminum	38,195	53,580	4.0%	59,012	60,681	0.3%	40,070	41,336	0.3%
Food oil mills	29,395	41,474	4.1%	36,039	37,655	0.4%	48,270	53,382	1.0%
Apparel	17,841	27,364	5.3%	22,061	22,237	0.1%	23,838	202948	-1.3%
Boat building	31,395	43,837	4.0%	45,445	55,490	2.0%	25,718	27,274	0.6%
Aerospace	39,302	59,570	5.2%	47,569	49,278	0.4%	NA	NA	NA
Jewelry	17,439	29,344	6.8%	19,013	19,477	0.2%	NA	NA	NA
Petroleum products	42,659	65,121	5.3%	34,827	35,283	0.1%	NA	NA	NA
Pharmaceuticals	24,349	34,935	4.3%	40,565	45,120	1.1%	NA	NA	NA
Platemaking and typesetting	43,202	87,128	10.2%	35,500	37,801	0.6%	NA	NA	NA
Stone, clay, and glass products	37,168	53,442	4.4%	47,193	49,239	0.4%	NA	NA	NA

Data source: U.S. Bureau of Labor Statistics ES-202 files (from Minnesota IMPLAN Group, Inc). The tobacco products cluster has been left out. IA GL = the Iowa Great Lakes Region.

Table 3 also shows that only two of the 21 clusters which had a presence in the Iowa Great Lakes Region in 2000 had an annual wage higher than the cluster's national average, the food oil mills

cluster and the fabricated textiles cluster. The composition of the industries within each cluster at the regional, state and national levels have a significant impact on employment and wage levels of that cluster. For most clusters, several key industries have a dominant influence on the clusters make-up at the regional level. To examine this further, a more detailed analysis will be undertaken of the five benchmark value-chain clusters which have the largest employment in the Iowa Great Lakes Region in 2000: metalworking and industrial machinery cluster, fabricated textiles cluster, construction materials cluster, transportation, shipping, and logistics cluster, and the printing and publishing cluster.

Metalworking and Industrial Machinery Cluster

The metalworking and industrial machinery cluster had the largest employment in the Iowa Great Lakes Region in 2000 with 1,335 employees. The cluster saw an annual employment growth rate of 2.0 percent between 1990 and 2000 while the U.S. only had an annual rate of 0.6 percent and Iowa experienced an annual rate of -0.1 percent. The cluster in 2000 consisted of 43 establishments and had an annual payroll of $42.9 million. The cluster's average annual wage was $32,129 and experienced an annual percentage wage increase of 0.8 percent between 1990 and 2000. The cluster's average at the U.S. level in 2000 was $41,192 and had a compounded annual growth rate of over 3.5 percent over its 1990 wage level. Statewide the cluster had an average annual wage of $38,880 and a compounded annual growth rate of 0.4 percent.

Figure 1 - Metalworking and Industrial Machinery Cluster Industry Mix

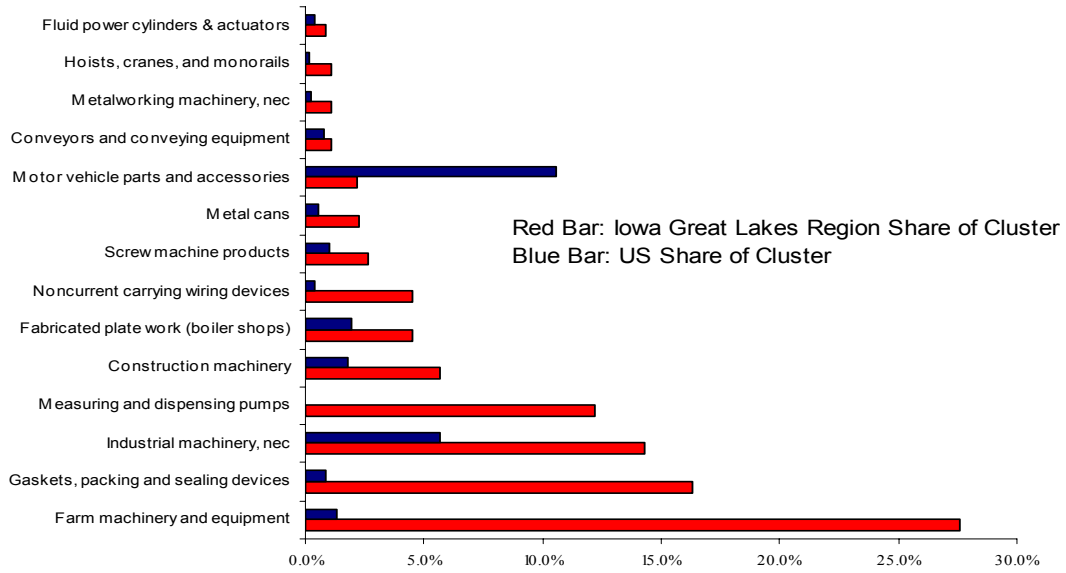


Figure 1 shows that a number of the industry sectors which make up the metalworking and industrial machinery cluster are present in the Iowa Great Lakes Region. The farm machinery and equipment industry (SIC 3523) was the largest industry employer in the cluster in the region, with over a quarter of the cluster's employment. Other major employing industry sectors in 2000 were the gaskets, packing and sealing devices industry (SIC 3053), the industrial machinery, n.e.c. (SIC 3599) and the measuring and dispensing pumps industry (SIC 3586). Each of these industries had employment levels over 100 workers in 2000. The largest employers in the cluster at the national level were the motor vehicle parts industry (SIC 3714), the industrial machinery industry (SIC 3599), the special dies, tools, jigs and fixtures industry (SIC 3544) and the blast

furnace and steel mills industry (SIC 3312). The farm machinery and equipment industry was also the largest employer in the cluster statewide in Iowa in 2000.

According to Dun and Bradstreet and the *Iowa Manufacturers Register* the largest employers in the metalworking and industrial machinery cluster in the three-county region include Eaton Corporation, Armstrong Rim and Wheel Manufacturing, Arts-Way Manufacturing, Simonsen Iron Works, Tecton Industries, General Machine Works, Simrit, Maurer Manufacturing and Vander Haeg's.

Fabricated Textiles Cluster

The fabricated textiles cluster in the Iowa Great Lakes Region in 2000 consisted of 1,033 employees and four establishments. Its annual payroll was $36.5 million and had an annual average wage of $35,381. The cluster's annual average wage increased by 1.7 percent annually between 1990 to 2000. The cluster's average annual wage at the U.S. level was $28,165 in 2000, below the region's wage rate, and had an annual percentage increase of 5.9 percent during the 1990s. The average annual wage statewide was below the region and U.S. averages ($26,255) and the annual percentage increase in wages was also below the region and the U.S. (0.2 percent).

Figure 2 - Fabricated Textiles Cluster Industry Mix

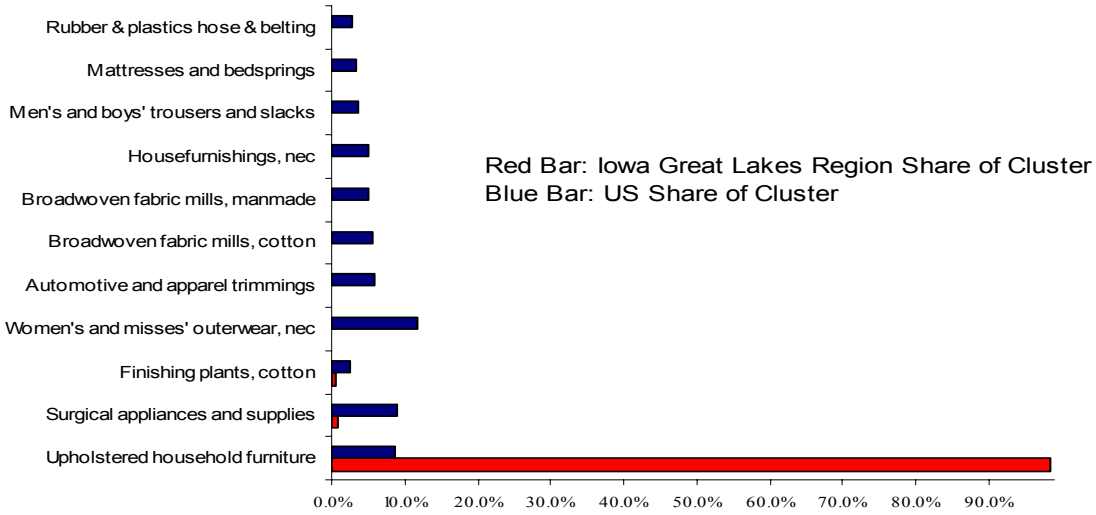
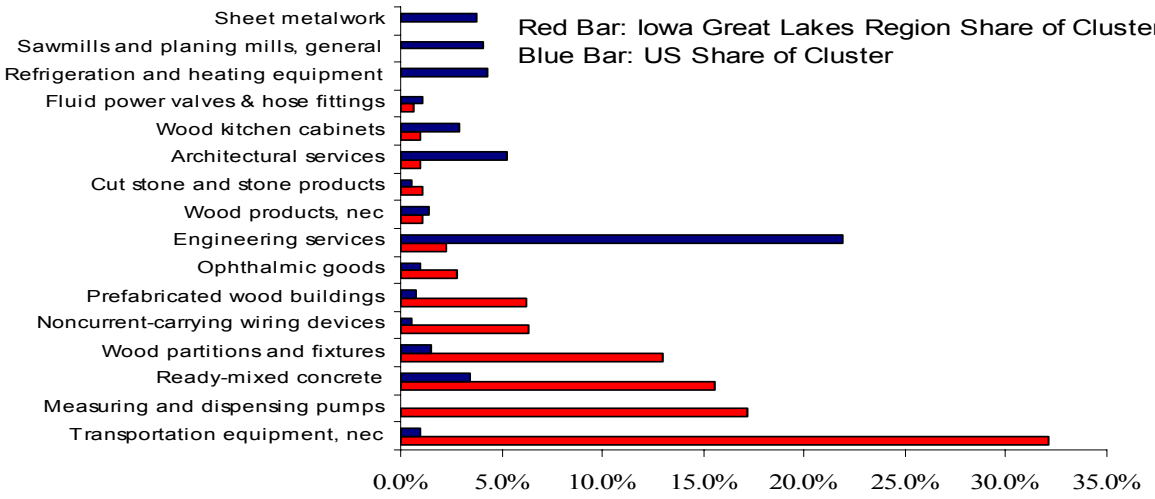


Figure 2 illustrates the distribution of employment by industry in the fabricated textiles cluster for the Iowa Great Lakes Region and the U.S. The upholstered household furniture industry (SIC 2512) with 1,018 employees had nearly all of the employment within the cluster in 2000. The upholstered household furniture industry was also the largest employer for this cluster at the state level. At the U.S. level the womens and misses outerwear, n.e.c. industry is the largest sector in the cluster. Employment in the cluster at the Iowa Great Lakes Region level and the U.S. level declined between 1990 and 2000. The annual rate of decline for the region (-5.5 percent) was larger than the U.S. annual rate (-3.5 percent). According to Dun and Bradstreet the largest employers in the fabricated textiles cluster in the Iowa Great Lakes Region are Stylecraft Furniture and Brown Medical Industries.

Construction Materials Cluster

The construction materials cluster was the third largest benchmark value-chain cluster in the Iowa Great Lakes Region with employment in 2000 of 948 workers. The cluster had 32 establishments in 2000 and experienced an annual increase in employment of nearly 2 percent between 1990 and 2000. Figure 3 compares the employment distribution for the construction materials cluster in the Iowa Great Lakes Region and nationwide. The largest industry sectors in the cluster region are the transportation equipment industry, n.e.c. (SIC 3799), the measuring and dispensing pumps industry (SIC 3586), the ready-mix concrete industry (SIC 3273) and the wood partitions and fixtures industry (SIC 2541).

Figure 3 - Construction Materials Cluster Industry Mix



At the national level, employment in this cluster is dominated by the engineering services (SIC 8711) and architectural services (SIC 8712) industries, followed by the refrigeration and heating equipment industry (SIC 3585), the saw mills and planing mills industry (SIC 2421) and the sheet metalwork industry (SIC 3444). Statewide, the millwork industry (SIC 2431) was the cluster's largest employer. The significance of the engineering and architectural services industry at the national level provides some explanation of the difference in the annual average wage in 2000 between the Iowa Great Lakes Region ($34,146) and Iowa ($35,300) and the U.S. ($43,416). The engineering services industry had an annual average wage of $39,701 in the Iowa Great Lakes Region and $58,081 at the U.S. level, while the architectural services cluster had a annual average wage of $30,233 in the region and $53,996 at the U.S. level.

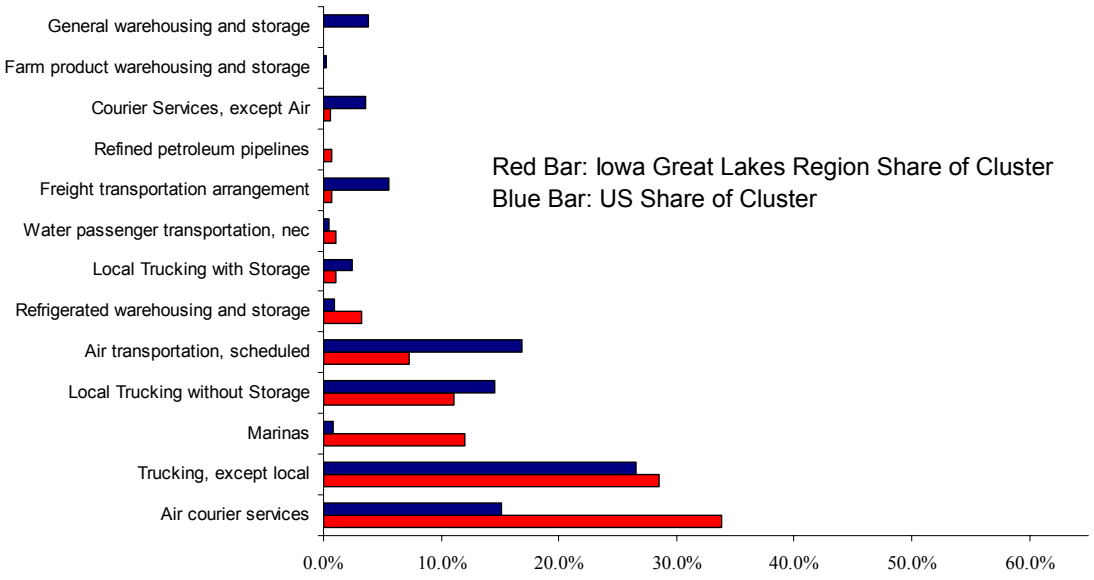
A further look at wages for the individual industry sectors present in the region within this cluster illustrates wage disparities between the U.S. level and the region. Three of the five largest industry sectors by employment in the cluster had annual average wages that were higher than the sector averages at the U.S. level: transportation equipment ($34,935 vs. $31,134), wood partitions and fixtures ($37,440 vs. $32,250) and noncurrent-carrying wiring devices ($50,996 vs. $36,649). According to Dun & Bradstreet and the *Iowa Manufacturers Register* the major employers in this cluster in the Iowa Great Lakes Region include Polaris Industries, Cycle Country Accessories and National-Spencer.

Transportation, Shipping and Logistics Cluster

Of all of the benchmark value-chain clusters which have a presence in the Iowa Great Lakes Region, the transportation, shipping and logistics cluster had the highest number of establishments with 68 in 2000. In 2000, the cluster had employment slightly over 706. However, employment in the cluster is now significantly smaller due to the move of Great Lakes Aviation out of Spencer in 2000, which had 239 employees in 2000 and was the largest employer in the cluster, the air courier services industry (SIC 4513). In the decade of the 1990s the cluster experienced a decline in employment, declining from 765 to 706 employees. The majority of the firms in the cluster are in the non-local trucking industry (SIC 4213) and local trucking industry (SIC 4212), which had employment of 279 in 2000. According to Dun & Bradstreet the major employers in the Iowa Great Lakes Region for this cluster include United Parcel Service, Pacific Enterprises, Heartland Technology, Holiday Express Corporation and Ruan Transportation Corporation.

Figure 4 shows that at the U.S. level, in addition to the two trucking industries, the other two industry sectors that are major employers in the transportation, shipping and logistics cluster involve air transportation. For the cluster in Iowa, the non-local trucking industry (SIC 4213) and the local trucking industry (SIC 4212) are the two largest industries.

