

The State of Illinois Manufacturing

**A Report for the
Illinois Manufacturers' Association**

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Center for Labor and Community Research (CLCR)

CLCR is a not-for-profit research and consultancy organization founded in 1982. Our mission is to promote and support High Road economic development, build sustainable communities, and work with companies to improve business performance through innovation and effective partnerships. We believe that research tied to strategy leads to results.

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Executive Summary

Many of Illinois' successes today are the result of its vibrant manufacturing economy. This is the economy that literally shook neighborhoods as steel was pounded into forms; that provided an entry into the middle class, home ownership and college educations for the children of millions of African Americans, Hispanics, and immigrants; that made Chicago the Candy Capital of the World; and that made Illinois synonymous with the giants of our national economy—Motorola, Caterpillar, U.S. Steel, Brach Candy, Wrigley, and others.

The strength of the manufacturing sector is fundamental to the overall economic performance of Illinois and the U.S. as a whole. The manufacturing sector in Illinois creates large numbers of jobs that pay high wages to workers, purchases more goods and services from within the state than any other sector, and constitutes a main component of the state export economy. For these and other reasons, manufacturing needs be at the center of all government discussions on economic policy.

The Center for Labor and Community Research (CLCR) was commissioned by the Illinois Manufacturers' Association to analyze the condition of the Illinois manufacturing sector. We found that Illinois manufacturing is essential to Illinois' economy, and although it is among the top manufacturing states in the country, it faces a number of challenges. This report demonstrates why and how Illinois manufacturing matters, explains the current challenges it faces, and recommends actions to overcome some of these challenges. In addition to looking at manufacturing as a whole, this report looks at four key manufacturing sectors, or clusters, that together account for 64% of manufacturing employment in the state. These are the metals, electrical, printing, and food manufacturing sectors.

A few key findings that CLCR uncovered in this study include the following:

- Manufacturing is vital to the state's economy and workers. Manufacturing directly employs 961,000 workers in Illinois. The indirect and induced demand effects of manufacturing generate another 1.4 million positions in other industries. This means that manufacturing is responsible for 2.3 million jobs, or nearly one third of total Illinois employment.
- Manufacturing products make up 66% of total Illinois exports, amounting to \$35.8 billion in 2000. These exports of manufactured goods were responsible for creating employment opportunities for 430,000 people in Illinois.
- Illinois manufacturing ranks fourth among the nation's leading manufacturing states in productivity and labor costs. Illinois manufacturing workers are the most productive in the nation by far. As a result, labor costs per unit of output are quite low even though workers are relatively well paid.
- While Illinois manufacturing's investment as a share of shipments is competitive,

its investment per employee is not. One of Illinois manufacturing's greatest weaknesses is that it has a low manufacturing profit margin.

- Like other U.S. states, Illinois faces increasing competition from low-wage producers in the developing world as well as from highly skilled producers in developed countries. This new reality constitutes a fork in the road for our manufacturing economy. In order to remain competitive into the future, the sector requires increased investments in its infrastructure and workers and an improved workforce development system. Illinois manufacturers must increase the value-added component of their products to justify higher prices, increase research and development to develop new products and production processes, and expand production in those sectors not significantly affected by low-wage competition.
- The Illinois manufacturing sector needs a “High Road” partnership with government and labor that can lead to increased investment in infrastructure, a dramatically improved workforce education and development system, and an Early Warning capacity to identify and address problems before they become a crisis. Such partnerships could also support the sector by creating specialized service centers that provide assistance to Illinois companies in managing key relationships, and by effectively using public subsidies to reward and assist those companies that are pursuing High Road strategies of innovation and development.

Overview and Methodology

Chapter 1: The Importance of Manufacturing to Illinois' Economy. We present data that demonstrates the importance of this sector to Illinois' economy and for the millions of Illinois workers whose jobs have been created by the sector.

Chapter 2: Illinois Manufacturing Industry Clusters. We characterize the industry's main clusters, and examine the current and projected employment trends and the opportunities and challenges that they face.

Chapter 3: Performance of Illinois Manufacturing. We use standard performance measures to compare Illinois manufacturing to other top manufacturing states. We then compare Illinois' industry clusters to its peers using the same performance measures.

Chapter 4: Challenges to Illinois Manufacturing. We examine the various challenges for Illinois' manufacturing sector. Some challenges are common to most Midwestern and Northeastern states, and some are unique to Illinois and represent opportunities for improvement.

Chapter 5: Recommendations. We outline strategies that decision makers can implement to keep manufacturing a vibrant foundation of Illinois' economy.

Chapter 6: Conclusion. We conclude with a brief summary of the report's major findings and recommendations.

Data used for this Report

Most data in this report is for the year 2000. This is the most recent year for which much of the detailed data is available. In most cases, rather than make confusing comparisons using data from different years, we have chosen to standardize on 2000. More recent data that is available shows that manufacturing has, of course, been affected by the recession. However, there is nothing that indicates that the recession has altered Illinois manufacturing's relative position. Data also comes from conversations with experts from within the industry that occurred in May and June of 2003.

A word about the differences between two data sets used for employment numbers is in order. Illinois Department of Employment Security (IDES) data is collected from the unemployment insurance reports filed by employers in March of the year. It *excludes* state employees and people employed by employers with a taxable payroll of less than \$1,500 in the calendar quarter. Data from IMPLAN is collected by the U.S. Department of Census and uses the Internal Revenue Service Quarterly Payroll File (FICA) as one of the sources. It *includes* state government employees, the self-employed and covers the entire calendar year.

Industry output data used throughout this report is measured in two different ways: using Gross State Product (GSP) and the value of shipments. GSP is used when possible

because it represents the total value of *final* goods and services delivered by each economic sector in the state. In contrast, the value of shipments measure gives a much higher number because it accounts for inter-company sales. We use the value of shipments measure of output when GSP data is not available, such as for analyses of industry clusters.

The forecasts for changes in output, employment and productivity used in this report originate from the U.S. Department of Labor.¹ The Illinois Department of Employment Security (IDES) takes the national forecasts and applies them to Illinois and its counties, taking into account past changes in the employment of each Illinois industry and expected changes reported by industry experts.

¹ To arrive at these projections, the U.S. Department of Labor forecasts what would happen to the economy in 2010. The Department of Labor forecasts expected change in total demand among consumers and industrial users. Trends over the past years are projected forward and studies are made of possible changes in various types of output. To measure the growth in productivity, it looks at past productivity growth in particular industries, looks at technological change and consults with experts on expected trends in productivity in each industry. Then the Department of Labor uses input-output tables to look at the impact that this change in final demand will have on the output of the goods and services needed. All the assumptions are detailed in the article by Betty Su, "The U.S. Economy is 2010," published in the Bureau of Labor Statistics' *Monthly Labor Review*, November 2001, pp. 3 to 20.

Chapter 1: The Importance of Manufacturing to Illinois' Economy

In this chapter, we compare manufacturing to other economic sectors in the state. We show manufacturing's significance within the state in terms of its size and the value of its purchases, the number of people it directly and indirectly employs, the high wages it offers, and its prime role in Illinois' export economy.

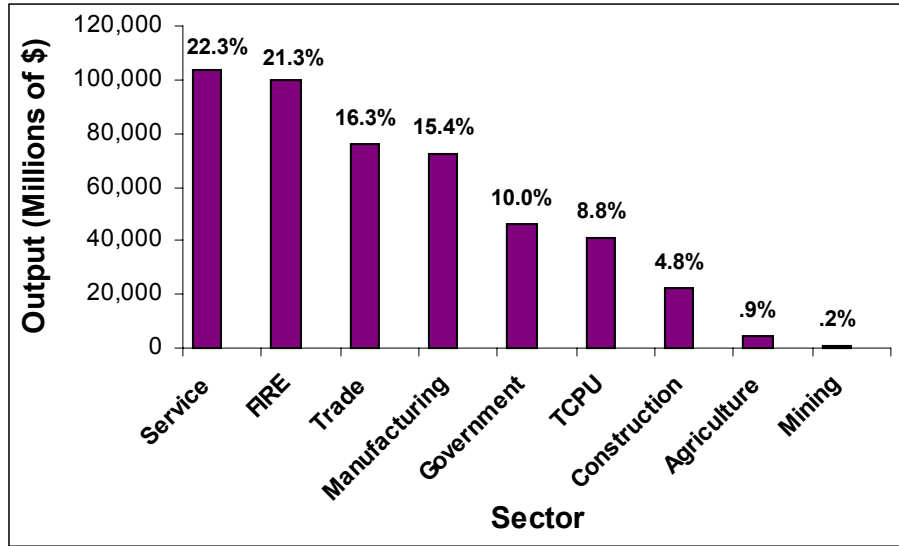
Size and Purchases

In the year 2000, manufacturing accounted for roughly 15.4% of the total Illinois Gross State Product (GSP) of \$466.3 billion. The GSP represents the total value of final goods and services delivered by all economic sectors in the state. Manufacturing's share made it the fourth largest segment of the state's economy, behind the service sector; finance, insurance and real estate (FIRE) sector; and the trade sector, including wholesale and retail. Manufacturing's share of Illinois' gross state product is larger than that of government; transportation, communications, and public utilities (TCPU); construction; agriculture; and mining.

**Illinois Gross State Products by Sector
2000**

Sector	Output (Millions of \$)	% of Total
Service	\$103,783	22.3%
FIRE	99,511	21.3%
Trade	75,796	16.3%
Manufacturing	71,987	15.4%
Government	46,476	10.0%
TCPU	41,055	8.8%
Construction	22,580	4.8%
Agriculture	4,119	0.9%
Mining	1,005	0.2%
GSP	\$466,312	100.0%

Source: Bureau of Census, U.S. Commerce Department.



Illinois Grosse State Products by Sector, 2000

Source: Bureau of Census, U.S. Commerce Department.

While manufacturing is not the largest segment of Illinois' economy, it is the largest purchaser of in-state products and services. Manufacturing uses other industries in the state as suppliers. This means that a great part of the state economy works just for manufacturing. Without purchases made by the manufacturing sector, the other sectors of the state economy would suffer a decrease in demand for their products.

The following table shows the amount of purchases each major sector of the Illinois economy purchased inside the state. Manufacturing had \$72 billion in output and purchased \$34 billion dollars of goods and services (used for its production processes) from within the state. Therefore, the ratio of its purchases bought within the state to its total output is 48%. In other words, for every dollar of manufacturing output, the sector generates \$0.48 purchases within the state. This far outstrips the overall contributions of the other segments of the Illinois economy. The service sector, which is the largest sector in the state, purchases about \$29 billion of products within the state—\$5 billion less than manufacturing's \$34 billion worth of in-state purchases. The output of the finance, insurance, and real estate (FIRE) sector made up a larger share of the state's total GSP than manufacturing, with \$100 billion, but it purchased only \$24 billion from within the state—\$10 billion less than manufacturing's in-state purchases (see the table below).

Output and Purchases Made Within Illinois by Sector, 2000

	Output (Billions of \$)	Purchases In Illinois (Billions of \$)	Purchases as % of Output
Manufacturing	\$72.0	\$34.3	47.7%
Services	103.8	28.9	27.8%
Finance, Insurance, Real Estate (FIRE)	99.5	24.2	24.3%
Trade	75.8	17.5	23.1%
Transportation, Communications, Utilities	41.0	12.3	29.9%

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

These regional purchases are crucial for the health of the state economy. Because every sector of the economy is dependent on manufacturing for a significant share of its market, a substantial reduction in Illinois' manufacturing sector would weaken the economy. In addition, because of its large numbers of purchases from other sectors, growth in manufacturing creates an employment ripple-effect throughout the economy.