Figure 4 - Transportation, Shipping and Logistics Cluster Industry Mix

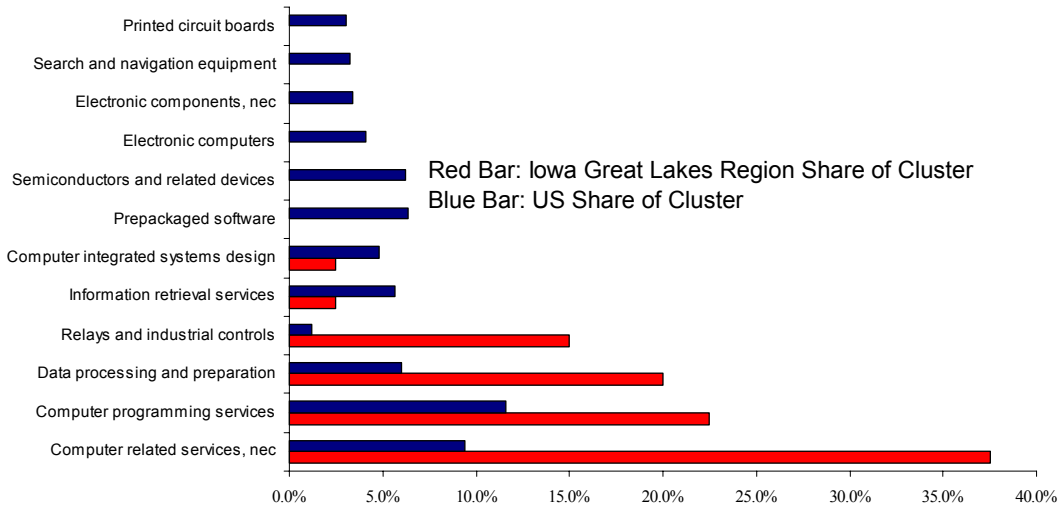


It should be kept in mind that the air courier services industry (SIC 4513) consisted of one establishment in 2000, which was Great Lakes Aviation. The transportation, shipping and logistics cluster in the Iowa Great Lakes Region had an annual average wage of $26,996 in 2000, which was actually lower than the region's annual average wage in 1990, which was $27,970. This represents an annual decline of -0.4 percent. The cluster's annual average wage at the U.S. level in 2000 was $36,805, an increase of 3.4 percent annually during the 1990s and statewide the cluster had an annual average wage of $30,482 with an annual wage growth rate of 0.4 percent.

Printing and Publishing Cluster

The printing and publishing industry cluster employed 532 workers in the Iowa Great Lakes Region in 2000. This cluster saw an annual increase in employment between 1990 and 2000 in the region (1.2 percent), at the state level (0.2 percent) and at the U.S. level (3.4 percent). Figure 5 shows that four industry sectors are the major employers within the cluster in the Iowa Great Lakes Region.

Figure 5 - Printing and Publishing Cluster Industry Mix



The largest industry sector in the cluster in the region is commercial printing, n.e.c. industry (SIC 2759) with the commercial lithographic printing industry (SIC 2752) having nearly as many employees. The other two sectors with measurable employment in 2000 were the newspaper publishing and printing industry (SIC 2711) and telephone communications (SIC 4813). According to Dun & Bradstreet the major employers in the Iowa Great Lakes Region for this cluster include Perry Judds Holding, Inc, Spencer Daily Reporter, Standard Printing & Design and Solutions, Inc. For the cluster statewide the two largest industries in 2000 were the data processing and preparations industry (SIC 7374) and the telephone communications industry (SIC 4813).

Wages in the printing and publishing industry cluster experienced growth at the regional, statewide and U.S. levels. The annual average wage in the Iowa Great Lakes Region was $27,929 which was well below the U.S. average annual wage ($59,668) and the Iowa average annual wage ($37,632). The cluster experienced an annual wage increase of over 8 percent annually in the decade of the 1990s at the U.S. level while the region only had a rate of 0.3 percent, which was only slightly lower than the statewide average of 0.7 percent. One of the major reasons for the wage difference is that at the U.S. level, computer related service industries were the largest sectors and pay high wages.

Technology Benchmark Clusters

As described above, the 8 benchmark technology clusters that are identified in this research were derived from a statistical analysis of the interdependence among high-technology industries. It should be noted that these technology-intensive clusters are not simply sub-sets of the 28

benchmark value-chain industry clusters. Table 4 provides summary data about the technology clusters at the U.S. level, Iowa level and the Iowa Great Lakes Region. The analysis following will illustrate that employment within several of these clusters is very much concentrated in several industry sectors. All of the six technology clusters that are present in the Iowa Great Lakes Region did experience employment growth between 1990 and 2000. The same cannot be said for those same technology clusters at the U.S. level or statewide. An illustration of these differences in growth rates can be seen when comparing Figures 6, 7 and 8 which compare each technology cluster's employment growth rates and employment size against average wages in 2000.

Figure 6 - US Technology Value-Chain Cluster Trends

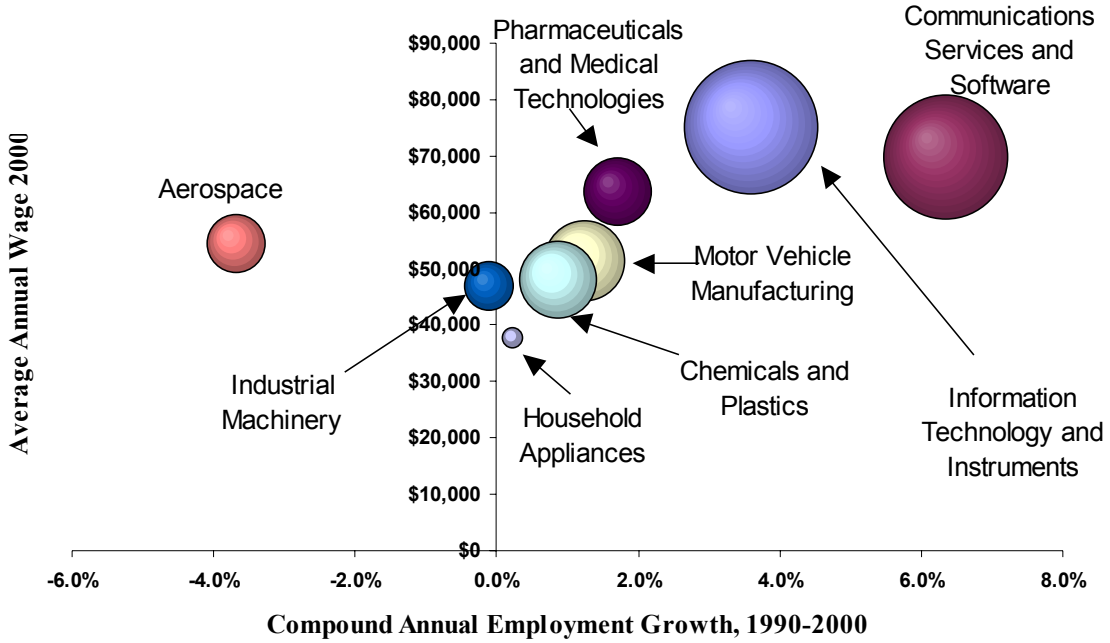


Figure 7 - Iowa Technology Value-Chain Cluster Trends

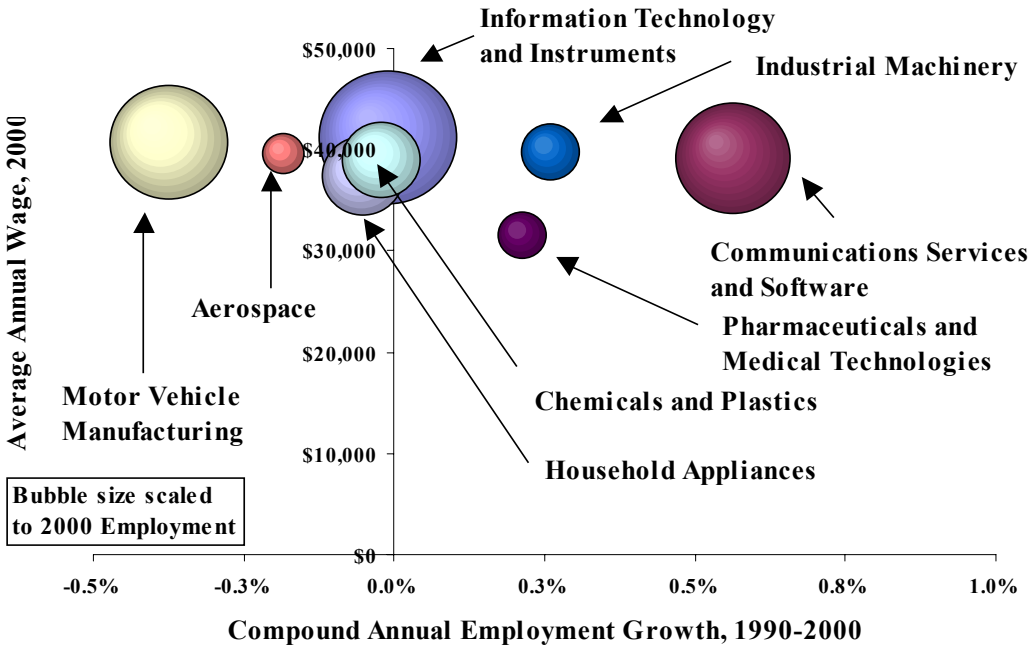


Figure 8 - Iowa Great Lakes Region Technology Cluster Trends

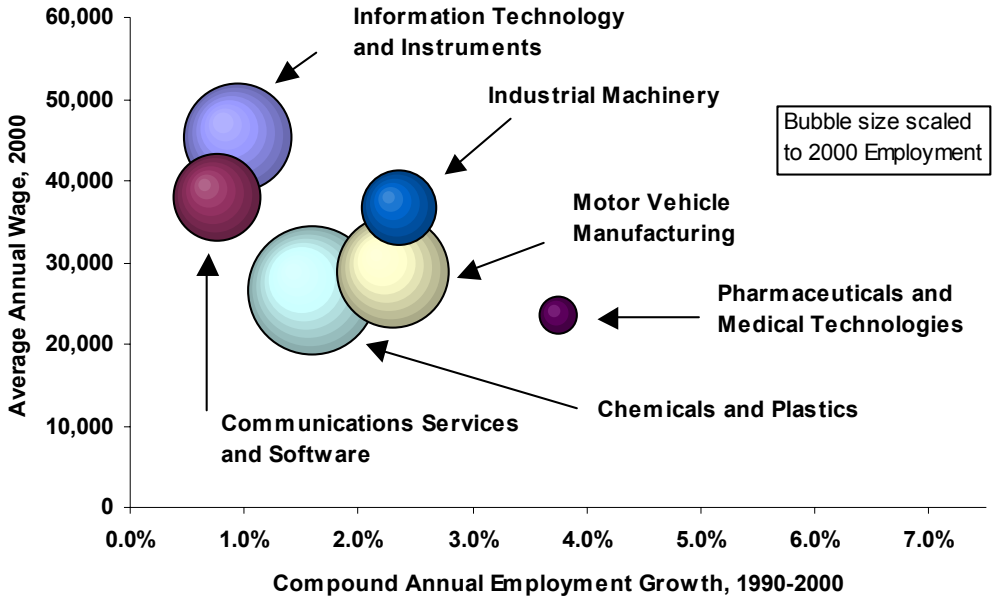


Figure 6 shows that at the U.S. level, the information technology and instruments technology cluster had the largest employment of the eight technology clusters. This technology cluster also had the highest annual average wage in 2000 for the U.S., $75,343 (see Table 4). Figure 7 shows that the information technology and instruments technology cluster was the largest technology cluster, yet its employment did not increase over the decade of the 1990s. The communications services and software technology cluster had the highest employment growth rate statewide. For the Iowa Great Lakes Region, as Figure 8 illustrates, the information technology and instruments technology cluster had the highest annual average wage while the chemicals and plastics technology cluster had the largest employment.

Table 4
Iowa Great Lakes Region
Benchmark Technology Clusters

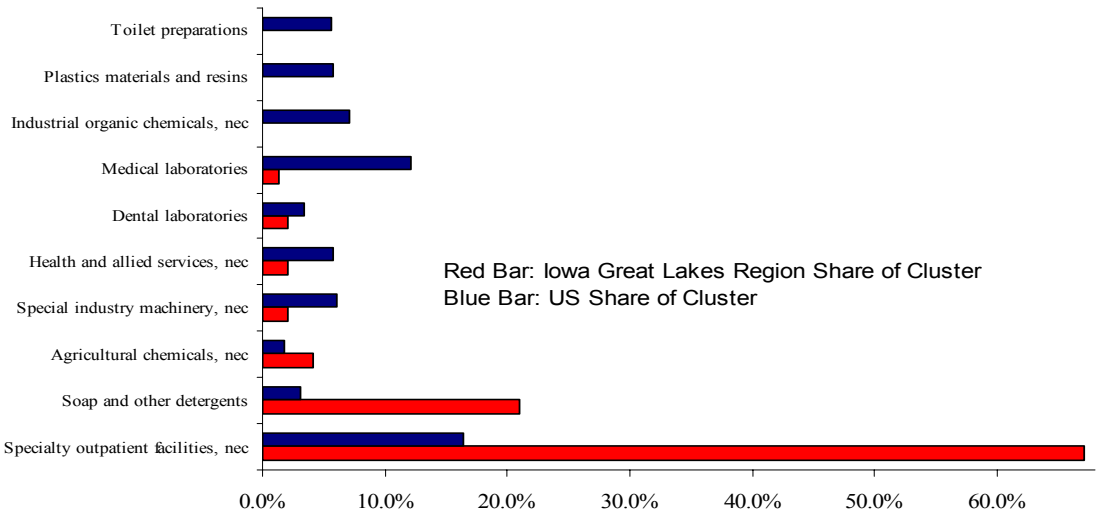
	Employment							Establish.		Payroll					
			CAGR			Location Quotient				Average Wage - 2000			*CAGR '90-'00*		
Description	*2000*	*Per Establ.*	*IA GL '90-'00*	*IA '90-'00*	*US '90-'00*	*2000*	*Chg '90-'00*	*2000*	*CAGR '90-'00*	*IA GL*	*Iowa*	*US*	*IA GL*	*IA*	*US*
Chemicals and Plastics	143	13.0	1.6%	0.0%	0.9%	0.6	0.1	11	1.0%	26,696	39,080	48,152	-0.3%	0.5%	3.9%
Motor Vehicle Manufacturing	108	18.0	2.3%	-0.4%	1.2%	0.4	0.1	6	0.0%	28,768	40,755	51,561	1.3%	0.4%	4.0%
Information Technology and Instruments	100	8.3	0.9%	0.0%	3.6%	0.1	0.0	12	1.8%	45,409	41,288	75,343	1.0%	0.6%	7.7%
Communications Services and Software	68	3.6	0.8%	0.6%	6.3%	0.1	0.0	19	3.1%	38,050	39,202	69,973	0.8%	0.7%	6.5%
Industrial Machinery	48	12.0	2.4%	0.3%	-0.1%	0.5	0.2	4	0.0%	36,700	39,938	46,988	-0.3%	0.6%	4.5%
Pharmaceuticals & Medical Technologies	13	3.3	3.7%	0.2%	1.7%	0.1	0.0	4	2.9%	23,457	31,593	63,741	0.4%	0.4%	6.0%
Aerospace	0	NA	NA	-0.2%	-3.7%	0.0	0.0	0	NA	NA	39,682	54,517	NA	0.4%	3.7%
Household Appliances	0	NA	NA	-0.1%	0.2%	0.0	0.0	0	NA	NA	37,511	37,861	NA	-0.2%	3.6%

Data source: U.S. Bureau of Labor Statistics ES-202 files (from Minnesota IMPLAN Group, Inc). IA GL = the Iowa Great Lakes Region. CAGR = compound annual growth rate

Chemicals and Plastics Technology Cluster

Table 4 shows that the chemicals and plastics technology cluster had the largest employment in the region, with 143 workers in 2000 and 11 establishments within the three-county region. However, as Figure 9 illustrates, two-thirds of the technology cluster's employment is in the specialty outpatient facilities, n.e.c. industry sector (SIC 8093), which consists of end users within this value-chain, such as alcohol and drug treatment facilities, mental health facilities and vocational rehabilitation facilities. Therefore, it could be argued that this technology cluster has a limited presence in the Iowa Great Lakes Region. It should be noted that the two largest industry sectors in this technology cluster at the U.S. level could be considered end-users, specialty outpatient facilities (SIC 8093) and medical laboratories (SIC 8071), both of which are health services industries. Yet at the U.S. level, over half of the employment in the cluster is in manufacturing industries which is not the case for the region. Specialty outpatient facilities was also the largest industry employer for this cluster statewide followed by the health and allied services, n.e.c. industry (SIC 8099). According to Dun & Bradstreet the major employers in the Iowa Great Lakes Region for this cluster include Northwest Iowa Alcoholism & Drug Treatment, Seasons Center Community Mental Health and C-Tech Industries.