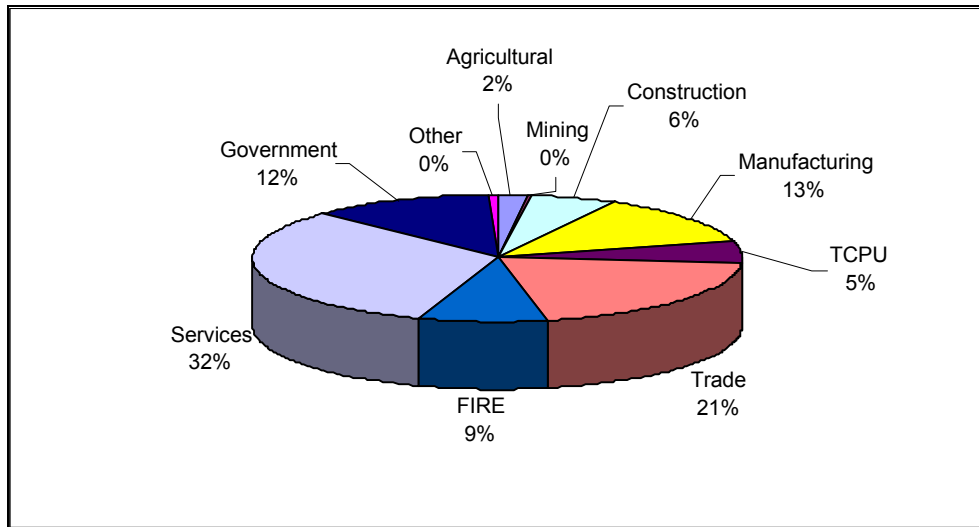
Employment

Illinois manufacturing currently employs more than 900,000 people. This puts manufacturing third in employment, behind the service and trade sectors.

Illinois Employment by Sector, 2000

Sector	# of Employees	% of Total
Services	2,377,801	31.9%
Trade	1,532,521	20.6%
Manufacturing	961,180	12.9%
Government	918,928	12.3%
FIRE	644,458	8.7%
Construction	422,380	5.7%
TCPU	381,255	5.1%
Agriculture	153,721	2.1%
Other	36,529	0.5%
Mining	14,749	0.2%
Total	7,443,522	100%

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.



Illinois Employment by Sector, 2000

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

However, because the other segments of the economy depend on manufacturing's purchases, the sector creates many more jobs than the direct employment figures indicate. It indirectly provides jobs in other segments of the economy by spurring economic activity in two ways: first, through its demand for goods and services and second, through the personal consumption of its workers and of the workers employed by manufacturing's suppliers (i.e., induced demand). Industries that supply products for manufacturing hire people because of this induced demand. These supplier industries, in turn, create employment in other sectors of the economy through their purchases. Because of these down-stream effects, manufacturing rivals the service sector as a generator of employment in the state.

Economists have developed a set of indicators to show how the creation of jobs in one segment of the economy contributes to their creation in other segments. These indicators are called industry employment multipliers. They are closely related to the amount of purchases that each industry makes within the state. They vary from one state to the next, depending on each state's industrial mix.

Manufacturing's employment multiplier of 3.7 is the highest of all Illinois industry sectors. This figure means that for every manufacturing job created in the state, 2.7 additional jobs are created in other sectors, resulting in a total of 3.7 jobs. The two industries that directly employ more people than manufacturing have particularly low employment multipliers. The service sector has an employment multiplier of 1.8, and trade has a multiplier of 1.7.

Employment Multipliers for Illinois in 2000

Sector	Employment Multiplier
Manufacturing	3.72
Mining	2.68
Transportation, Communications, Utilities	2.66
Construction	2.62
Finance, Insurance, Real Estate	2.53
Services	1.84
Trade	1.71
Agriculture	1.69
Government	1.58
Other	1.12

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

The high employment multiplier for manufacturing means that it is crucial to the creation of jobs in other industries in the state. For the 961,000 manufacturing jobs in Illinois, the indirect and induced demand effects of the manufacturing sector generate another 1.4 million positions in other industries. This means that manufacturing is responsible for 2.3 million jobs, or nearly one third of total Illinois employment. The service industry, which has the largest total employment in the state, creates 1.9 million jobs through indirect and induced demand, or only slightly more than manufacturing's 1.4 million.

The importance of manufacturing to other sectors in terms of the employment it creates varies. Manufacturing supports 30% of trade employment and 24% of service sector employment (see table below). It supports a quarter of transportation, communications and public utility jobs, and one third of agricultural employment. Overall, a substantial part of each of these industries relies on manufacturing to survive and grow. While manufacturing is only third in direct employment in the state, its health is essential for a large percentage of jobs in other sectors.

Jobs Created in other IL Sectors to Support Manufacturing, 2000

Industry	Total Employment	Employment Created by Manufacturing	% of Jobs Created by Mfg.
Manufacturing	961,000	961,000	100%
Mining	15,000	10,000	69%
Agriculture	154,000	53,000	34%
Trade	1,533,000	463,000	30%
Services	2,378,000	566,000	24%
Transport, Communications, Utilities	381,000	88,000	23%
Other	37,000	8,000	22%
Finance, Insurance & Real Estate	644,000	99,000	15%
Construction	422,000	40,000	9%
Government	919,000	48,000	5%
Total	7,444,000	2,336,000	31%

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

Wages

Manufacturing jobs offer significantly higher wages than jobs in other industry sectors. The average manufacturing worker received \$610 a week before taxes as of March 2003. This is almost three times the minimum wage, and double the federal poverty level for a family of three. This means that manufacturing workers can often support their families with only one person working, which can be a necessity when jobs are difficult to find.

While manufacturing does not have the highest average weekly pay of any industry, it far outstrips the pay of many industries that have had more robust job growth in recent decades. Retail workers, for instance, earn only \$322 a week on average, or 54% of the average manufacturing wage. Hotel and restaurant workers average only \$211 a week, or 32% of manufacturing wages. For these workers, manufacturing jobs would offer a significant improvement in their wages.

**Gross Pay of Illinois Manufacturing Relative to Other Industries
March 2003**

Industry	Weekly Pay	Industry Pay Relative to Manufacturing
Construction	\$944	155%
Information	660	108%
Finance	637	104%
Professional and Business Services	618	101%
Manufacturing	610	100%
Wholesale Trade	605	99%
Educational and Health Services	497	81%
Other Services	443	73%
Administrative and Waste Services	407	67%
Retail Trade	332	54%
Leisure and Hospitality	211	35%
Accommodation and Food Services	194	32%

Source: Illinois Department of Employment Security, *Covered Employment and Wages*, March 2003.

Exports

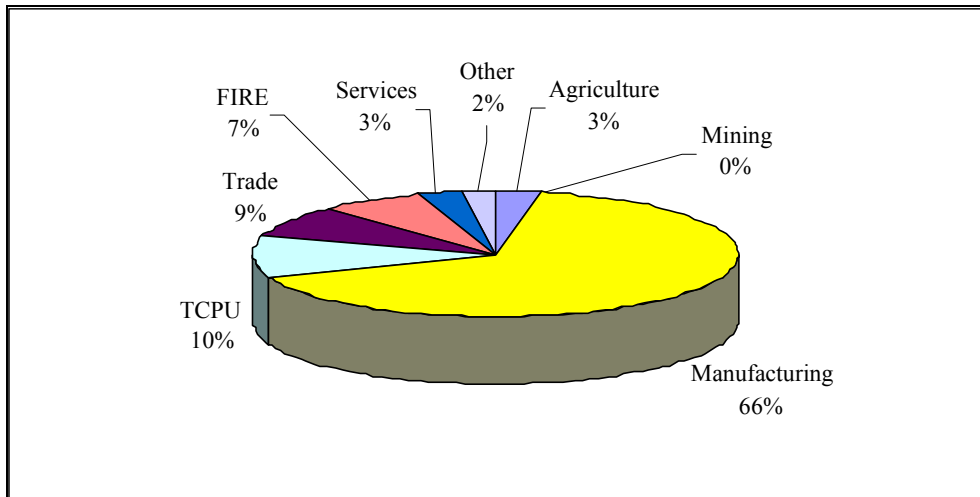
Manufacturing is more important to Illinois' export economy than any other sector. Illinois' total exports in the year 2000 were worth \$54.1 billion, and manufacturing accounted for \$35.8 billion—about two thirds—of total exports. Total manufacturing industry exports equal 66% of all state exports.

**Illinois Exports by Sector, 2000²
(In billions of \$)**

Industry	\$ (billions)	% of Total IL Exports
Manufacturing	35.8	66.1%
TCPU	5.5	10.1%
Trade	4.7	8.7%
FIRE	3.7	6.8%
Agriculture	1.6	3.0%
Services	1.6	3.0%
Other	1.2	2.2%
Mining	0.1	0.2%
Total	54.1	100.0%

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

² The construction sector is not included in this table because it does not have exports.



Share of Illinois Exports by Sector, 2000

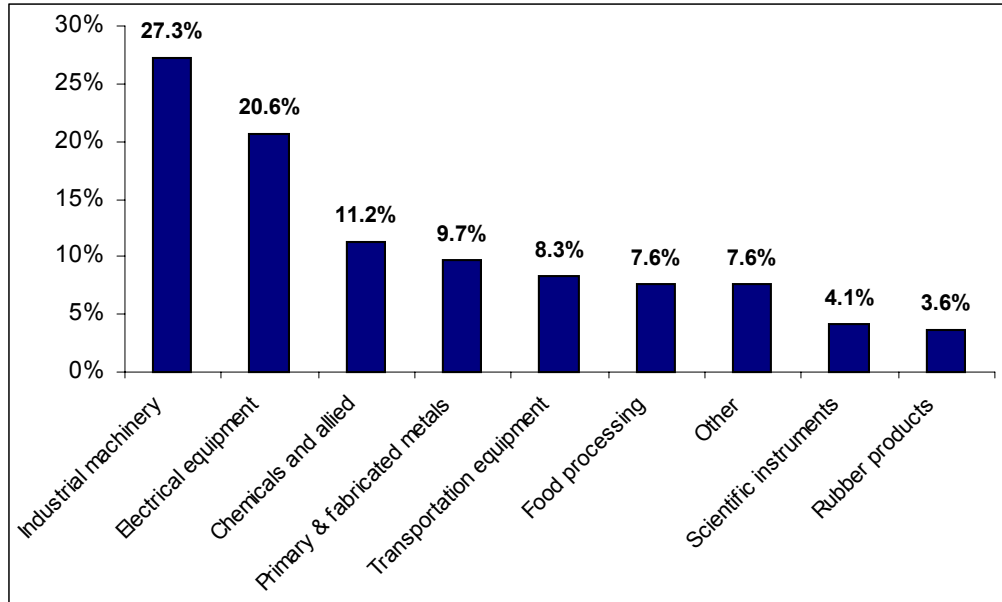
Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

A few key manufacturing industries dominate Illinois’ manufacturing exports. The table below shows that industrial machinery accounted for 27.3% of Illinois’ manufacturing exports in the year 2000, or 18% of all Illinois exports. The electrical equipment segment produced another 20% of manufacturing exports and 13.6% of all exports. Primary and fabricated metals accounted for more than 6% of Illinois’ exports.

Manufacturing Exports as a Percentage of Shipments and Total State Exports, 2000

Manufacturing Industry	Value of Shipments	Value of Exports	Exports as % of Shipments	Share of State Mfg. Exports	Share of Total State Exports
Industrial machinery	\$30,248	\$9,749	32.2%	27.3%	18.0%
Electrical equipment	28,726	7,379	25.7%	20.6%	13.6%
Chemicals and allied	23,135	4,015	17.4%	11.2%	7.4%
Primary & fabricated metals	30,956	3,484	11.3%	9.7%	6.4%
Transportation equipment	14,495	2,958	20.4%	8.3%	5.5%
Food processing	35,230	2,705	7.7%	7.6%	5.0%
Other	52,881	2,706	5.1%	7.6%	5.0%
Scientific instruments	5,277	1,475	28.0%	4.1%	2.7%
Rubber products	11,733	1,280	10.9%	3.6%	2.4%
Total	\$232,681	\$35,751	15.4%	100.0%	66.1%

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.



Share of Illinois Exports by Manufacturing Industry, 2000³

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

These exports produce a large number of jobs for Illinois workers. Manufacturing’s exports support 430,000 jobs in Illinois. Of these jobs, 154,000 are in the direct production of manufacturing exports, 129,000 are in the production of products purchased by the manufacturing sector (indirect), and 147,000 are jobs created by the personal consumption of manufacturing and manufacturing suppliers’ export workers (induced).

Jobs Created in Mfg. and Other Sectors by Mfg. Exports, 2000

Sector	Number of Jobs
Manufacturing	193,000
Services	103,000
Trade	78,000
FIRE	18,000
TCPU	16,000
Government	8,000
Agricultural	7,000
Construction	4,000
Other	2,000
Mining	1,000
Total	430,000

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

³ Total manufacturing exports make up 66% of all state exports.

The table below shows the jobs created by exports of each manufacturing industry. Industrial machinery and electrical equipment manufacturing, the two manufacturing industries that account for the largest percentage of manufacturing exports, provide the most jobs through their exports.

Jobs Created in Manufacturing Industries by Manufacturing Exports

Mfg. Industry	Number of Jobs
Industrial Machinery	56,000
Electrical Equipment	42,000
Chemical	16,000
Fabricated Metal	14,000
Food Processing	10,000
Transportation Equip.	10,000
Scientific Instruments	10,000
Rubber Products	7,000
Printing & Publication	6,000
Primary Metal	6,000
Pulp & Paper	5,000
Misc. Mfg.	4,000
Apparel	2,000
Stone, Glass & Clay	2,000
Wood Products	1,000
Furniture	1,000
Leather Products	1,000
Total	193,000

Source: Minnesota Implan Group, Input-Output Model for Illinois. Based on input-output tables developed by the U.S. Forest Service.

Conclusion

Illinois manufacturing is the foundation of the state’s economy. It spurs economic activity in all other sectors because it purchases more goods and services from within the state than any other sector. It directly and indirectly creates one-third of all jobs in the state and is the leader in Illinois’ export economy as well. For these reasons, Illinois’ economy depends on the manufacturing sector to prosper.

Chapter 2: Illinois' Industry Clusters

The Illinois manufacturing sector is very diverse. It includes small tortilla factories along with machinery plants employing thousands of workers. Although there are some things that can be said about Illinois manufacturing in general, it is possible to get a much more comprehensive picture by examining groups of manufacturing firms that have much in common. For this reason, we focus on sectors or “clusters” in the local economy as a foundation for our analysis. We define Illinois’ clusters and then characterize each, focusing on their size and the opportunities and challenges they face.

Michael Porter of the Harvard Business School offers a widely used definition of clusters:

A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. The geographic scope of clusters ranges from a region, a state, or even a single city to span nearby or neighboring countries. The geographic scope of a cluster relates to the distance over which informational, transactional, incentive, and other efficiencies occur. More than single industries, clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery, and services as well as providers of specialized infrastructure. Clusters also often extend downstream to channels or customers and laterally to manufacturers of complementary products or companies related by skills, technologies, or common inputs. Many clusters include governmental and other institutions (e.g., universities, think tanks, vocational training providers, standards-settings agencies, trade associations) that provide specialized training, education, information, research, and technical support.⁴

In simple terms, this means that manufacturers tend to locate in places where they have efficient access to specialized inputs, services, employees, information, institutions, and distribution channels they need. There are also ongoing performance comparisons and strong incentives to improve because of the presence of local manufacturing competitors.⁵ From an economic development policy point of view, it is far easier to retain (or attract) a firm that is (or will be) part of an existing cluster because the industrial infrastructure that the firm needs is already in place. The Cluster Mapping Project of the Harvard Business School identified 24 manufacturing clusters for Illinois (see Appendix A for a list of these clusters and the number of workers each employs).

In this report we focus on four industry clusters that represent the bulk of the manufacturing capacity in the region.⁶ Output and employment is used as the measure of

⁴ Michael Porter, “Location, Competition, and Economic Development: Local Clusters in a Global Economy,” *Economic Development Quarterly*, Vol. 14 No. 1, February 2000, pp. 15-34.

⁵ Christian H.M. Keels, Harvard Business School, *Cluster-Based Economic Development*, EDA Annual Conference, May 9, 2003, Washington D.C.

⁶ Most of our numerical data is derived from either the Census or from the Illinois Department of Employment.

size. The four industry clusters that account for 64% of all Illinois manufacturing employment are metal manufacturing, electrical, printing, and food manufacturing. Because of certain commonalities, two of these clusters are combinations of clusters listed in the Harvard work. Our metals manufacturing cluster corresponds to the basic portion of the Harvard Business School's metals manufacturing cluster, and is made up of primary metals, fabricated metals and machinery manufacturing. The electrical cluster is composed of Harvard's lighting and electrical and Harvard's communications cluster. Each cluster identified by the Harvard Cluster Mapping Project is composed of a number of sub-clusters. See Appendix B for a comprehensive list of the sub-clusters that compose the four clusters that this report focuses on.

Even though examining clusters rather than discussing manufacturing as a whole allows for more precise analysis, there can be many differences among manufacturers in the same industry cluster. Business strategies, technology, product mix, processes, financing, employee skill and experience, and management practices often vary widely. Major plant-level changes in output and employment are governed by idiosyncratic factors that are applicable to a particular company and plant.⁷ For example, in the automobile industry, a 2% change in aggregate demand for vehicles can mask major changes in the relative fortunes of individual companies. (For instance, Ford's sales may increase by 6% while GM's sales may decrease by 8% in the same year.) The fate of an individual assembly plant is tied to the success of one or two specific products, so even if the overall market and company are stable, a switch in consumer tastes from coupes to SUVs can cause a decline in one plant and rapid growth in another.

We do not treat information technology as a separate industry cluster because most manufacturing in Illinois is high tech. The new structure of manufacturing is based upon the use of computers to design, develop, produce, and often diagnose and repair manufacturing processes. Computers allow for formerly discrete functions of manufacturing such as design, inventory control, and quality control to be merged together, often using the same data to drive the processes. In short, the computer in manufacturing controls the entire production process and has served to increase the productivity of firms. The largest customers of computer software and hardware companies are manufacturers.

Too often, definitions of information technology jobs start by assuming they exist only in the computer manufacturing and software industries. If, however, we use an alternative definition of high technology that considers industries that have high percentages of engineers, scientists, technicians, and systems analysts, then industries such as special industrial machinery, electronic components and accessories, engineering service firms, and engineers and turbine production are all listed in the top 30 high-tech industries. A recent study by the University of Minnesota identified Chicago as the urban center

Security, both of which use slightly different aggregates from the Harvard project, but the two sets of data generally overlap.

⁷ Steven J. Davis, John C. Haltiwanger and Scott Schuh, *Job Creation and Destruction*, Cambridge MA: MIT Press, 1996.

possessing the highest number of high-tech industry jobs in the nation.⁸ Thus, rather than differentiating between manufacturing and information technology, we should think of them as inextricably linked.

The four industry clusters—metal manufacturing, electrical, printing, and food manufacturing—represent approximately 62% of the total output of all Illinois manufacturing (see table below). The clusters more than doubled their output from 1977 to 2000.

Illinois Manufacturing Output by Industry, 1977 and 2000
(Millions of Dollars)

Mfg. Industry	1977 Output	% of Total IL Mfg. Output	2000 Output	% of Total IL Mfg. Output
Metals and Machinery	\$12,193	39.6%	\$21,416	29.2%
Food & Kindred Products	3,537	11.5%	9,123	12.4%
Electrical Equipment	3,191	10.4%	8,003	10.9%
Printing & Publishing	2,435	7.9%	6,910	9.4%
Total	21,356	69.4%	45,452	61.9%

Source: Bureau of Census, U.S. Commerce Department.

All of the industries in these clusters account for a disproportionately large share of Illinois manufacturing employment compared to their share nationally. The relative proportion, or relative importance, of each industry is computed by comparing a given industry's percentage of Illinois manufacturing employment with its percentage of national manufacturing employment. For example, if a particular industry accounted for 10% of the national manufacturing employment, but it accounted for 15% of Illinois manufacturing employment, it would have a relative importance of 150% in this state. Any Illinois industry with a relative importance of more than 100% means that the industry is somewhat more important for the state than for the nation generally in terms of the number of people employed. The table below shows that these clusters account for a larger share of Illinois manufacturing employment than the clusters do nationally. Only the electrical equipment industry has had an increase in its relative importance within Illinois manufacturing over the past fourteen years. Even so, all four clusters are still more important for Illinois than they are for the nation.

⁸ See: Ann Markusen, et. al., *High-Tech and I-Tech: How Metros Rank and Specialize*, Minneapolis: The Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, August 2001.

**Change in Relative Importance of
Illinois Manufacturing Employment by Cluster: 1988 and 2002**

Mfg. Industry	Mfg. Industry % of Total Mfg. Employment: IL/US		Change
	1988	2002	
Electrical Equipment	133%	136%	3%
Metals and Machinery	147%	131%	-16%
Printing & Publishing	145%	126%	-19%
Food & Kindred Products	113%	107%	-6%

Source: Illinois Department of Employment Security, *Industry Projections 2000 to 2010*.

Relative importance is an indication of industry concentration. When an industry is concentrated in employment, there is a parallel concentration of suppliers, trained workers and related research organizations that strengthen the entire industry. Concentrated industries are more likely to grow than other industries because companies prefer to locate where needed physical and social infrastructure already exists. These four clusters are projected to remain the primary employers of Illinois manufacturing into the future, with certain industries expected to do better than others. The table below shows that the electrical equipment industry is expected to grow slightly between 2000 and 2010. The metal, printing, and food industries are forecasted to shrink in size as measured by employment. It is important to note that even though the predictions generated by the Illinois Department of Employment Security are based on past performance, forecasts of technological change, investment, government policy and the overall state of the economy, the reality often diverges from the forecasts.

Forecasted Employment Change in Industry Clusters: 2000 to 2010

Industry	Employment		Change	
	2000	2010	Number	Percent
All manufacturing	943,836	929,227	-14,609	-1.5%
Metals and Machinery	303,205	301,179	2,026	-.7%
Electrical Equipment	111,814	113,322	1,508	1.3%
Printing & Publishing	99,718	93,417	-6,301	-6.3%
Food & Kindred Prod	93,048	89,494	-3,554	-3.8%

Source: Illinois Department of Employment Security, *Industry Projections 2000 to 2010*.

The health of Illinois manufacturing, in terms of both output and employment, will largely depend on the performance of these four clusters. What follows is a profile of each of these top four Illinois manufacturing clusters. We explain the current and projected trends in employment for each cluster, and discuss the opportunities and challenges facing them.

Metals

The metals cluster consists of three different industry groups: primary metals, fabricated metals, and machinery. These three industries face different challenges and different situations in Illinois, but they are all linked to each other and form one cluster.

In total, the metals cluster in Illinois has gone down from about 7.3% of national metals employment in 1988 to about 7.1% in 2002. This decline has been particularly sharp in primary metals, where Illinois' share of national employment went from 7.3% to 6.2% in about a decade and a half. The state's share of machinery employment was steady, while fabricated metals experienced a small decline.

Illinois Metal Cluster Share of U.S. Metal Cluster Employment

	1988	2002	Change
Primary Metals	7.30%	6.20%	-1.1%
Fabricated Metals	7.70%	7.30%	-0.4%
Machinery	7.20%	7.20%	0.0%
Total	7.30%	7.10%	-0.2%

Source: U.S. Bureau of Labor Statistics and Illinois Department of Employment Security.