Figure 9 - Chemical and Plastics Technology Cluster Industry Mix

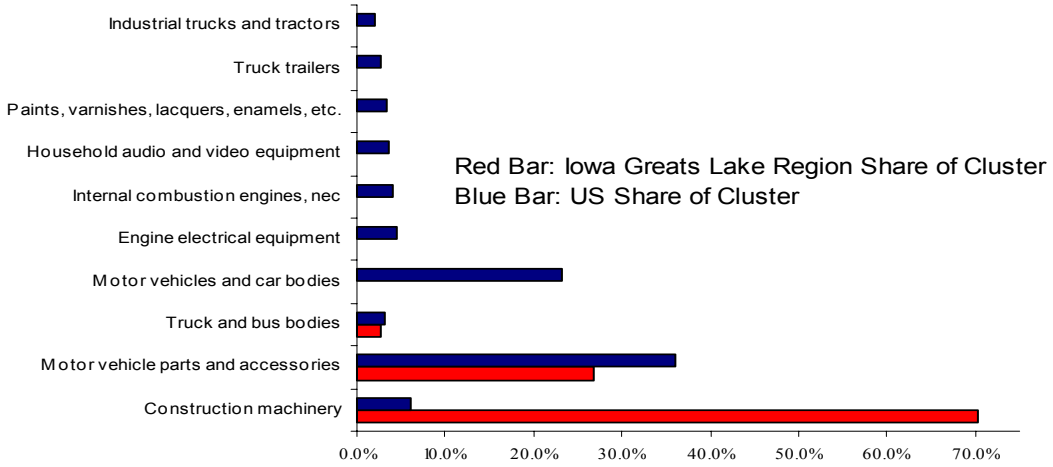


The only other industry sector which had any measurable employment in 2000 was the soap and other detergent manufacturing industry (SIC 2841) with 30 employees. This technology cluster at the regional level had an annual growth rate (1.6 percent) between 1990 and 2000 that was higher than the rate for the cluster at the U.S. level (0.9 percent) and the Iowa level (0.0 percent), but the technology cluster in the region saw a decline in wages during that same time period from $27,581 to $26,696, while the cluster at the U.S. level experienced nearly a 4 percent increase annually and had an annual average wage of $48,152 in 2000. At the Iowa level, the cluster had an annual increase of 0.5 percent and an annual average wage of $39,080.

Motor Vehicle Manufacturing Technology Cluster

The motor vehicle manufacturing technology cluster had the second highest employment in the Iowa Great Lakes Region in 2000 with 108 employees. This technology cluster also had an annual employment growth rate (2.3 percent) in the decade of the 1990s that was higher than the cluster at the U.S. level (1.2 percent) and statewide (-0.4 percent). Figure 9 provides the industry mix of the cluster.

Figure 10 - Motor Vehicle Manufacturing Technology Cluster Industry Mix



The majority of the employment in this technology cluster for the Iowa Great Lakes Region in 2000 resided in two industries: the construction machinery manufacturing industry (SIC 3531) and the motor vehicle parts and accessories industry (SIC 3714). Figure 10 shows illustrates that the automobile manufacturing-related industries dominate this technology cluster at the U.S. level, with the motor vehicle parts and accessories industry (SIC 3714) having over 36 percent of the cluster's employment and the motor vehicles and car bodies industry (SIC 3711) with over 23 percent of the cluster's employment. In Iowa, the construction machinery industry was the largest employer. According to Dun & Bradstreet, the largest employers within this technology cluster in the Iowa Great Lakes Region are Armstrong Rim & Wheel Manufacturing, Weekend Warrior and Aero Race Wheels

The motor vehicle manufacturing technology cluster at the national level experienced an annual average wage increase of 4.0 percent during the decade of the 1990s while for the Iowa Great Lakes Region, the annual wage growth rate was 1.3 percent and the annual wage rate statewide was 0.4 percent. In 2000, the cluster's average annual wage was $28,768 in the region while at the U.S. level it was $51,561 and for Iowa it was $40,755.

Information Technology and Instruments Technology Cluster

The information technology and instruments technology cluster had the third highest employment levels in the Iowa Great Lakes Region in 2000 with 100 employees. This technology cluster experienced growth in employment between 1990 and 2000 in the region (0.9 percent annually) and at the U.S. level (3.6 percent annually), while employment in Iowa remained stable. The cluster had an average annual wage in 2000 of $75,343 at the U.S. level while the average annual wage rate was $45,409 in the Iowa Great Lakes Region, which was the highest of the six technology clusters. This wage rate was well below the U.S. average for this technology cluster, but higher than the technology cluster's average annual wage at the Iowa level ($41,288).

Figure 11 - Information Technology and Instruments Technology Cluster Industry Mix

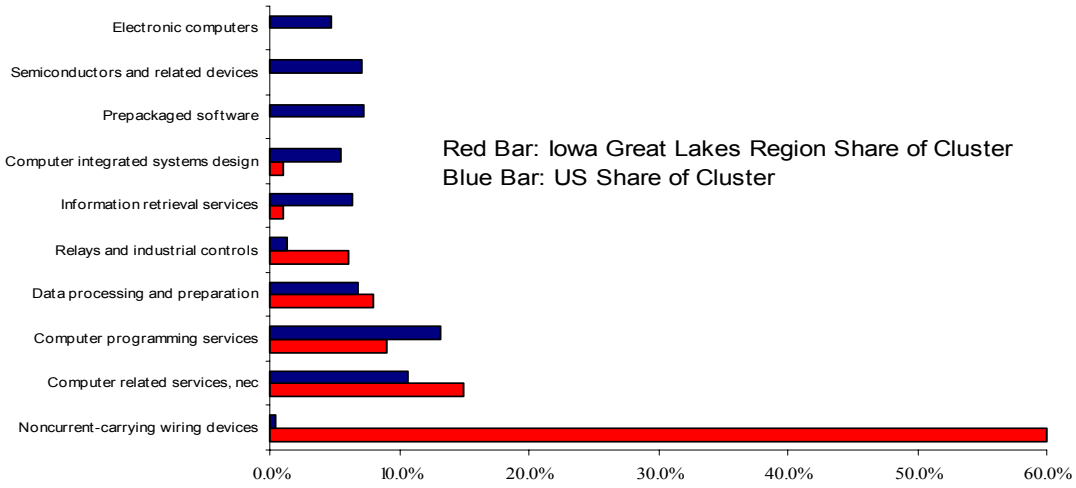


Figure 11 shows the distribution of employment by industry in this technology cluster in the Iowa Great Lakes Region and at the U.S. level. As with the chemicals and plastics technology cluster and the motor vehicle manufacturing technology cluster, a few industry sectors have a dominant presence in the region. The noncurrent-carrying wiring devices manufacturing industry (SIC 3644) had 60 percent of the cluster's employment in the region in 2000, followed by the computer related services, n.e.c. industry (SIC 7379) with 15 percent of the employment. At the U.S. level, the two largest industry sectors are the computer programming services industry (SIC 7371) and the computer related services, n.e.c. industry. The data processing and preparation industry (SIC 7374) and the search and navigation equipment industry (SIC 3812) were the two largest industries in this technology cluster in Iowa. According to Dun & Bradstreet, the largest employers within this technology cluster in the Iowa Great Lakes Region are Eaton Hydraulics, Choice Technologies, Inc and Solutions, Inc.

Benchmark Labor Skill Clusters

Each of the 17 benchmark labor clusters consists of industries that utilize similar workforce skills and occupations. As described above, these industry clusters were identified through an analysis of data on the workforce staffing patterns of industries and data on the skills and knowledge requirements of occupations. An examination of the human capital of a region has become critical since the availability and quality of labor are considered critical site selection criteria for businesses.

The health services labor cluster in 2000 was the largest benchmark labor cluster at the U.S. level, the Iowa level and in the Iowa Great Lakes Region. Three labor clusters had employment levels over 1,000 workers in 2000 and another eight labor clusters had at least 100 employees (see Table 5).

Table 5
Iowa Great Lakes Region
Benchmark Labor Clusters

	Employment							Establish.		Payroll					
			CAGR – '90-'00			Loc. Quotient				Average Wage - 2000			*CAGR '90-'00*		
Description	*2000*	*Per Establ.*	*IA GL*	*Iowa*	*US*	*2000*	*Chg '90-'00*	*2000*	*CAGR '90-'00*	*IA GL*	*Iowa*	*US*	*IA GL*	*IA*	*US*
Health Services	1,719	17.4	0.3%	0.3%	2.6%	0.9	-0.1	99	0.6%	28,609	43,513	34,928	0.6%	4.3%	3.3%
Low Skill, Non-Durable Manufacturing	1,361	52.3	-3.6%	-0.1%	-1.4%	2.4	-0.2	26	-0.7%	31,008	45,122	33,710	1.4%	2.1%	4.3%
Specialized Labor Intensive	1,162	89.4	0.7%	0.0%	0.5%	2.8	0.5	13	0.0%	34,438	38,608	35,547	0.1%	1.0%	3.5%
Distribution, Freight Handling	755	10.9	-0.8%	0.2%	2.7%	1.2	-0.3	69	0.4%	30,544	31,989	35,845	0.5%	0.8%	3.1%
Telecomm and Banking	563	8.8	0.5%	0.2%	0.9%	0.8	0.1	64	0.5%	32,255	40,520	49,122	0.2%	1.2%	5.5%
High End Information/Business Services	512	11.4	1.0%	0.1%	0.6%	1.1	0.2	45	0.5%	24,438	35,311	50,280	0.5%	0.9%	4.5%
Low Skill, Misc. Manufacturing	431	23.9	1.8%	0.2%	0.2%	1.4	0.4	18	1.2%	23,621	23,630	33,161	-0.5%	-1.7%	3.7%
Standardized Heavy Industry	235	14.7	2.7%	0.1%	0.4%	0.3	0.1	16	2.1%	32,985	35,783	47,271	0.3%	0.0%	3.8%
High Tech Machinery, Instruments	220	22.0	1.5%	0.0%	0.8%	1.4	0.3	10	1.1%	34,960	45,670	43,601	0.8%	2.7%	3.9%
Information Processing	204	3.1	0.8%	0.7%	4.3%	0.2	0.0	66	0.8%	26,156	39,180	59,714	0.4%	0.2%	6.7%
Building Products	142	28.4	6.5%	0.5%	1.6%	1.4	0.6	5	2.3%	35,565	29,772	32,860	0.7%	-0.3%	3.4%
Food and Tobacco Manufacturing	84	14.0	0.6%	-0.4%	-0.6%	0.6	0.1	6	1.8%	45,279	36,446	43,456	0.2%	-1.0%	4.0%
Electronics, Measuring Devices	66	33.0	1.3%	-0.4%	-0.4%	0.2	0.0	2	0.0%	48,186	31,872	66,125	0.3%	-0.9%	7.0%
Securities	41	4.1	0.5%	0.4%	5.9%	0.3	-0.1	10	0.0%	52,615	76,018	147,281	0.0%	0.7%	8.6%
Science Intensive	36	3.6	0.9%	0.1%	0.4%	0.1	0.0	10	3.6%	35,758	35,261	57,027	-0.8%	-2.1%	4.3%
Chemicals, Pharmaceuticals	6	6.0	7.2%	-0.6%	-0.3%	0.0	0.0	1	0.0%	20,081	56,832	73,849	1.3%	2.9%	6.0%
Petroleum	5	2.5	2.3%	-0.3%	-4.1%	0.0	0.0	2	0.0%	35,933	65,137	59,958	0.3%	4.2%	4.1%

Data source: U.S. Bureau of Labor Statistics ES-202 files (from Minnesota IMPLAN Group, Inc). IA = the Iowa Great Lakes Region. CAGR = compound annual growth rate

Health Services Labor Cluster

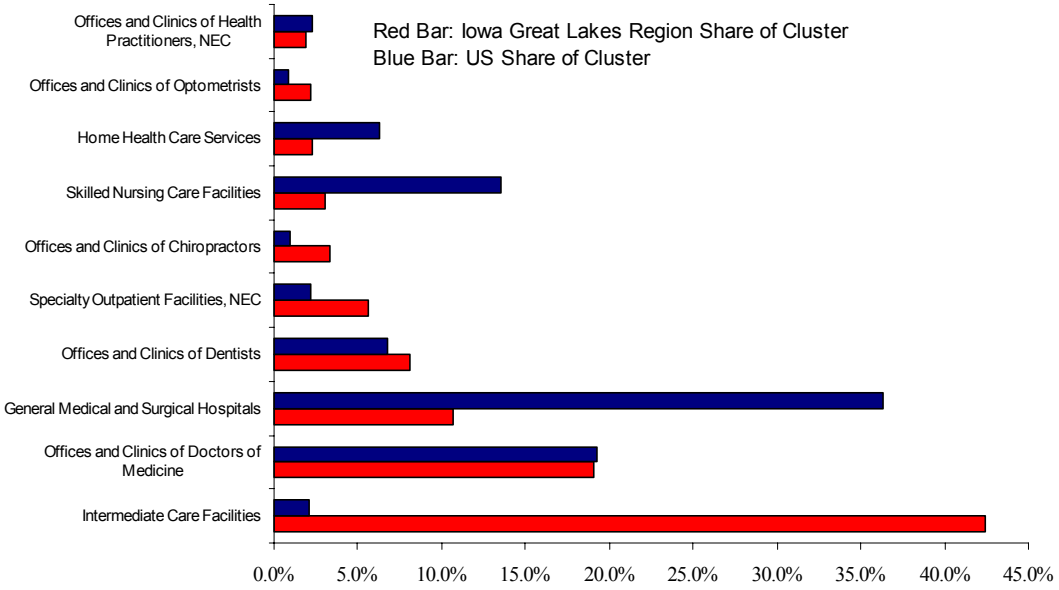
Employment in the health services labor cluster, in the region and statewide, experienced an annual growth rate of 0.3 percent between 1990 and 2000 while at the U.S. level employment levels grew even faster with an annual rate of 2.6 percent. Table 5 also shows that the health services labor cluster had the highest number of establishments of any of the labor clusters, which can be attributed to a considerable number of doctors' and dentists' offices. The health services labor cluster had an average annual wage rate of $28,609 in the Iowa Great Lakes Region while the labor cluster at the national level had an average annual wage rate of $34,928. The statewide labor cluster had an average annual wage rate of $29,665. The U.S. outpaced the Iowa Great Lakes Region considerably in annual wage growth in this cluster between 1990 and 2000 with an annual rate of 3.3 percent while the Iowa Great Lakes Region had an annual rate of 0.6 percent, which was above Iowa's rate (0.4 percent).

Figure 12 shows the industry mix of the health services labor cluster for the region and at the U.S. level. In 2000, intermediate care facilities (SIC 8052) had the highest employment numbers in the cluster within the region, followed by medical doctors' offices and medical clinics (SIC 8011) and general medical and surgical hospitals (SIC 8062). General medical and surgical hospitals were the largest employers in the cluster at the U.S. level and Iowa level. According to Dun & Bradstreet, the largest employers within this labor cluster in the Iowa Great Lakes Region are Spencer Municipal Hospital, Lakes Regional Healthcare, Estherville Good Samaritan Center and St. Luke Nursing Home.

The most common occupations in the intermediate care facilities are nursing aides, orderlies and attendants ,and licensed practical nurses and licensed vocational nurses. Registered nurses, medical assistants, receptionists and information clerks and medical secretaries are the most common occupations found in medical doctor offices and medical clinics. In the general medical

and surgical hospitals industry, the most common occupations are registered nurses and nursing aides, orderlies and attendants.

Figure 12 - Health Services Cluster Industry Mix

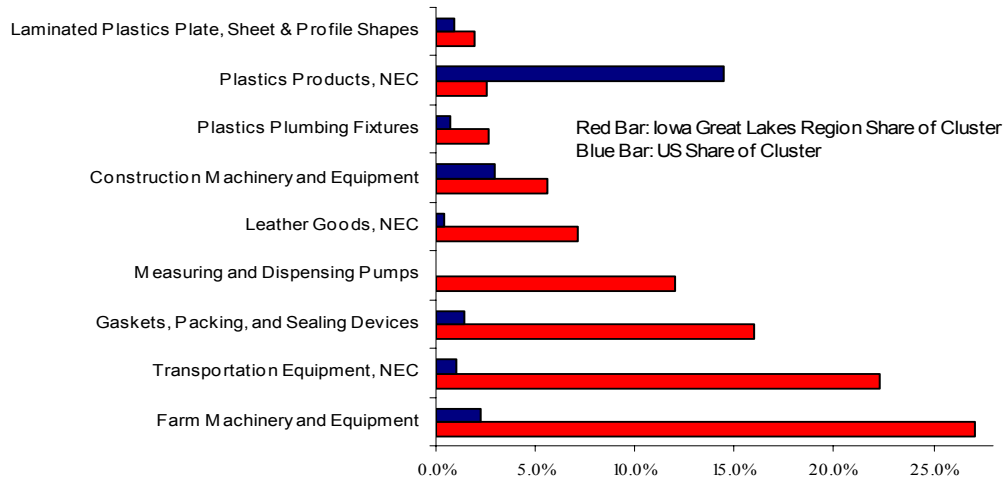


Low Skill, Non-Durable Manufacturing Labor Cluster

The low skill, non-durable manufacturing labor cluster had the second highest employment levels in 2000 in the Iowa Great Lakes Region with 1,361 employees. Figure 13 shows that the farm machinery and equipment industry (SIC 3523) and the transportation equipment, n.e.c. industry (SIC 3799) had almost half of the labor cluster's employment. At the U.S. level the plastics products, n.e.c. industry (SIC 3089) was the largest industry sector. The farm machinery and equipment industry and the construction machinery and equipment industry (SIC 3531) were the cluster's largest employers statewide. According to Dun & Bradstreet, the largest employers within this labor cluster in the Iowa Great Lakes Region are Arts-Way Manufacturing, Weekend Warrior, Nolin Milling and Armlift.