Primary Metals

The primary metals category includes facilities that process iron, steel and non-ferrous metal into a form that can be used by fabricated metal facilities. This industry in Illinois includes both large and small plants, but its workers are more heavily concentrated in large facilities than those in any other cluster except the electrical equipment cluster. Of 392 primary metals plants in the state, five have over 1000 workers. Recently, the primary metals industry has experienced extensive consolidation, with fewer owners. Ownership is internationalizing with more and more companies becoming trans-national, and restructuring has resulted in less overhead, more efficient labor and higher productivity. Some companies have been able to cut labor costs by one-third without any increased investment. There has been a shift from commodity to value-added products, such as special sizes, shapes and formulations. Prices have stabilized recently, and consolidation has given companies greater pricing leverage.

Historically, Illinois has been a center of the steel industry, which represents the largest single segment of the primary metals category in Illinois. However, the steel industry has been in a crisis for the last five years, during which period more than 20 steel firms have entered bankruptcy. There is massive global overcapacity in the industry. Small minimills that use scrap steel as their primary input and are mostly located in southern states have become effective competitors of large integrated mills. The table above shows that in the last few decades, Illinois has experienced a decline in its absolute primary metals employment, and its share of national output has declined as well. This is largely the result of the closure of relatively old and massive steel mills in the state and the fact that no new mills are being built to replace them. By 2010, primary metals manufacturing is

expected to employ only 39,062 people, which will be a loss of nearly 5,000 jobs from the year 2000 figure of 44,031 people.

The largest primary metals facility still in operation in Illinois is the National Steel plant in Granite City, which has over 2,500 workers. U. S. Steel purchased this company while it was in bankruptcy on May 20 of 2003. With this purchase, U. S. Steel has regained its position as the largest steel producer in the country. Its largest competitor, I. S. G. Steel, has a plant in Hennepin, Illinois, with about 625 employees. Currently, the steel industry is benefiting from a weak dollar and high steel tariffs that were imposed in March of 2002. The tariffs are scheduled to be phased out in March of 2005, and the weak dollar cannot be expected to continue indefinitely, so the steel industry is likely to face further difficulties in the future.

Fabricated Metals

The fabricated metals category includes enterprises that shape metals into useable commodities, such as tools and parts. It includes stamping plants, machine shops, cutlery factories, and other manufacturers. There are many more small fabricated metals shops than primary metals facilities. There is only one facility with over 1,000 workers. As of 2000, this category employed 111,872 people in Illinois

The fabricated metals category is much harder to summarize than primary metals. Consolidation is occurring, but with somewhat less internationalization of ownership. The industry in Illinois is experiencing less demand for many of its products because the U.S. is importing more and more fabricated parts from foreign countries, such as China, Brazil and Mexico. Illinois firms are countering this by becoming more specialized and emphasizing higher value and technologically complex products that are more difficult to source overseas.

The Ford Chicago Heights plant is by far the largest single employer in this category with about 2,300 workers. This plant is one of four Ford body-stamping plants in the country. Ford is a major industrial company, and it also has an assembly plant in Chicago. It is expected to open a new supplier park near the assembly plant in 2004. This supplier park will include other fabricated metals facilities. The Ford Stamping Plant, however, is atypical of the fabricated metals segment in the state, which tends to be concentrated in smaller plants.

In general, the fabricated metals industry in Illinois consists of many firms that are reliant on a generally favorable economic situation. Many of these firms rely on sales to other local manufacturers. For instance, over 18,000 Illinois fabricated metals employees work in machine shops. Thus, the future performance of this category will depend to a large degree on the success of the overall Illinois manufacturing economy. Illinois' absolute number of fabricated metals workers is expected to stay basically the same over the decade. However, the state's share of national fabricated metals employment is projected to decline from 7.3% in 2000 to 6.8% by 2010.

Machinery

The machinery category includes enterprises that produce agricultural equipment, construction machinery, office machinery, refrigeration and air conditioning machinery, and many other types of equipment. While there are a large number of facilities that employ a relatively small number of workers, there are also 11 very large factories with over 1,000 workers—more very large factories than in any other category.

Illinois has held its own in machinery manufacturing over the past decade and a half. Illinois had 7.2% of national machinery employment in 1988 and has the same share of the industry today. While Illinois faced a steep relative decline in industrial machinery during the 1980s, that decline appears to have ended. According to the Illinois Department of Employment Security, employment in machinery production is expected to grow from 147,302 in 2000 to 149,811 by 2010. Illinois' share of national employment in the machinery category is expected to decline slightly from 6.9% of national employment in the year 2000 to 6.7% by 2010. However, since Illinois' share of machinery employment had reached 7.2% in 2002, this prediction will hopefully be reversed.

While there are numerous small machinery plants in the state, machinery production is dominated by a relatively small number of very large firms. The largest machinery employer in Illinois is Caterpillar, which employs 20,500 workers in Illinois. These Illinois workers make up the majority of the company's 36,463 workers in the U.S. Thus, the fate of Illinois industrial machinery production will be heavily influenced by the fate of this company.

Caterpillar produces a full line of earthmoving, construction, and mining machinery as well as engines and parts in Illinois. It has facilities employing more than or nearly 1,000 workers in Aurora, Champaign, Decatur, Dixon, East Peoria, Joliet, Mapleton, Mossville, Peoria, Pontiac, Sterling and Woodbridge.

Machinery production is closely tied to the larger economic situation, because its sales are capital investments for other industries. In addition, a large part of the market for industrial machinery is global, so Illinois manufacturers compete with both foreign and domestic firms. Sales outside the United States accounted for 55% of Caterpillar's business in 2002, for instance. During 2002, this industry experienced shrinking markets and increased price competition worldwide.

Caterpillar's core businesses, including earthmoving, construction and mining machinery production, are facing global overcapacity. There is strong global competition in diesel engine production as well, but Caterpillar's share of heavy-duty diesel engine sales increased by 5% in 2002.

The overall situation for machinery manufacturing was bleak in 2002, but Illinois' manufacturers seem relatively well placed. In the first quarter of 2003, exporters of industrial machinery benefited from the weak dollar. Caterpillar did particularly well

against its competitors. It posted first quarter revenues of \$4.82 billion and profits of \$129 million, but it expects flat sales and revenues on an annual basis.

The state of the machinery sector in Illinois will depend to a large degree on the state of the economy, but will also depend on Illinois' competitive position worldwide. Because a large amount of industrial machinery is exported, it is particularly important for Illinois to provide a competitive environment for its machinery manufacturers.

Electrical Equipment

The electrical equipment category includes the electronic equipment sector and the lighting and electrical equipment sector. In 2000, this cluster employed 111,814 people in Illinois. Illinois' share of the electrical cluster was expected to decline from 6.5% of national production in 2000 to 6.2% by 2010, while absolute employment in this segment will increase in Illinois from 111,814 to 113,322. Given the major crisis in the industry, however, these projections will probably need to be reevaluated. Illinois' relative position depends to a large degree on the success of a relatively small number of firms with production located here. As with the machinery category, electronic equipment producers compete in a global market. For cellular phones and infrastructure, exports to developing countries are expected to increase in importance since the markets in the wealthy countries are nearly saturated. While the weak dollar benefits these firms in the short run, Illinois will need to provide a competitive base of operations if they are to succeed in the long run.

Electronic Equipment

The electronic equipment sub-sector includes firms that produce cellular phones and cellular broadcast equipment, electronic components like semiconductors, navigation and other instruments, and all other electronic products. Workers in this industry are particularly concentrated in relatively large establishments. While there are only five factories with over 1,000 workers in the state, there are 24 with more than 500 workers.

The electronic equipment sector has experienced particularly hard times in the past few years. Illinois did relatively well in this sector between 1988 and 2002, when the state's share of employment in this sector increased from 6.7% of the nation's to 7.1%.

The industry has experienced slowing growth worldwide as many markets reach the saturation point. The cellular infrastructure segment has fared even worse, as telecom service providers have stopped purchasing new equipment

Currently, however, there are some bright spots for the industry as a whole. Losses have moderated somewhat. This partial turnaround is largely due to cost reductions rather than from a significant increase in sales. However, cellular phone sales recorded a 7% increase in 2002 after contracting (for the first time ever) in 2001.

Lighting and Electrical Equipment

The lighting and electrical equipment sub-sector is facing dramatic foreign competition, especially from East Asia. Many traditional manufacturing firms in the sector are doing well by transforming themselves into importers/distributors. This preserves some jobs in Illinois, but not those of the direct manufacturing employees. The issue is price.

Customers are pressing hard for price reductions from manufacturers in this sector. One manufacturer told us that a product his firm made for a cost of \$14.50—and sold for \$13.50—could be outsourced from China for a total price of \$3.20 boxed and delivered. Even some tooling for the industry can be economically purchased overseas. The good news is that the import strategy allows Illinois companies to serve their customers; the bad news is that it does entail the reduction in productive capacity and jobs in Illinois.

Printing

The printing industry produces many different types of products. These include customized orders for business clients, newspapers, magazines, books, labels, postcards, greeting cards, and many other types of goods.

The industry can be broken up into a number of different sub-industries that each produce substantially different types of products. These include newspapers, books, commercial printing, blankbooks, and miscellaneous printing. The largest sub-industry in Illinois is commercial printing. These establishments produce catalogs, advertisements, and various printed materials for businesses. The second largest sub-industry is newspapers.

In both absolute and relative terms, employment in the printing industry in Illinois has been in decline in recent years and is expected to continue to decline for the near future. Illinois' share of the national printing industry's output has gone from 7.3% in 1988 to 6.8% in 2002. This is projected to decline to 6.0% by the year 2010. Employment in the industry is expected to go down as well, from over 99,718 in the year 2000 to 93,417 by 2010, for a total loss of 6,301 jobs.

There appears to be a number of interrelated causes for this decline. A good deal of the absolute decline in employment in the printing industry can be attributed to technology shifts, both in the industry and outside of it. A great deal of work that used to be done in print shops is done today by former clients using desktop publishing and in-house printing. These desktop publishing workers are not counted as printing industry employees. In addition, the shift to desktop publishing and to computer-based pre-press operations within the industry has caused a dramatic increase in printing productivity. This productivity increase has outstripped the growth in printing industry output, leading to a general decline in employment.

In the past, the printing industry was a very good indicator of the economy. If the economy grew 5%, the industry would grow at about the same rate. As more and more people get information, fill in forms, and conduct other transactions online, the demand for business forms and printed magazines is sharply declining. Now the industry expects to grow substantially less than the overall economy. This has resulted in another

problem: overcapacity. According to American Printer, the premier monthly trade magazine for U.S. printers, from 1999 to 2001 more than 21,000 offset presses exited the market.

Other technological developments have impacted the small and medium-sized printers in Illinois. The niche market of 7,500 to 15,000 copies was too big for copier machines but too small for a large printing shop. Now some copying machines can run this amount easily. As a result, more and more small printing shops feel the pinch between the Kinko-type stores and the large presses.

Illinois' relative loss in this industry compared to other states seems to be directly tied to these technological changes. The state's loss is exacerbated by the fact that Illinois had a large number of small, older print shops, exactly the type that were most adversely affected by the rise of in-house printing and desktop publishing. Of the 2,156 printing and related facilities in Illinois in 2001, only two employed more than 1,000 workers, and 1,324 employed less than ten. The average printing employer has about 26 workers.

Illinois also has an aging printing industry workforce and employer base. The owners of many small shops have chosen to retire and close their businesses in recent years, leading to a subsequent reduction both in overall printing employment and to a relative loss for Illinois. During economic downturns, older printing enterprises are particularly likely to close down.

The printing industry in Illinois thus faces two interrelated problems: it needs a workforce skilled in computer technology to replace its older retiring workers, and it needs to find successors to run the shops of retiring employers.

Currently, the printing industry is facing difficult economic times on a national scale. Printing is a particularly cyclical industry because a great deal of its revenue comes from advertising. This means that the current problems facing the economy as a whole have affected printing disproportionately.

The single largest printing industry employer in Illinois is R. R. Donnelley and Sons. This company has over 5,000 workers in Illinois, and has announced no plans to dramatically change that number in the coming years. This company has about 30,000 total employees worldwide, and Illinois is the state with the largest single concentration of R. R. Donnelley workers. The company's largest facility in the state is a periodical and commercial printing plant in Mattoon with approximately 1,700 workers, and it has additional facilities in Dwight, Bedford Park, Pontiac and Elgin.

This large company, however, seems to be the exception to the rule in Illinois. Since small shops dominate printing, their decline is projected to more than offset R. R. Donnelley's stability. For the country as a whole, printing employment is only expected to decline by .1% by 2010, but for Illinois, it is projected to shrink by 7.7%. Illinois' share of national printing output is expected to decline similarly.

Food

The food manufacturing industry consists of two main segments. The first is the primary processing of agricultural commodities, such as the production of flour or oil from soybeans. The second is the production of products ready for the consumer, such as the manufacturing of candy or biscuits. Illinois has a large number of manufacturers of both types.

Employment in the food manufacturing industry is concentrated in larger facilities than those in printing, but smaller than those in metals or electrical equipment. The average food manufacturing facility has about 65 workers. There are seven food manufacturing facilities in Illinois with over 1,000 workers, and 27 with more than 500 workers. While there are a lot of large facilities, there are also a large number of medium-sized plants spread throughout the state. Many of the small and medium-sized food facilities, however, are owned by large companies.

Unlike most Illinois manufacturing, the food manufacturing industry in Illinois has more or less held its own over the last decade and a half. Illinois' employment share has gone from 5.7% of U.S. employment in 1987 to 5.6% in 2002. Illinois food manufacturing is expected to maintain this position over the next decade. In the year 2010, it is projected to have 5.5% of total U.S. food manufacturing industry employment. However, total employment in the food industry is expected to decline across the nation. In Illinois, employment is projected to drop from 93,048 in the year 2000 to 89,494 by the year 2010, by 3.8%.

The food industry is much less cyclical than the other clusters identified in this study. This is attributable to the fact that consumer demand for food is constant throughout different economic conditions. For this reason, the food industry has been relatively stable during the current difficult economic times.

Primary Food Manufacturing

Many primary food manufacturers are large exporters. They stand to benefit from world population growth and from the increased caloric and protein intake of people in the developing world. Between 1990 and 2001, the demand for beef, pork and poultry products increased 29% worldwide. This increase is expected to continue for the foreseeable future. This contributed to a growth in the demand for grain products for feed. Primary food manufacturers have been vertically integrating and consolidating in recent years to take advantage of this opportunity.

Processed Foods Manufacturing

Illinois' processed foods manufacturing is in a more difficult position. This segment is less reliant on exports, and is less tied to local sources of agricultural products. It contains three large industries in Illinois: bakeries with 20,000 workers, animal slaughtering and processing, with 19,000 workers, and confectionery manufacturing, with 12,000 workers.

Each of these industries faces somewhat different challenges, but all are generally losing employment.

The largest processed foods employer in Illinois is Kraft foods. Kraft is 84% owned by Altria (the new name for Phillip Morris). This company acquired Nabisco, also located in Illinois, in December of 2000. Kraft has laid off 7,500 workers worldwide so far as a result of the Nabisco purchase. The largest single facility in the state is the Nabisco plant in Chicago with 2,400 workers. Kraft has two other large facilities in Chicago, which have 500 and 300 workers. Kraft also has large facilities in Northfield, Champaign, Granite City, Niles and Naperville.

Consolidation in all aspects of the food industry is a major factor in the future of individual firms. Retailers are consolidating, partly in response to the emergence of Wal-Mart as the largest single food retailer in the world. Distributors and brokers are also consolidating. It is now much more difficult for small firms to obtain distribution for their products. Large companies are also aggressive in demanding low prices, high quality, and integration of supplier data systems with that of the purchasing firm. All of these trends are intended to integrate logistics and take cost out of the business system, substantially aided by the use of technology. Compliance with these demands requires investment, which is difficult for small firms. These factors are stressing profit margins of food processors. There has been corresponding consolidation in the processing segment and this consolidation has a tendency to cost jobs.

Certain segments are also handicapped by sugar price supports in the United States. These make the local price of sugar considerably more expensive than the world price. In the past this was somewhat mitigated by the high productivity of Illinois' workers, but as companies and their workers in other countries gain sophistication, it is now possible for them to make products that meet quality standards for the American market. The Argentinean company Arcor, which specializes in confectionery products, is an example. Over the last few years it has grown from \$200 million in worldwide sales (\$100 million of that in the U.S.) to \$1.5 billion in worldwide sales with \$400 million in the U.S. The very important confectionary industry is therefore quite vulnerable. On the other hand, producers of corn sweeteners, like ADM and CPC, benefit from the high price of sugar.

For the food industry as a whole, the future looks mixed. Illinois is in a better relative position in food than in either printing or metals, largely because of the agricultural strength of the state and the region, good transportation and a large local demand. However, given that employment in the industry is expected to decline overall, Illinois would have to increase its share of national food production to maintain current employment levels.

Chapter 3: Performance of Illinois Manufacturing

In order to evaluate the state of the Illinois manufacturing economy, it is necessary to compare its performance to its peers among the top manufacturing states in the nation. We will use three basic measures to compare Illinois manufacturing and each of its clusters to its peers. But first, we need to determine which U.S. states are Illinois' peers in terms of the size of their manufacturing sector.

The size of states' manufacturing sectors is measured either by the value of shipments or by the number of people employed. Based on these two measures, Illinois, California, Texas, Michigan, Ohio, Indiana, Wisconsin, Pennsylvania, New York and North Carolina are the ten largest manufacturing states in this country (see table below). Manufacturing in these states accounts for 54.8% of national manufacturing output and 53.8% of national manufacturing employment. Within this group, Illinois holds the fifth place by output and the fourth place by employment.

Ten Largest Manufacturing States by Value of Shipments and Employment, 2000

Value of Shipments					
Top 10 Mfg. States	(Millions of \$)	Rank	Top 10 Mfg. States	Employment	Rank
California	\$446,873	1	California	1,846,255	1
Texas	344,998	2	Ohio	985,785	2
Ohio	258,665	3	Texas	979,029	3
Michigan	228,923	4	Illinois	867,634	4
Illinois	214,315 ⁹	5	Michigan	809,927	5
Pennsylvania	187,906	6	Pennsylvania	794,841	6
North Carolina	178,017	7	North Carolina	744,042	7
Indiana	162,577	8	New York	738,206	8
New York	155,355	9	Indiana	638,330	9
Wisconsin	131,755	10	Wisconsin	574,923	10
Group Average	230,938		Group Average	897,897	
US	\$4,217,852		US	16,681,425	
Group as % of US	54.8%		Group as % of US	53.8%	

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

We will compare Illinois' manufacturing performance to these nine other leading manufacturing states using standard performance measures: productivity, labor costs, and the rate of investment in new plant and equipment as a share of output.

⁹ This figure differs from the value of IL manufacturing shipments on page 11 because the Bureau of Census and the Minnesota Implan Group use different data sources. The Minnesota Implan Group figure comes from payroll data of all IL manufacturers, whereas the Bureau of Census data comes from a representative sample of IL manufacturers.

Productivity

Productivity is the most important measure of performance. Productivity measures the amount of labor that goes into producing a product or service. The less labor required, generally the lower the cost of production.¹⁰ Productivity grows because of new capital investment, improvements in the organization of work, and increased skill of workers. Manufacturing's monumental increase in labor productivity and concomitant decrease in employment has been one of the most important trends in the sector and deserves special consideration.

Productivity and Employment

Nationally, manufacturing total employment has declined while each American consumes more American-made manufactured products than ever before. Although manufacturing represents a smaller *share* of the economy, its output is increasing in absolute numbers. How can all of these statements be true? The answer is found in the enormous increase in manufacturing productivity. It simply takes much less labor to produce a given quantity of goods than ever before. American factories are producing 41% more than they did ten years ago with 8% fewer hours of labor. The benefits of this for the sector are somewhat obscured by the fact that productivity improvements are often passed on to customers in the form of lower prices.¹¹

One benefit of higher productivity is that it is the only way to increase *aggregate* living standards. Higher productivity benefits consumers who pay less in constant real dollars for most goods. It also benefits workers in manufacturing who are paid more than their counterparts in other sectors. Because manufactured goods cost relatively less than they did before labor costs decreased, consumers have more disposable income to spend on services. The negative side of high productivity is that many workers have lost their jobs as a result of it.

Output and productivity interact to affect the level of employment in three ways. First, when output grows faster than productivity, employment rises. Second, when output grows equal to productivity there is no change in employment, and third, when output grows less than productivity employment declines.

¹⁰ This is only generally true. It is possible that total costs could rise if labor was reduced but replaced with extremely expensive capital equipment. Similarly, highly efficient labor might replace capital in which case total costs might fall with an increase in labor inputs. However, these scenarios are not customary.

¹¹ Joel Popkin, *Producing Prosperity- Manufacturing Technology's Unmeasured Role in Economic Expansion*, McLean VA: The Association for Manufacturing Technology, 2000 and David Wessel, "Productivity: Too Much of a Good Thing?" *Wall Street Journal*, December 19, 2002, A2; and Clare Ansberry, "A New Blue Collar World," *Wall Street Journal*, June 30, 2003, B1-2. For a very accessible explanation of productivity see Paul Krugman, *Pop Internationalism*, Cambridge MA: MIT Press, 1997. An understandable mathematical explanation is found in Edward M. Graham, *Fighting the Wrong Enemy*, Washington DC: Institute for International Economics, 2000.

Illinois' Manufacturing Productivity Compared to its Peers

To measure productivity, we use two ratios: value of shipments per production worker and value of shipments per production hour.¹² (We do not use value of shipments per employee, another popular way to measure the productivity, because the concept of “employees” includes managers who are not directly involved in production.) Illinois is competitive by both of those measures. The following table indicates that in the year 2000, the average Illinois production worker produced \$350,000 in shipments. This put Illinois fourth among the top ten manufacturing states. Productivity in Illinois is equal to Ohio and the national average, and ranks behind Texas, Michigan and California.

Value of Product Shipments per Production Worker by Major Manufacturing State, 2000

Top 10 Mfg. States	Number of Production Workers	Value of Shipments (Millions of \$)	Value of Shipments per Worker (\$)	Comparison to US Average
Texas	673,198	\$344,998	\$510,000	145%
Michigan	615,527	228,923	370,000	105%
California	1,211,692	446,873	370,000	105%
Illinois	605,421	214,315	350,000	100%
Ohio	733,945	258,645	350,000	100%
Indiana	486,377	162,577	330,000	95%
Pennsylvania	572,067	187,906	330,000	93%
Wisconsin	425,581	131,755	310,000	88%
North Carolina	577,821	178,017	310,000	87%
New York	510,893	155,355	300,000	86%
Group Average	641,252	230,936	350,000	100%
US	11,959,223	\$4,217,852	\$350,000	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Illinois manufacturing again ranks fourth in the nation when its productivity is measured by the value of shipments per production hour. The table below shows that Illinois is nearly equal to the national average and is again behind Texas, California and Michigan. Texas shows very high productivity because the value of shipments for the oil industry includes a substantial amount of royalties.

¹² Economists often measure productivity using the ratio of Gross State Product (GSP) per production worker and production hour. We use the industries' value of shipments instead of GSP because of the shortage of detailed GSP data available for industry cluster analyses.