The low skill, non-durable manufacturing labor cluster had an annual average wage in 2000 of $31,008 in the Iowa Great Lakes Region, $33,710 at the U.S. level and $38,270 at the Iowa level. The wage rates for the labor cluster grew at all three geographic levels (U.S. with 4.3 percent, Iowa with 0.5 percent and Iowa Great Lakes Region with 1.4 percent). The labor cluster experienced an employment decline between 1990 to 2000 in the Iowa Great Lakes Region (-3.6 percent), at the U.S. level (-1.4 percent) and at the Iowa level (-0.1 percent). The most common occupations in the farm machinery and equipment industry are assemblers, welders, cutters, solderers and brazers, production and operating workers supervisors, and metal and plastic cutting, punching and press machine operators and setters. For the transportation equipment, n.e.c. industry the most common occupations include first-line production supervisors, laborers and freight, stock and material handlers and cutting, punching and press machine operators and setters.

Figure 13 - Low Skill, Non-Durable Manufacturing Labor Cluster Industry Mix



Specialized Labor Intensive Labor Cluster

The specialized labor intensive labor cluster is the third largest labor cluster in the Iowa Great Lakes Region, with 1,162 employees and 13 establishments, giving it the highest average number of employees per establishment of all of the labor clusters. Employment in the labor cluster in the region grew at a higher annual rate (0.7 percent) than the cluster's growth rate at the U.S. level (0.5 percent). The labor cluster remained stable during the decade of the 1990s. Table 5 shows the specialized labor intensive labor cluster also had the highest location quotient (2.8) among the 17 labor clusters, which means that proportionally, the employment in the cluster is higher when compared to the U.S. and other regions' employment levels.

Figure 14 - Specialized Labor Intensive Labor Cluster Industry Mix

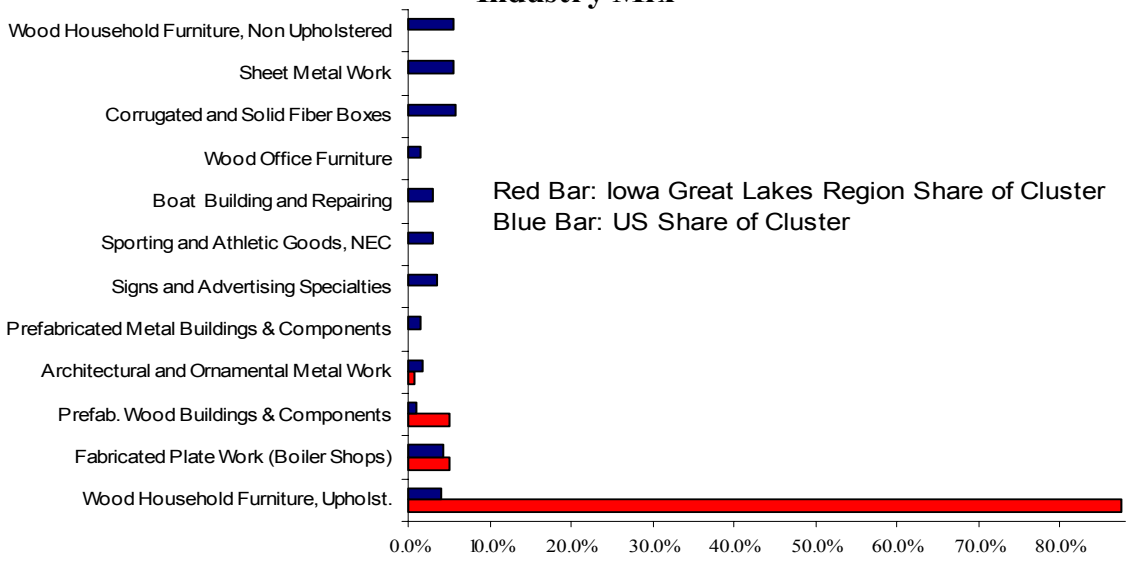


Figure 14 shows that in 2000 nearly all of the employment in this cluster in the Iowa Great Lakes Region was in the upholstered wood household furniture industry (SIC 2512), which includes the

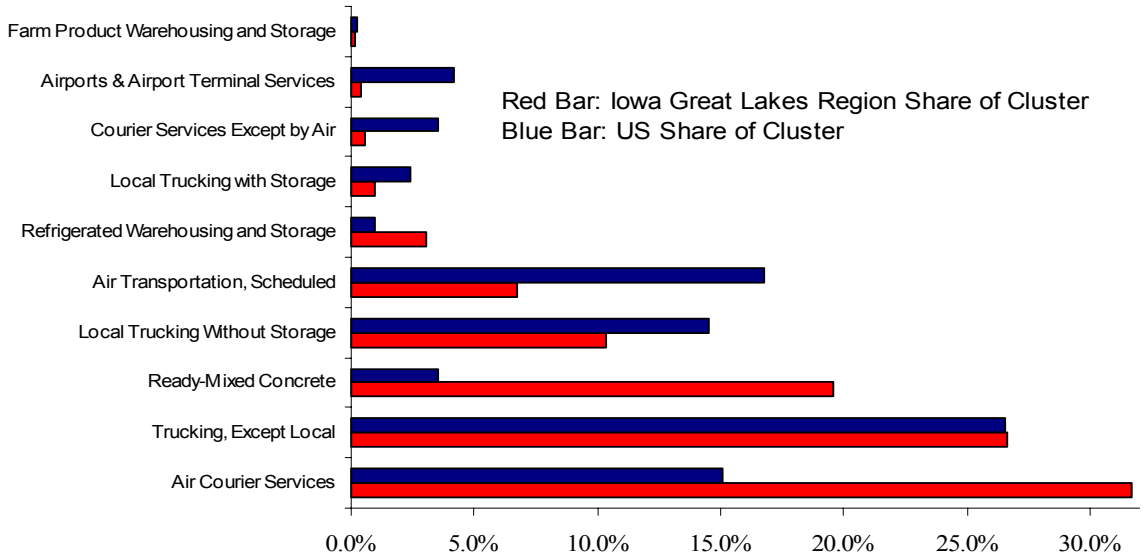
Style-Craft, Inc. facility in Milford. Two other industries had employment levels of some significance, the fabricated plate work industry (SIC 3443) and the prefabricated wood buildings and components industry (SIC 2452), each with slightly over 5 percent of the employment in the labor cluster. At the U.S. level, the largest industry sectors in 2000 were the corrugated and solid fiber boxes industry (SIC 2653), the sheet metal work industry (SIC 3444) and the non-upholstered wood furniture industry (SIC 2511). The non-wood office furniture industry (SIC 2522) and the tires and inner tubes manufacturing industry (SIC 3011) were the labor cluster's largest industries statewide.

The average annual wage for the specialized labor intensive labor cluster in the Iowa Great Lakes Region ($35,547) was slightly lower than the average at the U.S. level ($34,438) and at the Iowa level ($35,784). The annual average wage at the U.S. level grew by 3.5 percent annually during the 1990s, while the annual average wage only grew by 0.1 percent annually for the region and only by 0.5 percent statewide during the same time period. The most common occupations in the household furniture industries are team assemblers, sewing machine operators and upholsterers. In fabricated structural metal industries the most common occupations are welders, cutters, solders and brazers, team assemblers and metal and plastic cutting, punching and press machine operators and setters.

Distribution, Freight Handling Labor Cluster

In 2000, the distribution, freight handling labor cluster had the fourth highest employment in the Iowa Great Lakes Region in 2000 with 755 employees. However, it should be noted that since the year 2000, Great Lakes Aviation has moved its operations out of Spencer, which reduces this labor cluster's employment levels by nearly 240 workers. Of the industries remaining in the region at this time, the non-local trucking industry (SIC 4213) was the largest employer in the region in 2000 with over 200 employees followed by the ready-mixed concrete industry (SIC 3273) with 148 employees. Despite the removal of the air courier services industry (SIC 4513) jobs, this labor cluster would still be the fifth largest labor cluster in the region in 2000. At the U.S. level and Iowa level the trucking industry and air transportation related industries were the largest employers. According to Dun & Bradstreet, the largest employers within this labor cluster in the Iowa Great Lakes Region include UPS, Pacific Express, Holiday Express Corporation and Ruan Transportation Corporation.

Figure 15 - Distribution, Freight Handling Labor Cluster Industry Mix



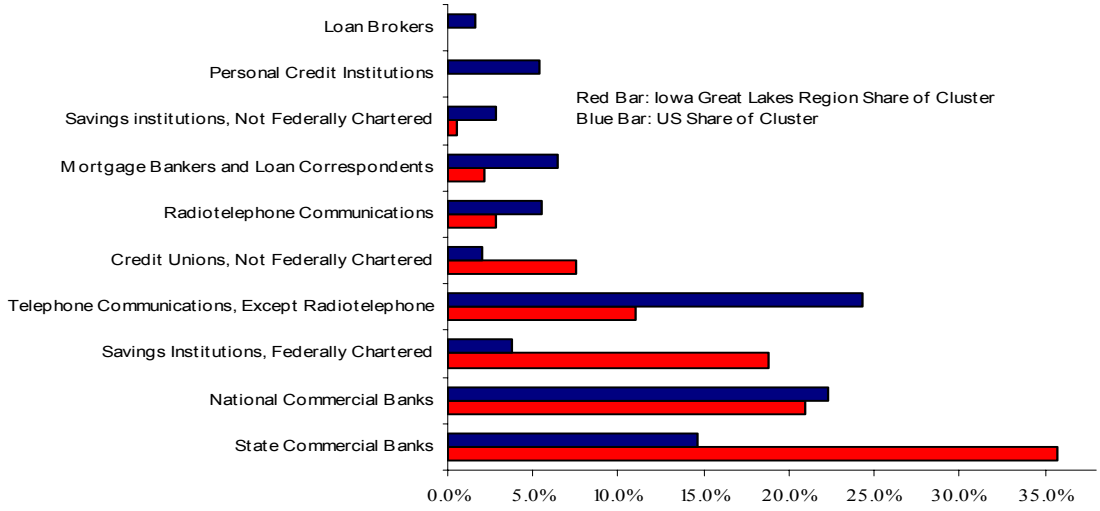
(Note: Great Lakes Aviation has since closed its operations in Spencer which reduces this labor cluster by nearly a third in employment)

The annual average wage for the distribution, freight handling labor cluster in the Iowa Great Lakes Region was lower than the labor cluster's average wage at the U.S. level ($30,544 compared to $35,845) and slightly lower than the statewide average ($30,755). When the air courier services industry (SIC 4513) is removed from the 2000 data for the region, the average annual wage for the region drops to $29,501. The annual average wage in 2000 for the air courier services industry in the region was $30,435, which was lower than the averages for the non-local trucking industry ($31,179) and the ready-mixed concrete industry ($37,914). The most common occupations in both the trucking industry and the concrete industry are heavy and tractor-trailer truck drivers, light or delivery services truck drivers and laborers and freight, stock and material movers.

Telecommunication and Banking Labor Cluster

The telecommunication and banking labor cluster in the Iowa Great Lakes Region had employment of 563 workers in 2000. The state and national commercial banking industries (SIC 6022 and SIC 6021) together contained over half of the employment in the region. Figure 16 shows that federally chartered savings institutions (SIC 6035) consisted of nearly another 20 percent (18.8 percent) of the labor cluster's employment in the Iowa Great Lakes Region. At the U.S. level, the telephone communications industry (SIC 4813) was the largest sector, while statewide the two largest sectors were state commercial banks and the telephone communications industry. Between 1990 and 2000, employment in the labor cluster grew at the U.S. level (0.9 percent), at the state level (0.2 percent) and within the Iowa Great Lakes Region (0.5 percent). According to Dun & Bradstreet, the largest employers within this labor cluster in the Iowa Great Lakes Region include Northwest Federal Savings Bank, Farmers Bank, Emmet County State Bank and First Bank and Trust.

Figure 16 - Telecom and Banking Labor Cluster Industry Mix



The annual wage levels for the telecomm and banking labor cluster were considerably higher at the U.S. level than for the Iowa Great Lakes Region. The U.S. average wage in 2000 was $49,122 while the Iowa Great Lakes Region's average wage was $32,255. The cluster's annual average wage statewide was also significantly higher ($38,450). At the U.S. level, the largest industry in this labor cluster is the telephone communications industry with nearly one fourth of the employment, which had an annual average wage of $61,314. In the Iowa Great Lakes Region the two largest industry sectors, the state and national commercial banks, had annual average wages in 2000 of $37,077 and $33,473. These wages were roughly $4,000 and $10,000 less than those sectors' national annual average wages of $41,829 and $41,754. The most common occupations in the commercial banking industry are tellers, customer service representatives and first-line supervisors/managers of office and administrative support workers.

Summary, Recommendations and Next Steps

Summary

The regional economy that encompasses the three-county Iowa Great Lakes Region experienced changes between 1990 and 2000, but overall the majority of the clusters did have positive employment growth in the 1990s. However, several larger clusters experienced employment declines due to industry layoffs and plant closings. In addition, several industries have shed jobs since 2000 which is not reflected in the data analyzed in this report. Businesses that have either closed or had layoffs since 2000 have included Great Lakes Aviation, APAC Teleservices, Eaton Corporation and K-Mart.

The Iowa Great Lakes Region's cluster employment trends between 1990 and 2000 were generally consistent with the clusters' activities at the U.S. level, yet for most clusters the employment growth rates in the region were lower than the growth rates at the U.S. level. This was typically the case when examining either the value-chain industry clusters, the benchmark technology clusters or the benchmark labor clusters. At the U.S. level only a few clusters experienced employment declines with several of those clusters experiencing employment growth in the Iowa Great Lakes Region. Obviously, the current national recession has tempered employment regionally and nationally. Statewide, Iowa has seen a mix of employment growth and decline depending on the specific cluster.

Benchmark Value-Chain Industry Clusters

Seven benchmark value-chain clusters in 2000 had employment levels of 400 employees or more in the Iowa Great Lakes Region. Four of the six industry clusters either remained stable or had positive employment growth over the previous decade, while at the U.S. level five of the six industry clusters had employment growth. The two largest value-chain industry clusters in the region were the metalworking and industrial machinery industry cluster and the fabricated textiles industry cluster. As Tables 1, 2 and 3 showed, many of the industry clusters which experienced employment growth and/or wage growth were at annual rates below the clusters' growth rates at the U.S. level.

The leather goods industry cluster had the highest annual employment growth rate in the Iowa Great Lakes Region with a rate of 6.9 percent per year, while at the U.S. level the cluster declined in employment and had an annual growth rate of -6.7 percent. At the U.S. level the fastest growing value-chain clusters were the hospitals, labs and specialized medical services cluster (3.5 percent annually), the printing and publishing industry cluster (3.4 percent annually), transportation, shipping, and logistics industry cluster (2.8 percent), information technology and instruments industry cluster (2.7 percent) and the pharmaceutical industry cluster (2.7 percent) in 2000. The first three of these value-chain clusters had a significant presence in the Iowa Great Lakes Region, while the information technology and instruments industry cluster and the pharmaceuticals industry cluster did not have a presence.

All but one of the Region's ten largest value-chain clusters experienced growth in their average annual wages. The lone exception was the transportation, shipping and logistics industry cluster. The wage growth rates for the value-chain clusters in the region did not keep pace with the wage growth rates at the U.S. level, but were similar to or higher than wage growth rates statewide.

Benchmark Technology Clusters

There was limited presence of the eight benchmark technology clusters in the Iowa Great Lakes Region. Only three of the benchmark technology clusters had employment above 100 in 2000 in the region (the chemicals and plastics technology cluster, the motor vehicle manufacturing technology cluster and the information technology and instruments technology cluster). All of the six technology clusters which had a presence in the Region did experience employment growth in the region between 1990 and 2000 (the aerospace technology cluster and the household appliances technology cluster had no presence in the Region.). At the U.S. level only two technology clusters experienced employment losses (the aerospace technology cluster and the industrial machinery technology cluster) during the same time period.

The annual average wages in the Iowa Great Lakes Region for the technology clusters were well below the averages at the U.S. level. As was discussed in the technology cluster section of the report, the types of occupations that are present in the region are a critical factor in the average wages paid. All of the technology clusters at the U.S. level had significant annual growth rates for wages between 1990 and 2000, from a high of 7.7 percent annually to a low of 3.6 percent annually. In the Iowa Great Lakes Region the wage growth rates ranged from –0.3 percent annually to 1.3 percent annually. Statewide the wage growth rates ranged from –0.2 percent annually to 0.7 percent annually.