Value of Shipments per Production Hour by Major Manufacturing State, 2000

Top 10 Mfg. States	Working Hours (In Millions)	Value of Shipments (Millions of \$)	Value of Shipments per Hour (\$)	Comparison to U.S. Average
Texas	1,368	\$344,998	\$252.2	144%
California	2,387	446,873	187.2	107%
Michigan	1,268	228,923	180.5	103%
Illinois	1,230	214,315	174.2	99%
Ohio	1,493	258,645	173.2	99%
Indiana	987	162,577	164.7	94%
Pennsylvania	1,157	187,906	162.4	92%
Wisconsin	839	131,755	157.0	89%
North Carolina	1,154	178,017	154.3	88%
New York	1,014	155,355	153.2	87%
Group Average	1,290	230,936	179.1	102%
US	24,006	\$4,217,852	\$175.7	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Labor Costs

Illinois ranks fourth again when its labor costs are compared to its peers. One important way to measure labor costs is to compare employee production wages to the value of shipments. Let's first look at average wages paid to Illinois manufacturing workers. As the following table indicates, the average wage for Illinois manufacturing production workers is \$15.46 an hour, while the average for the top ten manufacturing states was \$15.60 an hour. Among major Midwestern manufacturing states, Illinois has the lowest hourly wages in manufacturing, but has higher wages than the three Sunbelt states and the two Eastern states in the peer group.

Hourly Wage of Manufacturing Workers by Major Manufacturing State, 2000

Top 10 Mfg. States	Total Production Hours (Millions)	Total Production Wages (Millions of \$)	Average Hourly Wage (\$)	Comparison to U.S. Average
Michigan	1,268	\$25,361	\$20.00	132%
Ohio	1,493	25,435	17.04	113%
Indiana	987	16,406	16.62	110%
Wisconsin	839	13,256	15.80	104%
Illinois	1,230	19,015	15.46	102%
Pennsylvania	1,157	17,760	15.35	101%
New York	1,014	14,960	14.75	97%
Texas	1,368	19,897	14.54	96%
California	2,387	34,334	14.38	95%
North Carolina	1,154	14,790	12.82	85%
Group Average	1,290	20,121	15.60	103%
US	24,006	\$363,272	\$15.13	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

To determine the labor costs for Illinois, we divide total state wages per hour by the value of total shipments per hour. Productivity (value of shipments per hour of labor) is high when wages are a small percentage of the value of shipments. Illinois' labor costs are 8.9% of the value of hourly manufacturing shipments. Illinois has the lowest labor costs of its Midwestern and Eastern peers, but has higher costs than North Carolina, California, or Texas, making Illinois the fourth most efficient state in terms of its manufacturing labor costs.

Labor Costs as Percentage of Value of Shipments by Major Manufacturing State, 2000

Top 10 U.S. Mfg. States	Total Production Wages (Millions of \$)	Value of Shipments (Millions of \$)	Wages as % of value of shipments	Comparison to U.S. Average
Texas	\$19,897	\$344,998	5.80%	67%
California	34,334	446,873	7.70%	89%
North Carolina	14,790	178,017	8.30%	96%
Illinois	19,015	214,315	8.90%	103%
Pennsylvania	17,760	187,906	9.50%	110%
New York	14,960	155,355	9.60%	112%
Ohio	25,435	258,645	9.80%	114%
Indiana	16,406	162,577	10.10%	117%
Wisconsin	13,256	131,755	10.10%	117%
Michigan	25,361	228,923	11.10%	129%
Group Average	20,121	230,936	8.70%	101%
US	\$363,272	\$4,217,852	8.60%	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Labor costs depend to some degree on the industrial mix of the given state; some industries that are prominent in the Midwest, like auto manufacturing, have relatively high labor costs, while others that are prominent in Texas, like petroleum, have relatively low labor costs. Overall, however, Illinois labor costs place it in a competitive position relative to its peers.

Investment in Relation to Industry Shipments

Illinois ranks relatively low in the amount it invests in new plant and equipment relative to industrial shipments. This figure is important because it indicates what share of the value of production is reinvested in expanding and modernizing production in the state. This figure varies considerably from year to year, depending on industry profitability and manufacturers' expectations about changing markets. For this reason, we have created an aggregate figure for the four years 1997, 1998, 1999 and 2000.

The table below shows that Illinois ranks seventh out of the nation's 10 leading manufacturing states in terms of its investments as a percentage of shipments. As with labor costs, this figure depends to a large degree on the industrial mix of the state. Investment generally represents a lower percentage of shipments in the food industry than it does in printing. For that reason, it is more useful to look at each of our clusters individually in order to evaluate Illinois' competitiveness on a more specific basis. Still,

Illinois' low rank indicates that less manufacturing investment is being made in relation to production in Illinois than in many of its main competitors.

**Investment as a Percent of Shipments
All Manufacturing 1997 to 2000
Top 10 Manufacturing States**

Top 10 Mfg. States	Investment as a % of Shipments	Rank
Pennsylvania	4.1%	1
Michigan	4.0%	2
Texas	4.0%	3
California	4.0%	4
Indiana	3.7%	5
New York	3.7%	6
Illinois	3.6%	7
Ohio	3.5%	8
Wisconsin	3.5%	9
North Carolina	3.3%	10
Group Average	3.8%	
US	3.8%	

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000.*

Performance of Illinois' Manufacturing Clusters

Metals

Size

The Illinois Metals manufacturing cluster is the third largest in the nation after California and Ohio by both output and employment (see table below). The other top producers of primary metal, fabricated metal, and machinery are New York, Pennsylvania, Indiana, Texas, Wisconsin, Michigan and Tennessee. The metal industries in these states produce 60% of U.S. production and employ 59% of U.S. metals manufacturing employees. Illinois metal industries employ 7.2% of the workers in these industries and produce 7.7% of national shipments.

Productivity

The Illinois metal manufacturing cluster is highly competitive in the value of shipments per worker. The table below shows that Illinois ranks third after New York and Indiana in this measure of productivity. Illinois' output of \$280,000 per worker is higher than the national average by 3%, and is higher than the average for the top ten metals manufacturing states by 4%.

Value of Shipments per Worker in Metal Industries by Major Manufacturing States, 2000

Top 10 Mfg. States	Production Workers	Value of Shipments (Millions of \$)	Value of Shipments per Worker (\$)	Comparison to US Average
New York	102,287	\$33,003	\$320,000	123%
Indiana	138,823	43,584	310,000	120%
Illinois	198,894	55,556	280,000	107%
Ohio	239,163	\$63,196	\$260,000	101%
Tennessee	79,795	21,060	260,000	101%
Texas	167,658	43,402	260,000	99%
Pennsylvania	167,452	43,381	260,000	99%
California	233,166	58,383	250,000	96%
Wisconsin	133,285	32,959	250,000	95%
Michigan	173,665	41,487	240,000	91%
Group Average	163,419	43,601	270,000	102%
US	2,759,387	721,991	260,000	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

The Illinois metals cluster is similarly competitive on the basis of output per production hour. Again, Illinois ranks third in its peer group. Illinois' output of \$136 per production hour is five percent above the national average and two percent above the average for the top ten metals manufacturing states.

Value of Shipments per Production Hour in Metal Industries by State, 2000

Top 10 Mfg. States	Working Hours (Millions)	Value of Shipments (Millions of \$)	Value of Shipment per Hour (\$)	Comparison to US Average
New York	205	33,003	161	124%
Indiana	287	43,584	152	117%
Illinois	408	55,556	136	105%
Tennessee	156	21,060	135	104%
Ohio	489	63,196	129	100%
Pennsylvania	339	43,381	128	99%
California	466	58,383	125	97%
Wisconsin	266	32,959	124	96%
Texas	353	43,402	123	95%
Michigan	358	41,487	116	90%
Group Average	333	43,601	133	103%
US	5,580	\$721,991	\$129	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Overall, Illinois' metal manufacturing cluster is competitive by both measures of productivity. The Illinois cluster exceeds the national and group averages, and is the third most productive state.

Labor Costs

Illinois' metals workers are paid better than most of their counterparts in other states. They earn an average of \$16.59 an hour compared to an average of \$15.70 for the nation as a whole. However, this is the lowest rate of any Midwestern state. Michigan metals workers earn an average of \$17.58 an hour, or almost 6% more than Illinois metal workers.

Hourly Wages in Metal Industries by Major Manufacturing States, 2000

Top 10 Mfg. States	Working Hours (Millions)	Production Wages (Millions of \$)	Ave. Production Hourly Wages (\$)	Comparison to US Average
Michigan	358	\$6,295	\$17.58	112%
Indiana	287	4,999	17.42	111%
Ohio	489	8,428	17.24	110%
Illinois	408	6,768	16.59	106%
New York	205	3,364	16.41	105%
Pennsylvania	339	5,553	16.38	104%
Wisconsin	266	4,359	16.39	104%
California	466	6,981	14.98	95%
Texas	353	4,977	14.10	90%
Tennessee	156	2,180	13.97	89%
Group Average	333	5,390	16.20	103%
US	5,580	\$87,594	\$15.70	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Despite their relatively high pay, Illinois' metals production wages are approximately the same share of shipment value as the U.S. average. Illinois' metals production wages are a smaller percentage of the value of shipments than the average for the top ten metals manufacturing states. This is largely due to the high productivity of Illinois' workers. Illinois falls squarely in the middle of its main competitors on this measure (see table below).

Production Wages as a Percentage of Output in Metal Industries by State, 2000

Top 10 Mfg. States	Production Wages (Millions of \$)	Value of Shipments (Millions of \$)	Wages as % of Value of Shipments	Comparison to US Average
Michigan	\$6,295	\$41,487	15.2%	125%
Ohio	8,428	63,196	13.3%	110%
Wisconsin	4,359	32,959	13.2%	109%
Pennsylvania	5,553	43,381	12.8%	106%
Illinois	6,768	55,556	12.2%	100%
California	6,981	58,383	12.0%	99%
Texas	4,977	43,402	11.5%	95%
Indiana	4,999	43,584	11.5%	95%
Tennessee	2,180	21,060	10.4%	85%
New York	3,364	33,003	10.2%	84%
Group Ave.	5,390	43,601	12.4%	102%
US	\$87,594	\$721,991	12.1%	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Overall, the labor costs of Illinois' metals cluster are roughly comparable in aggregate effect with those of its competitors. Illinois workers are paid somewhat more than the national average, but are paid less than other Midwestern metals workers. Their high pay nationally is offset by their high productivity. Illinois' metals cluster is in a competitive position regarding overall labor costs.

Investment in Relation to Industry Shipments

Like overall manufacturing, Illinois' investment as a percent of shipments in the metals cluster is low compared to the other top metal manufacturing states. It ranks eight out of the 10 states.

Investment as a Percent of Shipments in the Metals Cluster 1997 to 2000
Top 10 Metals States

Top 10 Mfg. States	Investment % of Shipments	Rank
Michigan	4.1%	1
California	4.0%	2
Indiana	3.8%	3
Ohio	3.7%	4
Wisconsin	3.7%	5
Pennsylvania	3.5%	6
Texas	3.4%	7
Illinois	3.3%	8
New York	3.0%	9
Tennessee	2.8%	10
Group Average	3.6%	
US	3.6%	

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

In general, the Illinois metals manufacturing cluster is in a relatively competitive position in terms of aggregate figures. It has above average productivity, and about average labor costs. Like Illinois manufacturing in general, it ranks low in terms of its investments as a percentage of shipments.

Electrical

Size

As of the year 2000, Illinois had the most electrical industry workers of any state, and the third highest output. The other major electrical industry states are California, Ohio, Wisconsin, North Carolina, Pennsylvania, Texas, Georgia, Tennessee and New York. Taken together, these ten states produced 56% of the national electrical cluster shipments. Illinois alone accounted for 6.6%.

Productivity

In the year 2000, the Illinois electrical cluster was the second least productive of the major states by value of shipments per worker. It was 15% below the national average and 18% below the average for the top ten electrical manufacturing states.

Value of Shipments per Production Hour in Electrical Industries by State, 2000

Top 10 Mfg. States	Production Workers	Value of Shipments (Millions of \$)	Value of Shipments per Worker (\$)	Comparison to US Average
Georgia	17,826	\$7,013	\$390,000	136%
Wisconsin	22,635	7,846	350,000	120%
North Carolina	25,054	8,035	320,000	111%
Texas	17,868	5,559	310,000	107%
California	29,081	8,783	300,000	104%
Ohio	32,995	9,924	300,000	104%
Pennsylvania	19,430	5,762	300,000	102%
New York	15,416	3,818	250,000	86%
Illinois	33,211	8,194	250,000	85%
Tennessee	19,568	4,447	230,000	79%
Group Average	23,308	6,938	300,000	103%
US	431,371	\$124,864	\$290,000	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Illinois also had the second least productive electrical cluster in the value of shipments per hour. By this measure, Illinois was 17% below the national average, and 20% below the average for the top ten electrical manufacturing states.

Value of Shipments per Production Hour in Electrical Industries by State, 2000

Top 10 Mfg. States	Production Hours (Millions)	Value of Shipments (Millions of \$)	Value of Shipments per Hour (\$)	Comparison to US Average
Georgia	36	\$7,013	\$196	134%
Wisconsin	40	7,846	196	134%
Texas	35	5,559	158	108%
North Carolina	52	8,035	155	106%
California	58	8,783	151	103%
Ohio	66	9,924	151	103%
Pennsylvania	40	5,762	146	100%
New York	30	3,818	129	88%
Illinois	68	8,194	121	83%
Tennessee	39	4,447	115	78%
Group Average	46	6,938	150	103%
US	854	\$124,864	\$146	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Since the year 2000, the Illinois electrical cluster has experienced enormous numbers of job losses. While the figures are not yet available, it is likely that productivity both per worker and per hour has increased as a result. As of the year 2000, however, Illinois ranked near the bottom in electrical cluster productivity.

Labor Costs

Illinois' electrical manufacturing cluster wages are competitive with other major electrical manufacturing states. Illinois workers receive 97% of the national average for electrical workers, and 2% less than the average for the top ten states. They receive lower wages than workers in Georgia, Ohio or Wisconsin. While they receive more than workers do in six of the top ten states, Illinois wages are only significantly higher than those for workers in California, Tennessee and Texas. Illinois electrical wages are in the middle of those of its peer group.

Hourly Wages in Electrical Industries by Major Manufacturing States, 2000

States	Production Hours (Millions)	(Millions of \$)	Hourly Wages	to US Average
Wisconsin	40	\$661	16.53	117%
Ohio	66	1,036	15.74	111%
Georgia	36	520	14.58	103%
Illinois	68	928	13.72	97%
North Carolina	52	705	13.55	96%
New York	30	404	13.59	96%
Pennsylvania	40	531	13.40	95%
California	58	766	13.17	93%
Tennessee	39	506	13.03	92%
Texas	35	441	12.54	88%
Group Average	46	650	14.05	99%
US	854	\$12,101	\$14.17	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Because of its low productivity, wages represent a higher percentage of the value of Illinois' electrical industry cluster shipments than they do in most other states. Illinois is the second most inefficient state in terms of wages as a percentage of the value of shipments.

Production Wages as a Percentage of Output in Electrical Industries by State, 2000

Top 10 Mfg. States	Production Wages (Millions of \$)	Value of Shipments (Millions of \$)	Wages as % of Value of Shipments	Comparison to US Average
Georgia	\$520	\$7,013	7.4%	76.6%
Texas	441	5,559	7.9%	81.9%
Wisconsin	661	7,846	8.4%	87.0%
California	766	8,783	8.7%	90.0%
North Carolina	705	8,035	8.8%	90.5%
Pennsylvania	531	5,762	9.2%	95.0%
Ohio	1,036	9,924	10.4%	107.7%
New York	404	3,818	10.6%	109.1%
Illinois	928	8,194	11.3%	116.8%
Tennessee	506	4,447	11.4%	117.3%
Group Average	650	6,938	9.4%	96.6%
US	\$12,101	\$124,864	9.7%	100.0%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Wages in Illinois' electrical industry cluster are similar to those in other states, but Illinois' low productivity meant that as of the year 2000, wages accounted for a high share of the value of shipments. Again, the layoffs that have shaken the industry in Illinois since the year 2000 have undoubtedly affected the numbers. Also, given that absolute wages in Illinois are competitive, the low productivity of Illinois workers in this cluster is the cause of Illinois' lag.

Investment in Relation to Industry Shipments

Illinois ranks fourth in investment in new plant and equipment as a percent of output among the top ten manufacturing states. Illinois electrical manufacturers invested an average of 3.5% of the value of their shipments between 1997 and 2000. Undoubtedly, that figure is much smaller for the last few years. Nonetheless, the trend indicates that Illinois electrical cluster manufacturers are investing at a slightly higher rate than the average for the industry of 3.2% nationally and 3.3% for the ten leading states.

Investment as a Percent of Shipments in the Electrical Cluster, 1997 to 2000
Top 10 Electrical Manufacturing States

Top 10 Mfg. States	Investment % of Shipments	Rank
Georgia	5.5%	1
California	3.9%	2
North Carolina	3.8%	3
Illinois	3.5%	4
Texas	3.3%	5
Tennessee	3.0%	6
New York	2.8%	7
Pennsylvania	2.7%	8
Ohio	2.7%	9
Wisconsin	2.3%	10
Group Average	3.3%	
US	3.2%	

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Overall, the Illinois electrical cluster is not in the best competitive situation. It has low productivity and wages represent a high percentage of the value of its shipments. This is because many of its major businesses are facing difficult economic times. Hopefully these challenges can be met in the coming years.

Printing

Size

The Illinois printing industry is the second largest in the country in both number of workers and output, after only California (see table below). Illinois produces 8.0% of the national printing output. The other major printing states are Pennsylvania, New York, Texas, Wisconsin, Ohio, Minnesota, New Jersey and Florida. The top ten states produce 57.2% of the total printing output of the country.

Productivity

The Illinois printing industry is highly productive. Each Illinois printing worker produces about \$190,000 worth of shipments a year, which is 10% higher than the national average and 9% higher than the average of the top ten printing states. This makes Illinois second in productivity per worker, only behind New Jersey.

Value of Shipments per Worker in the Printing Industry by State, 2000

Top 10 Mfg. States	Production Workers	Value of Shipments (Millions of \$)	Value of Shipments per Worker	Comparison to US Average
New Jersey	23,820	\$5,297	\$220,000	127%
Illinois	43,686	8,406	190,000	110%
Minnesota	24,463	4,730	190,000	110%
New York	35,220	6,640	190,000	108%
Pennsylvania	38,446	6,792	180,000	101%
Wisconsin	28,643	4,962	170,000	99%
Texas	28,394	4,878	170,000	98%
California	62,066	10,444	170,000	96%
Ohio	28,572	4,786	170,000	96%
Florida	20,601	2,935	140,000	81%
Group Average	33,391	5,987	180,000	102%
US	597,480	\$104,614	\$180,000	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

When productivity is measured by the value of shipments per production hour, Illinois' printing industry ranks third among its peers. Illinois' output of \$97.74 of shipments per production hour exceeds the national average by 8% and the average of the top ten printing states by 5%. The Illinois printing industry is highly productive by both measures.

Value of Shipments per Production Hour in Printing Industry by State 2000

Top 10 Mfg. States	Production Hours (In millions)	Value of Shipment (Millions of \$)	Value of Shipments per Hour	Comparison to US Average
New Jersey	45	\$5,297	\$117.71	130%
Minnesota	48	4,730	98.54	109%
Illinois	86	8,406	97.74	108%
New York	69	6,640	96.23	106%
Texas	53	4,878	92.04	101%
Wisconsin	56	4,962	88.61	98%
California	118	10,444	88.51	98%
Pennsylvania	77	6,792	88.21	97%
Ohio	56	4,786	85.46	94%
Florida	37	2,935	79.32	87%
Group Average	65	5,987	92.82	102%
US	1,153	\$104,614	\$90.73	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Labor Costs

The average Illinois printing worker earned slightly more than the national industry average in the year 2000. Illinois printing workers averaged \$15.34 an hour, compared to the national figure of \$15.16. Illinois printing wages were nearly identical to the average of \$15.32 for the top ten printing states, and Illinois printing wages were lower than those

in Minnesota or New Jersey, the two states with the highest productivity along with Illinois.

Hourly Wages in the Printing Industry by State, 2000

Top 10 Mfg. States	Working Hours (In millions)	Production Wages (Millions of \$)	Average Production Hourly Wages	Comparison to US Average
New Jersey	45	\$819	\$18.20	120%
New York	69	1,083	15.70	104%
Minnesota	48	749	15.60	103%
California	118	1,828	15.49	102%
Wisconsin	56	864	15.43	102%
Illinois	86	1,319	15.34	101%
Pennsylvania	77	1,171	15.21	100%
Ohio	56	801	14.30	94%
Texas	53	758	14.30	94%
Florida	37	491	13.27	88%
Group Average	65	988	15.32	101%
US	1,153	\$17,477	\$15.16	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Illinois printing manufacturers enjoy low labor costs. Between the state's high productivity and its moderate wages, Illinois ranks third in production wages as a percentage of the value of printing industry shipments. Illinois' figure of 15.7% puts it 6% lower than the national average.

Production Wages as a Percentage of Value of Shipments in Printing Industry by State, 2000

Top 10 Mfg. States	Production Wages (Millions of \$)	Value of Shipments (Millions of \$)	Wages as % of Value of Shipments	Comparison to US Average
New Jersey	\$819	\$5,297	15.5%	93%
Texas	758	4,878	15.5%	93%
Illinois	1,319	8,406	15.7%	94%
Minnesota	749	4,730	15.8%	95%
New York	1,083	6,640	16.3%	98%
Florida	491	2,935	16.7%	100%
Ohio	801	4,786	16.7%	100%
Pennsylvania	1,171	6,792	17.2%	103%
Wisconsin	864	4,962	17.4%	104%
California	1,828	10,444	17.5%	105%
Group Average	988	5,987	16.5%	99%
US	\$17,477	\$104,614	16.7%	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Wages and productivity in the printing industry make Illinois highly competitive with its peers. While Illinois' wages are slightly higher than average, its labor costs are low. While the Illinois printing industry is struggling, wages are not the reason.

Investment in Relation to Industry Shipments

Illinois ranks sixth out of the top ten printing industry states in investment in new plant and equipment per dollar of shipment value. Illinois printers invested an average of 4.5% of the value of their shipments per year between 1997 and 2000. The national average for the printing industry was 4.7% and the average for the top ten printing states was 4.8%.

Investment as a Percent of Shipments in Printing, 1997 to 2000: Top 10 Printing States

Top 10 Mfg. States	Investment % of Shipments	Rank
Wisconsin	5.6%	1
Minnesota	5.6%	2
New York	5.4%	3
California	4.8%	4
Florida	4.6%	5
Illinois	4.5%	6
Pennsylvania	4.4%	7
Texas	4.4%	8
Ohio	4.2%	9
New Jersey	4.2%	10
Group Average	4.8%	
US	4.7%	

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

The Illinois printing cluster is in decline, but the reason does not appear to have anything to do with Illinois' competitive position. By every measure, Illinois' printing industry compares favorably to those of its competitors.

Food

Size

Illinois has the third highest employment in the food industry, behind only California and Texas. The other major food manufacturing states are Pennsylvania, Georgia, Wisconsin, Arkansas, Ohio, North Carolina, and New York. In the year 2000, these states produced 48.8% of food shipments nationally. Illinois alone produced 6.7% of national output.