Benchmark Labor Clusters

The Iowa Great Lakes Region had three benchmark labor clusters in 2000 that had employment levels over 1,000 (the health services labor cluster, the low skill, non-durable manufacturing labor cluster and the specialized labor intensive labor cluster), and another three had employments levels above 500 (the distribution, freight handling labor cluster, the telecomm and banking labor cluster and the high end information/business services labor cluster). Two of the six largest labor clusters in the Iowa Great Lakes Region had employment growth between 1990 and 2000. For these same six labor clusters at the U.S. level, all but one labor cluster (low skill, non-durable manufacturing labor cluster) had employment growth during the same time period.

For the labor clusters with any real measurable employment in the Iowa Great Lakes Region (at least 200 employees), the fastest growing labor cluster was the standardized heavy industry labor cluster which grew at 2.7 percent annually. The securities labor cluster was the fastest growing labor cluster at the U.S. level with an annual rate of 5.9 percent. The securities labor cluster also had the highest annual average wage in the Region ($52,615), which was over $90,000 below the labor cluster's average wage at the U.S. level ($147,281). All but two of the labor clusters had higher annual average wages at the U.S. level than within the Iowa Great Lakes Region. The two exceptions were the building products labor cluster and the food and tobacco manufacturing labor cluster. For the labor clusters which had higher average annual wages at the U.S. level, the differences in the average annual wages between the U.S. average annual wages and the Iowa Great Lakes Region average annual wages ranged from $1,109 for the specialized labor intensive labor cluster to $94,666 for the securities labor cluster.

Recommendations and Next Steps
Below are recommendations and next steps for the economic development organizations in the Iowa Great Lakes Region.

1. **Determine if Industry Linkages and Organizational Relationships Exist, or Could Exist, in the Region.**

   A. What industry linkages/relationships actually exist in the region?
   It is important to understand that the analysis that is completed in this study for the value-chain industry clusters and technology clusters is based on industry linkages and relationships that have been identified at the U.S. level. Therefore, it is important that additional fact finding is completed locally and regionally to determine if actual buyer-supplier relationships within the various clusters and industry sectors actually exist or could exist in the future. This input can be obtained from employers through existing industry/business surveys and interviews, focus groups or industry roundtables. It is important to find out whom businesses in the Iowa Great Lakes Region "buy from" and "sell to" in order to determine if there are important economic relationships within the region.

   B. What support organizations and programs are utilized by clusters?
   It is also important to determine what support organizations are utilized by businesses within the region and what additional needs they have that could be addressed collectively through cluster-focused or industry-focused strategies. Programs being utilized could include workforce training at Iowa Lakes Community College or pollution prevention assistance through the Iowa Waste Reduction Center at the University of Northern Iowa. Needs might include exporting assistance or process evaluations to assist with increasing productivity and competitiveness.

   Any efforts to evaluate whether value-chain and technology relationships exist within the region will enable the local development organizations and support organizations to gain a better understanding of the regional economy. A logical approach to gathering this information is to integrate the gathering activities into existing industry programming and business call programs that are undertaken by local economic development organizations, or develop a joint effort regionally specifically for this effort.

2. **Promote Regional Communication and Cooperation.**
   Labor markets and economic relationships flow across city, county and state political lines. Therefore, it is important to recognize and understand these relationships (see recommendation #1). It is important that appropriate economic development efforts reflect these realities. Cluster-based economic development efforts typically require the implementation of strategies at a regional level whether the strategies focus on workforce development, technology and production enhancements for manufacturers or infrastructure development.

   There is already of a tradition of regional economic development in the Iowa Great Lakes Region with the existence of the Iowa Great Lakes Corridor of Opportunity which is the

economic development organization for Clay and Dickinson counties. Where appropriate, discussion for broader regional development efforts should be considered to include development organizations in Emmet County, including the Estherville Area Association of Business and Industry. As needs and opportunities are identified within the value-chain industry clusters, technology clusters and the labor clusters, it is likely the actions will need to be regional in focus to have significant impact on the future of the region.

3. Determine Potential Approaches for Business Development and Industry Recruitment.

A. What industries could be targeted based on the value-chain clusters and the technology clusters?

If proactive recruitment efforts are being undertaken by economic development organizations or are being considered for future activities, the analysis provided in this report should be a starting point for targeting. A key advantage of using the benchmark cluster framework is the ability to determine potential areas for growth in the region such as industry gaps either within a value-chain cluster or technology cluster. For most of the value-chain clusters and technology clusters with a measurable presence in the Iowa Great Lakes Region, there are only a handful of industry sectors that have establishments within the region, so opportunities may exist for attracting or developing new industries which could compliment the existing industrial linkages in the region.

The construction materials industry cluster is an example of where potential gaps might exist. In the construction materials industry cluster in the Iowa Great Lakes Region, roughly a third of the employment is in the transportation equipment industry, n.e.c. (SIC 3799), followed by the measuring and dispensing pumps industry (SIC 3585), the ready-mix concrete industry (SIC 3273) and the wood partitions and fixtures industry (SIC 2541). Each of these last three industries had an employment share over 10 percent. At the U.S. level in the construction materials industry cluster, the fastest growing sectors were the transportation equipment manufacturing, n.e.c. industry (SIC 3799), the structural wood members manufacturing, n.e.c. industry (SIC 2439) and the wood kitchen cabinets industry (SIC 2434). Only the transportation equipment manufacturing, n.e.c. industry had a presence in the Region. Therefore, the cluster's other growth industries may be targets for recruitment if regional assets are attractive to firms within those industries.

B. What industries could be targeted based on the labor clusters?

Another approach is to identify growth industries within the benchmark labor clusters that would find the region's existing labor pool attractive, especially taking into account any recent job losses that have happened within the region. An example of this is the distribution, freight handling labor cluster that declined in employment in the Iowa Great Lakes Region between 1990 and 2000 while the labor cluster grew both statewide and nationally. Are there industries within this labor cluster that are growing nationally which would find the available labor in the Iowa Great Lakes Region attractive? Have there been recent mass layoffs or business closures within the region which would be attractive to industries within the labor clusters in which the downsizing or closing businesses are located?

C. Are there opportunities for entrepreneurs and existing employers within the region?

The identification of gaps within a value-chain cluster, technology cluster or labor cluster could also provide opportunities for entrepreneurs and existing employers within the region to develop new products and enter new markets. Gaps might allow existing businesses to diversify out of declining product lines or industries to new markets existing within the region and beyond.

D. Market Regionally.

If the proactive recruitment of industry is going to focus on industry clusters or the region's labor clusters, then regional marketing efforts should be considered as the most appropriate approach. Marketing regionally helps to better describe the regional economy and regional advantages. Regional marketing has been a good first step toward broader regional economic development strategies for other regional efforts around the country. Any effort to market regionally will require close collaboration between the local economic development professionals and their board leadership, local governments and elected officials. It will also require that all participating organizations have a clear understanding of the purpose of the marketing effort, the targets and the clear set of policies and procedures for funding and implementing the marketing effort.

4. Determine if Cluster-Based Economic Development Strategies are Appropriate.

A. Can economic development strategies be adjusted to focus on clusters and can we work regionally?

Cluster-based economic development strategies require focusing on the needs of multiple firms and industries over a broader geographic region than is typical for most communities' economic development efforts. Implementation of cluster-based development strategies will likely require local economic development organizations to shift their programming and strategies to focusing on maintaining and growing industry clusters in the region as opposed to a more narrow focus on only the needs of individual local firms. Local economic development groups will also be required to work more closely with other economic development groups and service providers within the region and beyond. Service providers will also likely need to adjust their programming to fit the needs of industry clusters.

As cluster-based economic development strategies are considered, it is important to determine if funding is available locally and regionally to undertake cluster-based efforts. In addition, the organizations and local governments providing funding must have a clear understanding of the region's cluster-based economic development strategies and how the funds will be used and how these uses could be different from previous efforts.

B. How balanced should economic development strategies be between economic diversification and industry concentration in our region?

One of the concerns often raised about cluster-based economic development strategies is that they do not promote industry diversification within a regional economy, but

rather the concentration of industries. With over-concentration, a region's economy could be severally impacted if the industry or industries experience a decline. The analysis shows that in many of the industry clusters several industry sectors are dominant. An example of this in the Iowa Great Lakes Region is the fabricated textiles industry cluster, which in 2000 had nearly all of its employment in the upholstered household furniture industry.

If economic development efforts in the region focus on the growth of industry clusters, a balanced approach should be considered which allows for the leveraging of the region's existing industry linkages and clusters while still allowing for economic diversification. An approach to achieving such a balance is to focus both on the value-chain and technology clusters along with the labor clusters since each of the three benchmark cluster frameworks focuses on different inputs.

5. **Determine the Needs of Businesses within the Clusters.**
Whether a cluster-based approach is undertaken or not, it is important to identify the needs and issues of existing businesses within the region. If a cluster-based approach is advanced, then the gathering of this information and the implementation of actions and strategies to meet those needs should be shaped around the industry clusters. This will require cooperation among the various economic development organizations and support organizations within the region. An example is a regional industry call program that gathers identical information for significant companies within a cluster. The same contact teams would make visits across the region so there would be consistency of information gathering. Common needs within an industry cluster could include customized workforce training, market research, technology and modernization assistance, exporting assistance or research and development assistance. Other issues might cut across clusters, such as the need for affordable or executive housing, transportation or other infrastructure enhancements such as the access to fiber optics or the need for clean lab facilities for product testing.

6. **Benchmark Progress of the Clusters and Region.**
It is important for an economic development organization and a community to measure their successes or lack of successes. Traditional success indicators have included job growth, wage rates, business start-ups and expanded taxable valuations. Measuring success for cluster-based economic development efforts will require different measures that focus on the performance within a cluster, such as increased sales, profits, productivity, employment and positive interaction among cluster firms. Obviously, some of these measures are hard to measure or the data is not readily available. Therefore, proxy measures will need to be developed which can provide insights into the progress being made with cluster development.

It is also useful to benchmark the region with the state, nation and other comparable regions to determine comparable progress over time.

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Appendix A

Benchmark Value-Chain Industry Clusters

Metalworking and Industrial Machinery

SIC	Description
2514	Metal household furniture
2522	Office furniture, except wood
2542	Partitions and fixtures, except wood
2591	Drapery hardware & blinds & shades
2599	Furniture and fixtures, nec
3053	Gaskets, packing and sealing devices
3255	Clay refractories
3272	Concrete products, nec
3274	Lime
3312	Blast furnaces and steel mills
3313	Electrometallurgical products
3315	Steel wire and related products
3316	Cold finishing of steel shapes
3317	Steel pipe and tubes
3321	Gray and ductile iron foundries
3322	Malleable iron foundries
3324	Steel investment foundries
3325	Steel foundries, nec
3398	Metal heat treating
3411	Metal cans
3412	Metal barrels, drums, and pails
3421	Cutlery
3423	Hand and edge tools, nec
3425	Saw blades and handsaws
3429	Hardware, nec
3431	Metal sanitary ware
3433	Heating equipment, except electric
3441	Fabricated structural metal
3442	Metal doors, sash, and trim
3443	Fabricated plate work (boiler shops)
3444	Sheet metalwork
3446	Architectural metal work
3448	Prefabricated metal buildings
3449	Miscellaneous metal work
3451	Screw machine products
3452	Bolts, nuts, rivets, and washers
3462	Iron and steel forgings
3465	Automotive stampings
3466	Crowns and closures
3469	Metal stampings, nec
3471	Plating and polishing
3479	Metal coating and allied services
3483	Ammunition, exc. for small arms, nec
3484	Small arms
3489	Ordnance and accessories, nec
3491	Industrial valves
3492	Fluid power valves & hose fittings
3493	Steel springs, except wire
3494	Valves and pipe fittings, nec
3495	Wire springs
3496	Misc. fabricated wire products
3498	Fabricated pipe and fittings
3499	Fabricated metal products, nec
3511	Turbines and turbine generator sets
3519	Internal combustion engines, nec
3523	Farm machinery and equipment
3524	Lawn and garden equipment
3531	Construction machinery
3532	Mining machinery
3533	Oil and gas field machinery
3534	Elevators and moving stairways
3535	Conveyors and conveying equipment
3536	Hoists, cranes, and monorails
3537	Industrial trucks and tractors
3541	Machine tools, metal cutting types
3542	Machine tools, metal forming types
3543	Industrial patterns
3544	Special dies, tools, jigs & fixtures
3545	Machine tool accessories
3546	Power-driven handtools
3547	Rolling mill machinery
3548	Welding apparatus .
3549	Metalworking machinery, nec
3552	Textile machinery
3553	Woodworking machinery
3554	Paper industries machinery
3555	Printing trades machinery
3556	Food products machinery
3559	Special industry machinery, nec
3561	Pumps and pumping equipment
3562	Ball and roller bearings
3563	Air and gas compressors
3564	Blowers and fans
3565	Packaging machinery

3566	Speed changers, drives, and gears
3567	Industrial furnaces and ovens
3568	Power transmission equipment, nec
3569	General industrial machinery, nec
3581	Automatic vending machines
3582	Commercial laundry equipment
3585	Refrigeration and heating equipment
3586	Measuring and dispensing pumps
3589	Service industry machinery, nec
3592	Carburetors, pistons, rings, valves
3593	Fluid power cylinders & actuators
3594	Fluid power pumps and motors
3599	Industrial machinery, nec
3612	Transformers, except electronic
3613	Switchgear and switchboard apparatus
3621	Motors and generators
3624	Carbon and graphite products
3631	Household cooking equipment
3632	Household refrigerators and freezers
3633	Household laundry equipment
3634	Electric housewares and fans
3639	Household appliances, nec
3643	Current carrying wiring devices
3644	Noncurrent carrying wiring devices
3692	Primary batteries, dry and wet
3713	Truck and bus bodies
3714	Motor vehicle parts and accessories
3715	Truck trailers
3731	Ship building and repairing
3732	Boat building and repairing
3743	Railroad equipment
3751	Motorcycles, bicycles, and parts
3795	Tanks and tank components
3821	Laboratory apparatus and furniture
3949	Sporting and athletic goods, nec
3995	Burial caskets

Packaged Food Products

SIC	Description
2011	Meat packing plants
2013	Sausages and other prepared meats
2015	Poultry slaughtering and processing
2021	Creamery butter
2022	Cheese, natural and processed
2023	Dry, condensed, evaporated products
2024	Ice cream and frozen desserts
2026	Fluid milk
2032	Canned specialties
2033	Canned fruits and vegetables
2034	Dehydrated fruits, vegetables, soups
2035	Pickles, sauces, and salad dressings
2037	Frozen fruits and vegetables
2038	Frozen specialties, nec
2043	Cereal breakfast foods
2044	Rice milling
2045	Prepared flour mixes and doughs
2051	Bread, cake, and related products
2052	Cookies and crackers
2053	Frozen bakery products, except bread
2061	Raw cane sugar
2062	Cane sugar refining
2063	Beet sugar
2064	Candy & other confectionaries
2066	Chocolate and cocoa products
2067	Chewing gum
2068	Salted and roasted nuts and seeds
2079	Edible fats and oils, nec
2082	Malt beverages
2084	Wines, brandy, and brandy spirits
2085	Distilled and blended liquors
2086	Bottled and canned soft drinks
2091	Canned and cured fish and seafoods
2092	Fresh or frozen prepared fish
2095	Roasted coffee
2096	Potato chips and similar snacks
2098	Macaroni and spaghetti
2099	Food preparations, nec
2676	Sanitary paper products
2861	Gum and wood chemicals
3262	Vitreous china table & kitchenware
3263	Semivitreous table & kitchenware
3556	Food products machinery
3565	Packaging machinery
3914	Silverware and plated ware

Construction Materials

SIC	Description
2273	Carpets and rugs
2394	Canvas and related products
2421	Sawmills and planing mills, general
2426	Hardwood dimension & flooring mills
2429	Special product sawmills, nec
2431	Millwork
2434	Wood kitchen cabinets
2435	Hardwood veneer and plywood
2436	Softwood veneer and plywood

2439	Structural wood members, nec
2452	Prefabricated wood buildings
2491	Wood preserving
2493	Reconstituted wood products
2499	Wood products, nec
2541	Wood partitions and fixtures
2679	Converted paper products, nec
2851	Paints, varnishes, lacquers, enamels, etc.
2951	Asphalt paving mixtures and blocks
2952	Asphalt felts and coatings
3251	Brick and structural clay tile
3253	Ceramic wall and floor tile
3259	Structural clay products, nec
3261	Vitreous plumbing fixtures
3264	Porcelain electrical supplies
3271	Concrete block and brick
3273	Ready-mixed concrete
3275	Gypsum products
3281	Cut stone and stone products
3291	Abrasive products
3296	Mineral wool
3315	Steel wire and related products
3357	Nonferrous wiredrawing & insulating
3425	Saw blades and handsaws
3431	Metal sanitary ware
3432	Plumbing fixture fittings and trim
3433	Heating equipment, except electric
3442	Metal doors, sash, and trim
3444	Sheet metalwork
3449	Miscellaneous metal work
3491	Industrial valves
3492	Fluid power valves & hose fittings
3494	Valves and pipe fittings, nec
3495	Wire springs
3496	Misc. fabricated wire products
3498	Fabricated pipe and fittings
3561	Pumps and pumping equipment
3563	Air and gas compressors
3585	Refrigeration and heating equipment
3586	Measuring and dispensing pumps
3613	Switchgear and switchboard apparatus
3634	Electric housewares and fans
3639	Household appliances, nec
3643	Current-carrying wiring devices
3644	Noncurrent-carrying wiring devices
3645	Residential lighting fixtures
3646	Commercial lighting fixtures
3647	Vehicular lighting equipment
3648	Lighting equipment, nec
3663	Radio & TV communications equipment
3669	Communications equipment, nec
3699	Electrical equipment & supplies, nec
3799	Transportation equipment, nec
3822	Environmental controls
3851	Ophthalmic goods
3991	Brooms and brushes
3996	Hard surface floor coverings, nec
8711	Engineering services
8712	Architectural services
8713	Surveying services

Printing and Publishing

SIC	Description
2611	Pulp mills
2652	Setup paperboard boxes
2653	Corrugated and solid fiber boxes
2655	Fiber cans, drums & similar products
2656	Sanitary food containers
2657	Folding paperboard boxes
2671	Paper coated & laminated, packaging
2672	Paper coated and laminated, nec
2673	Bags: plastics, laminated, & coated
2674	Bags: uncoated paper & multiwall
2675	Die-cut paper and board
2676	Sanitary paper products
2677	Envelopes
2678	Stationery products
2679	Converted paper products, nec
2711	Newspapers: publishing, or pub. & printing
2721	Periodicals: publishing and printing
2731	Book publishing
2732	Book printing
2741	Miscellaneous publishing
2752	Commercial printing, lithographic
2754	Commercial printing, gravure
2759	Commercial printing, nec
2761	Manifold business forms
2771	Greeting cards
2782	Blankbooks and looseleaf binders
2789	Bookbinding and related work
2791	Typesetting
2796	Platemaking services
3275	Gypsum products
3861	Photographic equipment and supplies
3953	Marking devices
3955	Carbon paper and inked ribbons

3993	Signs and advertising specialities
3999	Manufacturing industries, nec
4812	Radiotelephone communications
4813	Telephone communications, exc. radio
4822	Telegraph & other message communications
4899	Communications services, nec
7371	Computer programming services
7372	Prepackaged software
7373	Computer integrated systems design
7374	Data processing and preparation
7375	Information retrieval services
7376	Computer facilities management
7377	Computer rental & leasing
7378	Computer maintenance & repair
7379	Computer related services, nec

Information Technology and Instruments

SIC	Description
3471	Plating and polishing
3571	Electronic computers
3572	Computer storage devices
3575	Computer terminals
3577	Computer peripheral equipment, nec
3578	Calculating and accounting equipment
3579	Office machines, nec
3596	Scales and balances, exc. laboratory
3625	Relays and industrial controls
3629	Electrical industrial apparatus, nec
3651	Household audio and video equipment
3661	Telephone and telegraph apparatus
3663	Radio & TV communications equipment
3669	Communications equipment, nec
3672	Printed circuit boards
3674	Semiconductors and related devices
3675	Electronic capacitors
3676	Electronic resistors
3677	Electronic coils and transformers
3678	Electronic connectors
3679	Electronic components, nec
3694	Engine electrical equipment
3699	Electrical equipment & supplies, nec
3728	Aircraft parts and equipment, nec
3761	Guided missiles and space vehicles
3769	Space vehicle equipment, nec
3812	Search and navigation equipment
3821	Laboratory apparatus and furniture
3822	Environmental controls
3823	Process control instruments
3824	Fluid meters and counting devices
3825	Instruments to measure electricity
3826	Analytical instruments
3827	Optical instruments and lenses
3829	Measuring & controlling devices, nec
3841	Surgical and medical instruments
3844	X-ray apparatus and tubes
3845	Electromedical equipment
3861	Photographic equipment and supplies
3873	Watches, clocks, watchcases and parts
3931	Musical instruments
7371	Computer programming services
7372	Prepackaged software
7373	Computer integrated systems design
7374	Data processing and preparation
7375	Information retrieval services
7376	Computer facilities management
7377	Computer rental & leasing
7378	Computer maintenance & repair
7379	Computer related services, nec

Chemicals and Plastics

SIC	Description
2087	Flavoring extracts and syrups, nec
2611	Pulp mills
2621	Paper mills
2631	Paperboard mills
2812	Alkalies and chlorine
2813	Industrial gases
2816	Inorganic pigments
2821	Plastics materials and resins
2822	Synthetic rubber
2823	Cellulosic manmade fibers
2824	Organic fibers, noncellulosic
2841	Soap and other detergents
2842	Polishes and sanitation goods
2843	Surface active agents
2851	Paints, varnishes, lacquers, enamels, etc.
2865	Cyclic crudes and intermediates
2869	Industrial organic chemicals, nec
2875	Fertilizers, mixing only
2879	Agricultural chemicals, nec
2891	Adhesives and sealants
2893	Printing ink
2899	Chemical preparations, nec
3011	Tires and inner tubes
3061	Mechanical rubber goods
3069	Fabricated rubber products, nec

3081	Unsupported plastics film & sheet
3082	Unsupported plastics profile shapes
3083	Laminated plastics plate & sheet
3084	Plastics pipe
3085	Plastics bottles
3086	Plastics foam products
3087	Custom compound purchased resins
3088	Plastics plumbing fixtures
3089	Plastics products, nec
3111	Leather tanning and finishing
3291	Abrasive products
3399	Primary metal products, nec
3559	Special industry machinery, nec
3692	Primary batteries, dry and wet
3996	Hard surface floor coverings, nec
8042	Offices and clinics of optometrists
8043	Offices and clinics of podiatrists
8049	Offices of health practitioners, nec
8071	Medical laboratories
8072	Dental laboratories
8092	Kidney dialysis centers
8093	Specialty outpatient facilities, nec
8099	Health and allied services, nec

Apparel

SIC	Description
2211	Broadwoven fabric mills, cotton
2221	Broadwoven fabric mills, manmade
2231	Broadwoven fabric mills, wool
2241	Narrow fabric and other smallwares mills
2251	Women's hosiery, except socks
2252	Hosiery, nec
2253	Knit outerwear mills
2254	Knit underwear mills
2257	Weft knit fabric mills
2258	Lace & warp knit fabric mills
2259	Knitting mills, nec
2261	Finishing plants, cotton
2262	Finishing plants, manmade
2269	Finishing plants, nec
2273	Carpets and rugs
2281	Yarn spinning mills
2282	Throwing and winding mills
2284	Thread mills
2296	Tire cord and fabrics
2297	Nonwoven fabrics
2298	Cordage and twine
2299	Textile goods, nec
2311	Men's and boys' suits, coats and overcoats
2321	Men's and boys' shirts
2322	Men's & boys' underwear and nightwear
2323	Men's and boys' neckwear
2325	Men's and boys' trousers and slacks
2326	Men's and boys' work clothing
2329	Men's and boys' clothing, nec
2331	Women's & misses' blouses & shirts
2335	Women's, junior's, & misses' dresses
2337	Women's and misses' suits and coats
2339	Women's and misses' outerwear, nec
2341	Women's and children's underwear
2342	Bras, girdles, and allied garments
2353	Hats, caps, and millinery
2361	Girls' & children's dresses, blouses
2369	Girls' and children's outerwear, nec
2371	Fur goods
2381	Fabric dress and work gloves
2384	Robes and dressing gowns
2385	Waterproof outerwear
2386	Leather and sheep-lined clothing
2387	Apparel belts
2389	Apparel and accessories, nec
2395	Pleating and stitching
2397	Schiff li machine embroideries
2824	Organic fibers, noncellulosic
3965	Fasteners, buttons, needles, & pins

Motor Vehicle Manufacturing

SIC	Description
2273	Carpets and rugs
2299	Textile goods, nec
2396	Automotive and apparel trimmings
2399	Fabricated textile products, nec
2531	Public building and related furniture
2599	Furniture and fixtures, nec
2851	Paints, varnishes, lacquers, enamels, etc.
2891	Adhesives and sealants
3011	Tires and inner tubes
3052	Rubber & plastics hose & belting
3061	Mechanical rubber goods
3069	Fabricated rubber products, nec
3081	Unsupported plastics film & sheet
3082	Unsupported plastics profile shapes
3083	Laminated plastics plate & sheet
3084	Plastics pipe
3085	Plastics bottles
3086	Plastics foam products

3087	Custom compound purchased resins
3088	Plastics plumbing fixtures
3089	Plastics products, nec
3142	House slippers
3211	Flat glass
3229	Pressed and blown glass, nec
3231	Glass products, made of purchased glass
3465	Automotive stampings
3493	Steel springs, except wire
3519	Internal combustion engines, nec
3524	Lawn and garden equipment
3585	Refrigeration and heating equipment
3592	Carburetors, pistons, rings, valves
3641	Electric lamps
3651	Household audio and video equipment
3694	Engine electrical equipment
3711	Motor vehicles and car bodies
3713	Truck and bus bodies
3714	Motor vehicle parts and accessories
3715	Truck trailers
3716	Motor homes

Fabricated Textiles

SIC	Description
2211	Broadwoven fabric mills, cotton
2221	Broadwoven fabric mills, manmade
2231	Broadwoven fabric mills, wool
2261	Finishing plants, cotton
2262	Finishing plants, manmade
2295	Coated fabrics, not rubberized
2311	Men's and boys' suits, coats and overcoats
2321	Men's and boys' shirts
2322	Men's & boys' underwear + nightwear
2323	Men's and boys' neckwear
2325	Men's and boys' trousers and slacks
2326	Men's and boys' work clothing
2329	Men's and boys' clothing, nec
2331	Women's & misses' blouses & shirts
2335	Women's, junior's, & misses' dresses
2337	Women's and misses' suits and coats
2339	Women's and misses' outerwear, nec
2341	Women's and children's underwear
2342	Bras, girdles, and allied garments
2353	Hats, caps, and millinery
2361	Girls' & children's dresses, blouses
2369	Girls' and children's outerwear, nec
2371	Fur goods
2381	Fabric dress and work gloves
2384	Robes and dressing gowns
2385	Waterproof outerwear
2386	Leather and sheep□lined clothing
2387	Apparel belts
2389	Apparel and accessories, nec
2391	Curtains and draperies
2392	Housefurnishings, nec
2393	Textile bags
2394	Canvas and related products
2396	Automotive and apparel trimmings
2399	Fabricated textile products, nec
2512	Upholstered household furniture
2515	Mattresses and bedsprings
2823	Cellulosic manmade fibers
3021	Rubber and plastics footwear
3052	Rubber & plastics hose & belting
3161	Luggage
3172	Personal leather goods, nec
3842	Surgical appliances and supplies
3942	Dolls and stuffed toys
3965	Fasteners, buttons, needles, & pins
3995	Burial caskets

Stone, Clay and Glass Products

SIC	Description
2873	Nitrogenous fertilizers
2874	Phosphatic fertilizers
2911	Petroleum refining
3011	Tires and inner tubes
3241	Cement, hydraulic
3255	Clay refractories
3261	Vitreous plumbing fixtures
3262	Vitreous china table & kitchenware
3263	Semivitreous table & kitchenware
3264	Porcelain electrical supplies
3269	Pottery products, nec
3274	Lime
3295	Minerals, ground or treated
3297	Nonclay refractories
3299	Nonmetallic mineral products, nec
3629	Electrical industrial apparatus, nec

Wood Products and Furniture

SIC	Description
2411	Logging
2426	Hardwood dimension & flooring mills
2431	Millwork
2434	Wood kitchen cabinets

2439	Structural wood members, nec
2441	Nailed wood boxes and shook
2448	Wood pallets and skids
2449	Wood containers, nec
2451	Mobile homes
2452	Prefabricated wood buildings
2493	Reconstituted wood products
2499	Wood products, nec
2511	Wood household furniture
2517	Wood TV and radio cabinets
2521	Wood office furniture
2611	Pulp mills
2621	Paper mills
2631	Paperboard mills
2861	Gum and wood chemicals
3792	Travel trailers and campers
3931	Musical instruments

Primary Nonferrous Metals

SIC	Description
3321	Gray and ductile iron foundries
3322	Malleable iron foundries
3324	Steel investment foundries
3325	Steel foundries, nec
3331	Primary copper
3339	Primary nonferrous metals, nec
3351	Copper rolling and drawing
3356	Nonferrous rolling and drawing, nec
3363	Aluminum die-castings
3364	Nonferrous die-casting exc. aluminum
3365	Aluminum foundries
3366	Copper foundries
3369	Nonferrous foundries, nec
3399	Primary metal products, nec
3599	Industrial machinery, nec

Leather Goods

SIC	Description
3111	Leather tanning and finishing
3131	Boot and shoe cut stock and findings
3142	House slippers
3143	Men's footwear, except athletic
3144	Women's footwear, except athletic
3149	Footwear, except rubber, nec
3151	Leather gloves and mittens
3171	Women's handbags and purses
3172	Personal leather goods, nec
3199	Leather goods, not elsewhere classified

Tobacco Products

SIC	Description
2111	Cigarettes
2121	Cigars
2131	Chewing and smoking tobacco
2141	Tobacco stemming and redrying

Canned and Bottled Beverages

SIC	Description
2046	Wet corn milling
2047	Dog and cat food
2048	Prepared feeds, nec
2083	Malt
2087	Flavoring extracts and syrups, nec
2873	Nitrogenous fertilizers
2874	Phosphatic fertilizers
2875	Fertilizers, mixing only
2879	Agricultural chemicals, nec
3221	Class containers
3411	Metal cans

Fat Oil Mills

SIC	Description
2074	Cottonseed oil mills
2075	Soybean oil mills
2076	Vegetable oil mills, nec
2077	Animal and marine fats and oils
2079	Edible fats and oils, nec

Aerospace

SIC	Description
3463	Nonferrous forgings
3482	Small arms ammunition
3483	Ammunition, exc. for small arms, nec
3721	Aircraft
3724	Aircraft engines and engine parts
3728	Aircraft parts and equipment, nec
3761	Guided missiles and space vehicles
3764	Space propulsion units and parts
3769	Space vehicle equipment, nec
3812	Search and navigation equipment

Petroleum Products

SIC	Description
2895	Carbon black
2911	Petroleum refining
2951	Asphalt paving mixtures and blocks
2952	Asphalt felts and coatings

2992	Lubricating oils and greases
2999	Petroleum and coal products, nec

Jewelry

SIC	Description
3339	Primary nonferrous metals, nec
3911	Jewelry, precious metal
3915	Jewelers' materials & lapidary work
3961	Costume jewelry

Boat Building

SIC	Description
3732	Boat building and repairing
3543	Industrial patterns
3541	Machine tools, metal cutting types
3519	Internal combustion engines, nec
3511	Turbines and turbine generator sets

Aluminum

SIC	Description
2819	Industrial inorganic chemicals, nec
3334	Primary aluminum
3353	Aluminum sheet, plate, and foil
3354	Aluminum extruded products
3355	Aluminum rolling and drawing, nec
3411	Metal cans
3463	Nonferrous forgings
3497	Metal foil and leaf

Hospitals, Labs, Specialized Medical Services

SIC	Description
2731	Book publishing
7371	Computer programming services
7372	Prepackaged software
7373	Computer integrated systems design
7374	Data processing and preparation
7375	Information retrieval services
7376	Computer facilities management
7377	Computer rental & leasing
7378	Computer maintenance & repair
7379	Computer related services, nec
8042	Offices and clinics of optometrists
8043	Offices and clinics of podiatrists
8049	Offices of health practitioners, nec
8062	General medical and surgical hospitals
8063	Psychiatric hospitals
8069	Specialty hospitals, except psychiatric
8071	Medical laboratories
8072	Dental laboratories
8092	Kidney dialysis centers
8093	Specialty outpatient facilities, nec
8099	Health and allied services, nec
8731	Commercial physical research
8732	Commercial nonphysical research
8734	Testing laboratories

Platemaking and Typesetting

SIC	Description
2791	Typesetting
2796	Platemaking services
2893	Printing ink
3555	Printing trades machinery

Securities and Insurance

SIC	Description
6231	Security and commodity exchanges
6282	Investment advice
6289	Security and commodity exchange nec
6311	life insurance
6321	Accident and health insurance
6324	Hospital and medical service plans
6351	Surety insurance
6361	Title insurance
6371	Pension, health, and welfare funds
6399	Insurance carriers, nec
6531	Real estate agents and managers

Banking and Advertising

SIC	Description
6011	Federal reserve banks
6019	Central reserve depository institutions, nec
6021	National commercial banks
6022	State commercial banks
6029	Commercial banks, nec
6035	Savings institutions, Federally chartered
6036	Savings institutions, not Federally chartered
6061	Credit unions, Federally chartered
6062	Credit unions, not Federally chartered
6081	Branched and agencies of foreign banks
6082	Foreign trade & intl. banking institutions
6091	Nondeposit trust facilities
6099	Functions related to depository banking, nec
6111	Federal and Fed.-sponsored credit
6141	Personal credit institutions
6153	Short-term bus. credit institutions, exc. ag
6159	Misc. business credit institutions

6162	Mortgage bankers and loan correspondents
6163	Loan Brokers
6211	Security brokers, dealers, & flotation co
6221	Commodity contracts brokers and dealers
7311	Advertising agencies
7312	Outdoor advertising services
7313	Radio, TV, publisher representatives
7319	Advertising, nec

Legal Services

SIC	Description
8111	Legal services

Transportation, Shipping, & Logistics

SIC	Description
4212	Local Trucking without Storage
4213	Trucking, except local
4214	Local Trucking with Storage
4215	Courier Services, except Air
4221	Farm product warehousing and storage
4222	Refrigerated warehousing and storage
4225	General warehousing and storage
4226	Special warehousing and storage, nec
4231	Trucking terminal facilities
4311	U.S. Postal Service
4412	Deep sea foreign transportation of freight
4424	Deep sea domestic transportation of freight
4432	Freight trans. on Great Lakes - St. Lawrence
4449	Water transport of freight, nec
4481	Deep sea passenger trans., ex. ferry
4482	Ferries
4489	Water passenger transportation, nec
4491	Marine cargo handling
4492	Towing and tugboat service
4493	Marinas
4499	Water transportation services, nec
4512	Air transportation, scheduled
4513	Air courier services
4522	Air transportation, nonscheduled
4612	Crude petroleum pipelines
4613	Refined petroleum pipelines
4619	Pipelines, nec
4731	Freight transportation arrangement
4741	Rental of railroad cars
4783	Packing and crating
4785	Vehicle inspection and weighing services
4789	Transportation services, nec

Pharmaceuticals

SIC	Description
2833	Medicinals and botanicals
2834	Pharmaceutical preparations
2835	Diagnostic substances
2836	Biological products exc. diagnostic

Source: Edward .J. Feser, Associate Professor, Department of City and Regional Planning, University of North Carolina – Chapel Hill (2003)

Appendix B

Benchmark Technology-Intensive Clusters

Chemicals and Plastics

SIC	Description
2812	Alkalies and chlorine
2813	Industrial gases
2816	Inorganic pigments
2821	Plastics materials and resins
2822	Synthetic rubber
2823	Cellulosic manmade fibers
2824	Organic fibers, noncellulosic
2841	Soap and other detergents
2842	Polishes and sanitation goods
2843	Surface active agents
2844	Toilet preparations
2851	Paints, varnishes, lacquers, enamels, etc.
2865	Cyclic crudes and intermediates
2869	Industrial organic chemicals, nec
2873	Nitrogenous fertilizers
2874	Phosphatic fertilizers
2875	Fertilizers, mixing only
2879	Agricultural chemicals, nec
2891	Adhesives and sealants
2893	Printing ink
2899	Chemical preparations, nec
3559	Special industry machinery, nec
3624	Carbon and graphite products
3692	Primary batteries, dry and wet
3843	Dental equipment and supplies
8071	Medical laboratories
8072	Dental laboratories
8092	Kidney dialysis centers
8093	Specialty outpatient facilities, nec
8099	Health and allied services, nec

Information Technology and Instruments

SIC	Description
3571	Electronic computers
3572	Computer storage devices
3575	Computer terminals
3577	Computer peripheral equipment, nec
3578	Calculating and accounting equipment
3579	Office machines, nec
3625	Relays and industrial controls
3629	Electrical industrial apparatus, nec
3631	Household cooking equipment
3643	Current-carrying wiring devices
3644	Noncurrent-carrying wiring devices
3661	Telephone and telegraph apparatus
3663	Radio & TV communications equipment
3669	Communications equipment, nec
3672	Printed circuit boards
3674	Semiconductors and related devices
3675	Electronic capacitors
3676	Electronic resistors
3677	Electronic coils and transformers
3678	Electronic connectors
3679	Electronic components, nec
3694	Engine electrical equipment
3699	Electrical equipment & supplies, nec
3812	Search and navigation equipment
3821	Laboratory apparatus and furniture
3822	Environmental controls
3823	Process control instruments
3824	Fluid meters and counting devices
3825	Instruments to measure electricity
3826	Analytical instruments
3827	Optical instruments and lenses
3829	Measuring & controlling devices, nec
3844	X-ray apparatus and tubes
3845	Electromedical equipment
7371	Computer programming services
7372	Prepackaged software
7373	Computer integrated systems design
7374	Data processing and preparation
7375	Information retrieval services
7379	Computer related services, nec

Industrial Machinery

SIC	Description
3511	Turbines and turbine generator sets
3532	Mining machinery
3535	Conveyors and conveying equipment
3536	Hoists, cranes, and monorails
3541	Machine tools, metal cutting types
3542	Machine tools, metal forming types
3546	Power-driven handtools
3547	Rolling mill machinery

3549	Metalworking machinery, nec
3553	Woodworking machinery
3555	Printing trades machinery
3556	Food products machinery
3559	Special industry machinery, nec
3561	Pumps and pumping equipment
3563	Air and gas compressors
3564	Blowers and fans
3565	Packaging machinery
3612	Transformers, except electronic
3621	Motors and generators

Motor Vehicle Manufacturing

SIC	Description
2851	Paints, varnishes, lacquers, enamels, etc.
2893	Printing ink
3519	Internal combustion engines, nec
3531	Construction machinery
3534	Elevators and moving stairways
3537	Industrial trucks and tractors
3548	Welding apparatus
3641	Electric lamps
3645	Residential lighting fixtures
3646	Commercial lighting fixtures
3647	Vehicular lighting equipment
3648	Lighting equipment, nec
3651	Household audio and video equipment
3691	Storage batteries
3694	Engine electrical equipment
3711	Motor vehicles and car bodies
3713	Truck and bus bodies
3714	Motor vehicle parts and accessories
3715	Truck trailers

Aerospace

SIC	Description
3544	Special dies, tools, jigs & fixtures
3545	Machine tool accessories
3721	Aircraft
3724	Aircraft engines and engine parts
8734	Testing laboratories
3728	Aircraft parts and equipment, nec
3761	Guided missiles and space vehicles
3764	Space propulsion units and parts
3769	Space vehicle equipment, nec

Household Appliances

SIC	Description
3632	Household refrigerators and freezers
3633	Household laundry equipment
3635	Household vacuum cleaners
3639	Household appliances, nec
3716	Motor homes

Communications Services and Software

SIC	Description
4899	Communications services, nec
7371	Computer programming services
7372	Prepackaged software
7373	Computer integrated systems design
7374	Data processing and preparation
7375	Information retrieval services
7379	Computer related services, nec
8711	Engineering services
8712	Architectural services
8713	Surveying services
8731	Commercial physical research
8732	Commercial nonphysical research
8734	Testing laboratories

Pharmaceuticals and Medical Technologies

SIC	Description
2833	Medicinals and botanicals
2834	Pharmaceutical preparations
2835	Diagnostic substances
2836	Biological products exc. diagnostic
3634	Electric housewares and fans
3841	Surgical and medical instruments
3842	Surgical appliances and supplies
8731	Commercial physical research
8732	Commercial nonphysical research

Source: Edward .J. Feser, Associate Professor, Department of City and Regional Planning, versity of North Carolina – Chapel Hill (2003)

Appendix C

Benchmark Labor Clusters

Low Skill, Non-Durable Manufacturing

2211 Broadwoven Fabric Mills, Cotton
2221 Broadwoven Fabric Mills, Manmade Fiber and Silk
2231 Broadwoven Fabric Mills, Wool (Including Dyeing and Finishing)
2241 Narrow Fabric and Other Smallware Mills: Cotton, Wool, Silk, and Manmade Fiber
2251 Women's Full-Length and Knee-Length Hosiery, Except Socks
2252 Hosiery, NEC
2253 Knit Outerwear Mills
2254 Knit Underwear and Nightwear Mills
2257 Weft Knit Fabric Mills
2258 Lace and Warp Knit Fabric Mills
2259 Knitting Mills, NEC
2261 Finishers of Broadwoven Fabrics of Cotton
2262 Finishers of Broadwoven Fabrics of Manmade Fiber and Silk
2269 Finishers of Textiles, NEC
2273 Carpets and Rugs
2281 Yarn Spinning Mills
2282 Yarn Texturizing, Throwing, Twisting, and Winding Mills
2284 Thread Mills
2295 Coated Fabrics, Not Rubberized
2296 Tire Cord and Fabrics
2297 Nonwoven Fabrics
2298 Cordage and Twine
2299 Textile Goods, NEC
2311 Men's and Boys' Suits, Coats, and Overcoats
2321 Men's and Boys' Shirts, Except Work Shirts
2322 Men's and Boys' Underwear and Nightwear
2323 Men's and Boys' Neckwear
2325 Men's and Boys' Trousers and Slacks
2326 Men's and Boys' Work Clothing
2329 Men's and Boys' Clothing, NEC
2331 Women's, Misses', and Juniors' Blouses and Shirts
2335 Women's, Misses', and Juniors' Dresses
2337 Women's, Misses' and Juniors' Suits, Skirts, and Coats
2339 Women's, Misses', and Juniors' Outerwear, NEC
2341 Women's, Misses', Children's, and Infants' Underwear and Nightwear
2342 Brassieres, Girdles, and Allied Garments
2353 Hats, Caps, and Millinery
2361 Girls', Children's, and Infants' Dresses, Blouses, and Shirts
2369 Girls', Children's, and Infants' Outerwear, NEC
2371 Fur Goods
2381 Dress and Work Gloves, Except Knit and All-Leather
2384 Robes and Dressing Gowns
2385 Waterproof Outerwear
2386 Leather and Sheep-Lined Clothing
2387 Apparel Belts
2389 Apparel and Accessories, NEC
2391 Curtains and Draperies
2392 Housefurnishings, Except Curtains and Draperies
2393 Textile Bags
2394 Canvas and Related Products
2395 Pleating, Decorative and Novelty Stitching, and Tucking for the Trade
2396 Automotive Trimmings, Apparel Findings, and Related Products
2397 Schiffli Machine Embroideries
2399 Fabricated Textile Products, NEC
2821 Plastics Material and Synthetic Resins, and Nonvulcanizable Elastomers
2822 Synthetic Rubber
2823 Cellulosic Manmade Fibers
2824 Manmade Organic Fibers, Except Cellulosic
2851 Paints, Varnishes, Lacquers, Enamels, and Allied Products
3021 Rubber and Plastics Footwear
3052 Rubber and Plastics Hose and Belting
3053 Gaskets, Packing, and Sealing Devices
3061 Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods
3069 Fabricated Rubber Products, NEC
3081 Unsupported Plastics Film and Sheet
3082 Unsupported Plastics Profile Shapes
3083 Laminated Plastics Plate, Sheet, and Profile Shapes
3084 Plastics Pipe
3085 Plastics Bottles
3086 Plastics Foam Products
3087 Custom Compounding of Purchased Plastics Resins
3088 Plastics Plumbing Fixtures

3089 Plastics Products, NEC
3111 Leather Tanning and Finishing
3151 Leather Gloves and Mittens
3161 Luggage
3171 Women's Handbags and Purses
3172 Personal Leather Goods, Except Women's Handbags and Purses
3199 Leather Goods, NEC
3523 Farm Machinery and Equipment
3524 Lawn and Garden Tractors and Home Lawn and Garden Equipment
3531 Construction Machinery and Equipment
3532 Mining Machinery and Equipment, Except Oil and Gas Field Machinery and Equipment
3533 Oil and Gas Field Machinery and Equipment
3534 Elevators and Moving Stairways
3535 Conveyors and Conveying Equipment
3536 Overhead Traveling Cranes, Hoists, and Monorail Systems
3537 Industrial Trucks, Tractors, Trailers, and Stackers
3581 Automatic Vending Machines
3582 Commercial Laundry, Drycleaning, and Pressing Machines
3585 Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment
3586 Measuring and Dispensing Pumps
3589 Service Industry Machinery, NEC
3631 Household Cooking Equipment
3632 Household Refrigerators and Home and Farm Freezers
3633 Household Laundry Equipment
3634 Electric Housewares and Fans
3635 Household Vacuum Cleaners
3639 Household Appliances, NEC
3792 Travel Trailers and Campers
3795 Tanks and Tank Components
3799 Transportation Equipment, NEC
3911 Jewelry, Precious Metal
3914 Silverware, Plated Ware, and Stainless Steel Ware
3915 Jewelers' Findings and Materials, and Lapidary Work

Information Processing

4731 Arrangement of Transportation of Freight and Cargo
6311 Life Insurance
6321 Accident and Health Insurance
6324 Hospital and Medical Service Plans
6331 Fire, Marine, and Casualty Insurance
6351 Surety Insurance
6361 Title Insurance
6371 Pension, Health, and Welfare Funds
6399 Insurance Carriers, NEC
6531 Real Estate Agents and Managers
7371 Computer Programming Services
7372 Prepackaged Software
7373 Computer Integrated Systems Design
7374 Computer Processing and Data Preparation and Processing Services
7375 Information Retrieval Services
7376 Computer Facilities Management Services
7377 Computer Rental and Leasing
7378 Computer Maintenance and Repair
7379 Computer Related Services, NEC
8721 Accounting, Auditing, and Bookkeeping Services

Low Skill, Misc. Manufacturing

2011 Meat Packing Plants
2013 Sausages and Other Prepared Meats
2015 Poultry Slaughtering and Processing
2032 Canned Specialties
2033 Canned Fruits, Vegetables, Preserves, Jams, and Jellies
2034 Dried and Dehydrated Fruits, Vegetables, and Soup Mixes
2035 Pickled Fruits and Vegetables, Vegetable Sauces and Seasonings, and Salad Dressings
2037 Frozen Fruits, Fruit Juices, and Vegetables
2038 Frozen Specialties, NEC
2091 Canned and Cured Fish and Seafood
2092 Prepared Fresh or Frozen Fish and Seafoods
2095 Roasted Coffee
2096 Potato Chips, Corn Chips, and Similar Snacks
2097 Manufactured Ice
2098 Macaroni, Spaghetti, Vermicelli, and Noodles
2099 Food Preparations, NEC
2421 Sawmills and Planing Mills, General
2426 Hardwood Dimension and Flooring Mills
2429 Special Product Sawmills, NEC
2441 Nailed and Lock Corner Wood Boxes and Shook
2448 Wood Pallets and Skids
2449 Wood Containers, NEC
2499 Wood Products, NEC
2791 Typesetting

2796 Platemaking and Related Services
2841 Soaps and Other Detergents, Except Speciality Cleaners
2842 Speciality Cleaning, Polishing, and Sanitary Preparations
2843 Surface Active Agents, Finishing Agents, Sulfonated Oils, and Assistants
2844 Perfumes, Cosmetics, and Other Toilet Preparations
3142 House Slippers
3143 Men's Footwear, Except Athletic
3144 Women's Footwear, Except Athletic
3149 Footwear, Except Rubber, NEC
4412 Deep Sea Foreign Transportation of Freight
4424 Deep Sea Domestic Transportation of Freight
4432 Freight Transportation on the Great Lakes - St. Lawrence Seaway
4449 Water Transportation of Freight, NEC
4481 Deep Sea Transportation of Passengers, Except by Ferry
4482 Ferries
4489 Water Transportation of Passengers, NEC
4491 Marine Cargo Handling
4492 Towing and Tugboat Services
4493 Marinas
4499 Water Transportation Services, NEC
4783 Packing and Crating
4785 Fixed Facilities and Inspection and Weighing Services for Motor Vehicle Transportation
4789 Transportation Services, NEC

Standardized Heavy Industry

2611 Pulp Mills
2621 Paper Mills
2631 Paperboard Mills
3131 Boot and Shoe Cut Stock and Findings
3211 Flat Glass
3221 Glass Containers
3229 Pressed and Blown Glass and Glassware, NEC
3231 Glass Products, Made of Purchased Glass
3312 Steel Works, Blast Furnaces (Including Coke Ovens), and Rolling Mills
3313 Electrometallurgical Products, Except Steel
3315 Steel Wiredrawing and Steel Nails and Spikes
3316 Cold-Rolled Steel Sheet, Strip, and Bars
3317 Steel Pipe and Tubes
3321 Gray and Ductile Iron Foundries
3322 Malleable Iron Foundries
3324 Steel Investment Foundries
3325 Steel Foundries, NEC
3331 Primary Smelting and Refining of Copper
3334 Primary Production of Aluminum
3339 Primary Smelting and Refining of Nonferrous Metals, Except Copper and Aluminum
3341 Secondary Smelting and Refining of Nonferrous Metals
3351 Rolling, Drawing, and Extruding of Copper
3353 Aluminum Sheet, Plate, and Foil
3354 Aluminum Extruded Products
3355 Aluminum Rolling and Drawing, NEC
3356 Rolling, Drawing, and Extruding of Nonferrous Metals, Except Copper and Aluminum
3357 Drawing and Insulating of Nonferrous Wire
3363 Aluminum Die-Castings
3364 Nonferrous Die-Castings, Except Aluminum
3365 Aluminum Foundries
3366 Copper Foundries
3369 Nonferrous Foundries, Except Aluminum and Copper
3411 Metal Cans
3412 Metal Shipping Barrels, Drums, Kegs, and Pails
3421 Cutlery
3423 Hand and Edge Tools, Except Machine Tools and Handsaws
3425 Saw Blades and Handsaws
3429 Hardware, NEC
3431 Enameled Iron and Metal Sanitary Ware
3432 Plumbing Fixture Fittings and Trim
3433 Heating Equipment, Except Electric and Warm Air Furnaces
3451 Screw Machine Products
3452 Bolts, Nuts, Screws, Rivets, and Washers
3462 Iron and Steel Forgings
3463 Nonferrous Forgings
3465 Automotive Stamping
3466 Crowns and Closures
3469 Metal Stamping, NEC
3471 Electroplating, Plating, Polishing, Anodizing, and Coloring
3479 Coating, Engraving, and Allied Services, NEC
3482 Small Arms Ammunition
3483 Ammunition, Except for Small Arms
3484 Small Arms
3489 Ordnance and Accessories, NEC
3491 Industrial Valves
3492 Fluid Power Valves and Hose Fittings
3493 Steel Springs, Except Wire

3494 Valves and Pipe Fittings, NEC
3495 Wire Springs
3496 Miscellaneous Fabricated Wire Products
3497 Metal Foil and Leaf
3498 Fabricated Pipe and Pipe Fittings
3499 Fabricated Metal Products, NEC
3511 Steam, Gas, and Hydraulic Turbines, and Turbine Generator Set Units
3519 Internal Combustion Engines, NEC
3561 Pumps and Pumping Equipment
3562 Ball and Roller Bearings
3563 Air and Gas Compressors
3564 Industrial and Commercial Fans and Blowers and Air Purification Equipment
3565 Packaging Machinery
3566 Speed Changers, Industrial High-Speed Drives, and Gears
3567 Industrial Process Furnaces and Ovens
3568 Mechanical Power Transmission Equipment, NEC
3569 General Industrial Machinery and Equipment, NEC
3711 Motor Vehicles and Passenger Car Bodies
3713 Truck and Bus Bodies
3714 Motor Vehicle Parts and Accessories
3715 Truck Trailers
3716 Motor Homes
3743 Railroad Equipment
3841 Surgical and Medical Instruments and Apparatus
3842 Orthopedic, Prosthetic, and Surgical Appliances and Supplies
3843 Dental Equipment and Supplies
3844 X-Ray Apparatus and Tubes and Related Irradiation Apparatus
3845 Electromedical and Electrotherapeutic Apparatus
3851 Ophthalmic Goods
4311 United States Postal Service

High End Information/Business Services

2711 Newspapers: Publishing, or Publishing and Printing
2721 Periodicals: Publishing, or Publishing and Printing
2731 Books: Publishing, or Publishing and Printing
2732 Book Printing
2741 Miscellaneous Publishing
2752 Commercial Printing, Lithographic
2754 Commercial Printing, Gravure
2759 Commercial Printing, NEC
7311 Advertising Agencies
7312 Outdoor Advertising Services
7313 Radio, Television, and Publishers' Advertising Representatives
7319 Advertising, NEC
8111 Legal Services

Distribution, Freight Handling

2411 Logging
3271 Concrete Block and Brick
3272 Concrete Products, Except Block and Brick
3273 Ready-Mixed Concrete
3274 Lime
3275 Gypsum Products
4212 Local Trucking Without Storage
4213 Trucking, Except Local
4214 Local Trucking with Storage
4215 Courier Services Except by Air
4221 Farm Product Warehousing and Storage
4222 Refrigerated Warehousing and Storage
4225 General Warehousing and Storage
4226 Special Warehousing and Storage, NEC
4231 Terminal and Joint Terminal Maintenance Facilities for Motor Freight Transportation
4512 Air Transportation, Scheduled
4513 Air Courier Services
4522 Air Transportation, Nonscheduled
4581 Airports, Flying Fields, and Airport Terminal Services

Electronics, Measuring Devices

3571 Electronic Computers
3572 Computer Storage Devices
3575 Computer Terminals
3577 Computer Peripheral Equipment, NEC
3578 Calculating and Accounting Machines, Except Electronic Computers
3579 Office Machines, NEC
3612 Power, Distribution, and Specialty Transformers
3613 Switchgear and Switchboard Apparatus
3621 Motors and Generators
3624 Carbon and Graphite Products
3625 Relays and Industrial Controls
3629 Electrical Industrial Apparatus, NEC
3641 Electric Lamp Bulbs and Tubes
3643 Current-Carrying Wiring Devices
3644 Noncurrent-Carrying Wiring Devices

3645 Residential Electric Lighting Fixtures
3646 Commercial, Industrial, and Institutional Electric Lighting Fixtures
3647 Vehicular Lighting Equipment
3648 Lighting Equipment, NEC
3651 Household Audio and Video Equipment
3652 Phonograph Records and Prerecorded Audio Tapes and Disks
3661 Telephone and Telegraph Apparatus
3663 Radio and Television Broadcasting and Communications Equipment
3669 Communications Equipment, NEC
3671 Electron Tubes
3672 Printed Circuit Boards
3674 Semiconductors and Related Devices
3675 Electronic Capacitors
3676 Electronic Resistors
3677 Electronic Coils, Transformers, and Other Inductors
3678 Electronic Connectors
3679 Electronic Components, NEC
3691 Storage Batteries
3692 Primary Batteries, Dry and Wet
3694 Electrical Equipment for Internal Combustion Engines
3695 Magnetic and Optical Recording Media
3699 Electrical Machinery, Equipment, and Supplies, NEC
3821 Laboratory Apparatus and Furniture
3822 Automatic Controls for Regulating Residential and Commercial Environments and Appliances
3823 Industrial Instruments for Measurement, Display, and Control of Process Variables; and Related Products
3824 Totalizing Fluid Meters and Counting Devices
3825 Instruments for Measuring and Testing of Electricity and Electrical Signals
3826 Laboratory Analytical Instruments
3827 Optical Instruments and Lenses
3829 Measuring and Controlling Devices, NEC
3861 Photographic Equipment and Supplies

Chemicals, Pharmaceuticals

2812 Alkalies and Chlorine
2813 Industrial Gases
2816 Inorganic Pigments
2819 Industrial Inorganic Chemicals, NEC
2833 Medicinal Chemicals and Botanical Products
2834 Pharmaceutical Preparations
2835 In Vitro and In Vivo Diagnostic Substances
2836 Biological Products, Except Diagnostic Substances
2861 Gum and Wood Chemicals
2865 Cyclic Organic Crudes and Intermediates, and Organic Dyes and Pigments
2869 Industrial Organic Chemicals, NEC
2873 Nitrogenous Fertilizers
2874 Phosphatic Fertilizers
2875 Fertilizers, Mixing Only
2879 Pesticides and Agricultural Chemicals, NEC
2891 Adhesives and Sealants
2892 Explosives
2893 Printing Ink
2895 Carbon Black
2899 Chemicals and Chemical Preparations, NEC

Telecomm and Banking

4812 Radiotelephone Communications
4813 Telephone Communications, Except Radiotelephone
6011 Federal Reserve Banks
6019 Central Reserve Depository Institutions, NEC
6021 National Commercial Banks
6022 State Commercial Banks
6029 Commercial Banks, NEC
6035 Savings Institutions, Federally Chartered
6036 Savings institutions, Not Federally Chartered
6061 Credit Unions, Federally Chartered
6062 Credit Unions, Not Federally Chartered
6081 Branches and Agencies of Foreign Banks
6082 Foreign Trade and International Banking Institutions
6091 Nondeposit Trust Facilities
6099 Functions Related to Deposit Banking, NEC
6111 Federal and Federally-Sponsored Credit Agencies
6141 Personal Credit Institutions
6153 Short-Term Business Credit Institutions, Except Agricultural
6159 Miscellaneous Business Credit Institutions
6162 Mortgage Bankers and Loan Correspondents
6163 Loan Brokers

Science Intensive

3761 Guided Missiles and Space Vehicles
3764 Guided Missile and Space Vehicle Propulsion Units and Propulsion Unit Parts
3769 Guided Missile Space Vehicle Parts and Auxiliary Equipment, NEC
3812 Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems and Instruments
4822 Telegraph and Other Message Communications
4899 Communications Services, NEC
8711 Engineering Services
8712 Architectural Services
8713 Surveying Services
8731 Commercial Physical and Biological Research
8732 Commercial Economic, Sociological, and Educational Research
8733 Noncommercial Research Organizations
8734 Testing Laboratories

High Tech Machinery, Instruments

3541 Machine Tools, Metal Cutting Type
3542 Machine Tools, Metal Forming Type
3543 Industrial Patterns
3544 Special Dies and Tools, Die Sets, Jigs and Fixtures, and Industrial Molds
3545 Cutting Tools, Machine Tool Accessories, and Machinists' Precision Measuring Devices
3546 Power-Driven Handtools
3547 Rolling Mill Machinery and Equipment
3548 Electric and Gas Welding and Soldering Equipment
3549 Metalworking Machinery, NEC
3552 Textile Machinery
3553 Woodworking Machinery
3554 Paper Industries Machinery
3555 Printing Trades Machinery and Equipment
3556 Food Products Machinery
3559 Special Industry Machinery, NEC
3592 Carburetors, Pistons, Piston Rings, and Valves
3593 Fluid Power Cylinders and Actuators
3594 Fluid Power Pumps and Motors
3596 Scales and Balances, Except Laboratory
3599 Industrial and Commercial Machinery and Equipment, NEC
3931 Musical Instruments

Petroleum

2911 Petroleum Refining
3721 Aircraft
3724 Aircraft Engines and Engine Parts
3728 Aircraft Parts and Auxiliary Equipment, NEC
4612 Crude Petroleum Pipelines
4613 Refined Petroleum Pipelines
4619 Pipelines, NEC

Health Services

8011 Offices and Clinics of Doctors of Medicine
8021 Offices and Clinics of Dentists
8031 Offices and Clinics of Doctors of Osteopathy
8041 Offices and Clinics of Chiropractors
8042 Offices and Clinics of Optometrists
8043 Offices and Clinics of Podiatrists
8049 Offices and Clinics of Health Practitioners, NEC
8051 Skilled Nursing Care Facilities
8052 Intermediate Care Facilities
8059 Nursing and Personal Care Facilities, NEC
8062 General Medical and Surgical Hospitals
8063 Psychiatric Hospitals
8069 Specialty Hospitals, Except Psychiatric
8071 Medical Laboratories
8072 Dental Laboratories
8082 Home Health Care Services
8092 Kidney Dialysis Centers
8093 Specialty Outpatient Facilities, NEC
8099 Health and Allied Services, NEC

Specialized Labor Intensive

1081 Metal Mining Services
2451 Mobile Homes
2452 Prefabricated Wood Buildings and Components
2491 Wood Preserving
2493 Reconstituted Wood Products
2511 Wood Household Furniture, Except Upholstered
2512 Wood Household Furniture, Upholstered
2514 Metal Household Furniture
2515 Mattresses, Foundations, and Convertible Beds
2517 Wood Television, Radio, Phonograph and Sewing Machine Cabinets
2519 Household Furniture, NEC
2521 Wood Office Furniture
2522 Office Furniture, Except Wood
2531 Public Building and Related Furniture

2591 Drapery Hardware and Window Blinds and Shades
2599 Furniture and Fixtures, NEC
2652 Setup Paperboard Boxes
2653 Corrugated and Solid Fiber Boxes
2655 Fiber Cans, Tubes, Drums, and Similar Products
2656 Sanitary Food Containers, Except Folding
2657 Folding Paperboard Boxes, Including Sanitary
2671 Packaging Paper and Plastics Film, Coated and Laminated
2672 Coated and Laminated Paper, NEC
2673 Plastics, Foil, and Coated Paper Bags
2674 Uncoated Paper and Multiwall Bags
2675 Die-Cut Paper and Paperboard and Cardboard
2676 Sanitary Paper Products
2677 Envelopes
2678 Stationery, Tablets, and Related Products
2679 Converted Paper and Paperboard Products, NEC
2761 Manifold Business Forms
2771 Greeting Cards
2782 Blankbooks, Loose-leaf Binders and Devices
2789 Bookbinding and Related Work
3011 Tires and Inner Tubes
3398 Metal Heat Treating
3399 Primary Metal Products, NEC
3441 Fabricated Structural Metal
3442 Metal Doors, Sash, Frames, Molding, and Trim Manufacturing
3443 Fabricated Plate Work (Boiler Shops)
3444 Sheet Metal Work
3446 Architectural and Ornamental Metal Work
3448 Prefabricated Metal Buildings and Components
3449 Miscellaneous Structural Metal Work
3731 Ship Building and Repairing
3732 Boat Building and Repairing
3751 Motorcycles, Bicycles, and Parts
3873 Watches, Clocks, Clockwork Operated Devices and Parts
3942 Dolls and Stuffed Toys
3944 Games, Toys, and Children's Vehicles, Except Dolls and Bicycles
3949 Sporting and Athletic Goods, NEC
3951 Pens, Mechanical Pencils, and Parts
3952 Lead Pencils, Crayons, and Artist's Materials
3953 Marking Devices
3955 Carbon Paper and Inked Ribbons
3961 Costume Jewelry and Costume Novelties, Except Precious Metals
3965 Fasteners, Buttons, Needles, and Pins
3991 Brooms and Brushes
3993 Signs and Advertising Specialties
3995 Burial Caskets
3996 Linoleum, Asphalted-Felt-Base, and Other Hard Surface Floor Coverings, NEC
3999 Manufacturing Industries, NEC

Food and Tobacco Manufacturing

2021 Creamery Butter
2022 Natural, Processed, and Imitation Cheese
2023 Dry, Condensed, and Evaporated Dairy Products
2024 Ice Cream and Frozen Desserts
2026 Fluid Milk
2041 Flour and Other Grain Mill Products
2043 Cereal Breakfast Foods
2044 Rice Milling
2045 Prepared Flour Mixes and Doughs
2046 Wet Corn Milling
2047 Dog and Cat Food
2048 Prepared Feed and Feed Ingredients for Animals and Fowls, Except Dogs and Cats
2051 Bread and Other Bakery Products, Except Cookies and Crackers
2052 Cookies and Crackers
2053 Frozen Bakery Products, Except Bread
2061 Cane Sugar, Except Refining
2062 Cane Sugar Refining
2063 Beet Sugar
2064 Candy and Other Confectionery Products
2066 Chocolate and Cocoa Products
2067 Chewing Gum
2068 Salted and Roasted Nuts and Seeds
2074 Cottonseed Oil Mills
2075 Soybean Oil Mills
2076 Vegetable Oil Mills, Except Corn, Cottonseed, and Soybeans
2077 Animal and Marine Fats and Oils
2079 Shortening, Table Oils, Margarine, and Other Edible Fats and Oils, NEC
2082 Malt Beverages
2083 Malt
2084 Wines, Brandy, and Brandy Spirits
2085 Distilled and Blended Liquors
2086 Bottled and Canned Soft Drinks and Carbonated Waters
2087 Flavoring Extracts and Flavoring Syrups NEC
2111 Cigarettes

2121 Cigars
2131 Chewing and Smoking Tobacco and Snuff
2141 Tobacco Stemming and Redrying
2992 Lubricating Oils and Greases
2999 Products of Petroleum and Coal, NEC

Securities

6211 Security Brokers, Dealers, and Flotation Companies
6221 Commodity Contracts Brokers and Dealers
6231 Security and Commodity Exchanges
6282 Investment Advice
6289 Services Allied With the Exchange of Securities or Commodities, NEC

Building Products

2431 Millwork
2434 Wood Kitchen Cabinets
2435 Hardwood Veneer and Plywood
2436 Softwood Veneer and Plywood
2439 Structural Wood Members, NEC
3299 Nonmetallic Mineral Products, NEC
2541 Wood Office and Store Fixtures, Partitions, Shelving, and Lockers
2542 Office and Store Fixtures, Partitions, Shelving, and Lockers, Except Wood
3241 Cement, Hydraulic
3251 Brick and Structural Clay Tile
3253 Ceramic Wall and Floor Tile
3255 Clay Refractories
3259 Structural Clay Products, NEC
3261 Vitreous China Plumbing Fixtures and China and Earthenware Fittings and Bathroom Accessories
3262 Vitreous China Table and Kitchen Articles
3263 Fine Earthenware (Whiteware) Table and Kitchen Articles
3264 Porcelain Electrical Supplies
3269 Pottery Products, NEC
3281 Cut Stone and Stone Products
3295 Minerals and Earths, Ground or Otherwise Treated
3296 Mineral Wool

Source: Edward .J. Feser, Associate Professor, Department of City and Regional Planning, University of North Carolina – Chapel Hill (2003)