Productivity

Illinois has the most productive food sector of any of the top ten states. The output per worker in the Illinois food sector is about \$460,000 a year, while the average for both the U.S. and the top ten food producing states is only \$380,000. Illinois food industry workers are 23% more productive than both the U.S. and the top ten states' averages.

Value of Shipments per Production Worker in Food Industry by State, 2000

Top 10 Mfg. States	Production Workers	Value of Shipments (Millions of \$)	Value of Shipments Per Worker	Comparison to US Average
Illinois	62,595	\$29,078	\$460,000	123%
Ohio	41,953	18,657	440,000	118%
Wisconsin	50,387	21,551	430,000	113%
Pennsylvania	52,003	21,407	410,000	109%
Texas	68,193	27,170	400,000	106%
New York	34,269	13,486	390,000	104%
California	118,132	42,193	360,000	95%
Georgia	51,651	16,168	310,000	83%
North Carolina	41,852	12,137	290,000	77%
Arkansas	44,263	10,286	230,000	62%
Group Average	56,530	21,213	380,000	99%
US	1,150,225	\$434,261	\$380,000	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

The Illinois food industry is also the most productive on an hourly basis. Illinois food workers produce an average of \$222 of shipments every hour. When productivity is measured this way, the Illinois food industry exceeds the U.S. average by 19% and the average for the top ten food manufacturing states by 20%.

Value of Shipments per Production Hour in Food Industry by State, 2000

Top 10 Mfg. States	Working Hours (In millions)	Value of Shipments (In millions of \$)	Value of Shipments Per Hour (\$)	Comparison to US Average
Illinois	131	\$29,078	\$222	119%
Ohio	84	18,657	222	119%
Wisconsin	101	21,551	213	114%
Pennsylvania	106	21,407	202	108%
New York	68	13,486	198	106%
Texas	146	27,170	186	100%
California	234	42,193	180	97%
Georgia	106	16,168	153	82%
North Carolina	88	12,137	138	74%
Arkansas	86	10,286	120	64%
Group Average	115	21,213	184	99%
US	2,329	\$434,261	\$186	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

However it is measured, Illinois food workers are the most productive of any major food-producing state. They exceed the national average by a considerable amount. This productivity should make the Illinois food industry highly competitive on a national basis.

Labor Costs

Illinois food industry workers are well paid compared to their counterparts in other major food manufacturing states. The average food industry worker in Illinois receives \$13.37 an hour, compared to the \$11.99 average for the country as a whole. Illinois food workers receive the third highest pay of any state, after only Pennsylvania and Ohio.

Hourly Production Wages in Food Industry by State, 2000

Top 10 Mfg. States	Production Wages (In millions of \$)	Production Hours (In millions)	Hourly Wage (\$)	Comparison with US
Pennsylvania	\$1,537	106	\$14.50	121%
Ohio	1,150	84	13.69	114%
Illinois	1,751	131	13.37	111%
Wisconsin	1,340	101	13.27	111%
New York	865	68	12.72	106%
California	2,890	234	12.35	103%
Georgia	1,106	106	10.43	87%
Texas	1,498	146	10.26	86%
North Carolina	877	88	9.97	83%
Arkansas	849	86	9.87	82%
Group Average	1,386	115	12.05	101%
US	\$27,927	2,329	\$11.99	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Fortunately, because of their exceptionally high productivity, the relatively high wages of Illinois food workers do not hurt the industry. Labor costs represent only 6.0% of the value of food industry output in Illinois, compared to 6.4% for the country as a whole and 6.5% for the top ten food manufacturing states (see table below). The productivity advantage of Illinois food workers over the national average is greater than the wage gap between them. Illinois has the second lowest labor costs per output of any of the top ten states.

Labor Costs as a Percentage of Output in Food Industry by State, 2000

Top 10 Mfg. States	Production Wages (In millions of \$)	Value of Shipments (In millions of \$)	Labor Costs as % of Value of Shipments	Comparison With US
Texas	\$1,498	\$27,170	5.5%	86%
Illinois	1,751	29,078	6.0%	94%
Ohio	1,150	18,657	6.2%	96%
Wisconsin	1,340	21,551	6.2%	97%
New York	865	13,486	6.4%	100%
Georgia	1,106	16,168	6.8%	106%
California	2,890	42,193	6.8%	107%
Pennsylvania	1,537	21,407	7.2%	112%
North Carolina	877	12,137	7.2%	112%
Arkansas	849	10,286	8.3%	128%
Group Average	1,386	21,213	6.5%	102%
US	\$27,927	\$434,261	6.4%	100%

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Its high productivity makes the Illinois food industry highly competitive. This finding supports the Illinois Department of Employment Security's prediction that Illinois will increase its share of the U.S. food industry in the near future.

Investment in Relation to Industry Shipment

Illinois ranked fourth out of the top ten food manufacturing states in investments in new plant and equipment as a percent of shipments between 1997 and 2000. Illinois' 2.9% ratio of investments to shipments is above the national average of 2.7%, and it is slightly above the average of 2.8% for the top ten states.

**Investment as a Percent of Shipments in Food Manufacturing 1997 to 2000
Top 10 Food Manufacturing States**

	Investment as a % of Shipments	Rank
California	3.3%	1
Pennsylvania	3.2%	2
Ohio	3.0%	3
Illinois	2.9%	4
North Carolina	2.6%	5
Wisconsin	2.6%	6
Georgia	2.6%	7
New York	2.5%	8
Arkansas	2.4%	9
Texas	2.1%	10
Group Average	2.8%	
US	2.7%	

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

Overall, Illinois is highly competitive in the food industry. It has the highest productivity of any of the top ten states, it has a high level of output per hour, and capital investment continues to rank in the top four in the nation.

Conclusion

As a whole, Illinois manufacturing is highly competitive. As one would expect, it has its strong points, such as the high productivity of the food cluster, and its weak points, such as the low productivity of the electrical cluster. However, these strengths and weaknesses do not necessarily correlate with the industries that are thriving in the state. The printing industry is shrinking, both in absolute terms and as a share of national production, but it is highly competitive. The electrical cluster, on the other hand, was one of Illinois' healthiest industries in the period before the most recent recession in terms of its output and employment, despite its low productivity. Other factors, then, have to account for the challenges that Illinois manufacturing faces in maintaining its status as a leading manufacturing state.

Chapter 4: Challenges to Illinois Manufacturing

For more than 40 years, the traditional Midwestern and Northeastern manufacturing belt of the United States has been losing its share of the nation's industry to the South and the West. Although Illinois and other Midwestern and Northeastern states are still among the top 10 largest manufacturing states in terms of output and the number of people employed, their future dominant status is threatened because manufacturing in Southern and Western states is growing while it declines in the Midwest and Northeast. The table below shows that Great Lakes states' share of manufacturing Gross State Product (GSP) declined by almost 6% between 1977 and 2000, while Western and Southern states' share grew.

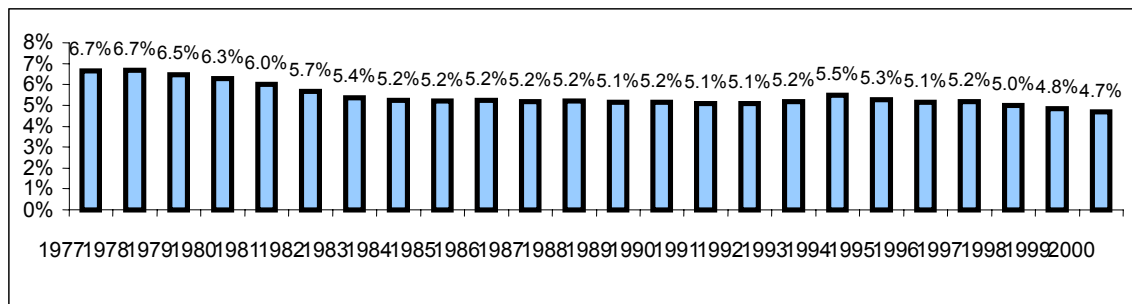
Share of Manufacturing Gross State Product by Region, 1977 and 2000

U.S. Region	1977	2000	% Change
Far West	11.9%	16.1%	4.3%
Southeast	19.2%	22.4%	3.2%
Southwest	6.6%	9.5%	2.9%
Rocky Mountain	1.6%	2.3%	0.8%
Plains	6.8%	7.1%	0.3%
New England	6.0%	5.5%	-0.5%
Mid Atlantic	19.7%	14.6%	-5.1%
Great Lakes	28.3%	22.4%	-5.9%

Source: Bureau of Census, U.S. Commerce Department.

In 1977, Illinois accounted for 6.7% of national manufacturing output (GSP), but by the year 2000, Illinois' share had declined to 4.7%.

Illinois' % of U.S. Manufacturing GSP, 1977 to 2000



Source: Bureau of Census, U.S. Commerce Department.

The table below shows that while Illinois' manufacturing output more than doubled between 1977 and 2000, the nation's growth in output more than tripled.

Illinois and U.S. Manufacturing Output, 1977 to 2000
(in millions of \$)

	Illinois	U.S.	Illinois % of U.S.
1977	\$30,805	\$462,751	6.7%
1978	34,650	517,534	6.7%
1979	36,942	571,038	6.5%
1980	36,844	587,481	6.3%
1981	39,100	652,217	6.0%
1982	36,903	650,748	5.7%
1983	37,117	693,310	5.4%
1984	40,976	782,519	5.2%
1985	41,805	804,377	5.2%
1986	43,460	829,494	5.2%
1987	46,161	888,592	5.2%
1988	51,039	979,902	5.2%
1989	52,314	1,017,673	5.1%
1990	53,673	1,040,589	5.2%
1991	53,185	1,043,541	5.1%
1992	55,086	1,081,998	5.1%
1993	58,448	1,131,403	5.2%
1994	67,169	1,223,210	5.5%
1995	68,067	1,289,069	5.3%
1996	67,728	1,316,049	5.1%
1997	71,263	1,379,609	5.2%
1998	71,595	1,431,499	5.0%
1999	72,352	1,496,784	4.8%
2000	73,413	1,566,579	4.7%

Source: Bureau of Census, U.S. Commerce Department.

While Illinois' manufacturing performs well in terms of productivity and labor costs as a share of shipments, one of its greatest weaknesses is that it has a low manufacturing profit margin. This is calculated by assessing the amount of property-type income, including pre-tax profits, depreciation and interest paid by manufacturers, as a percent of manufacturing's share of GSP. This figure indicates the share of manufacturing output that exceeds the costs of doing business. By this measure, Illinois ranked 42nd out of 50 states and the District of Columbia in the year 2000. For Illinois, property-type income amounted to only 27% of the manufacturing GSP, compared to a national average of 33%.

Profit Margin of Manufacturing by State, 2000

	Mfg. Output (millions of \$)	Property-Type Income (Millions of \$)	PTI as % of Mfg. GSP	Rank
US	\$1,566,579	\$522,687	33%	
New Mexico	8,862	6,811	77%	1
Wyoming	1,333	810	61%	2
Oregon	30,608	17,028	56%	3
Louisiana	20,145	10,535	52%	4
Idaho	8,468	4,330	51%	5
Arizona	24,382	11,633	48%	6
Alaska	1,073	510	48%	7
Oklahoma	14,824	6,961	47%	8
Hawaii	1,296	603	47%	9
Kentucky	31,633	14,360	45%	10
West Virginia	6,760	2,940	43%	11
Georgia	49,553	20,654	42%	12
Iowa	19,747	8,086	41%	13
North Dakota	1,580	635	40%	14
Nebraska	8,022	3,143	39%	15
Arkansas	15,065	5,883	39%	16
Texas	101,105	39,402	39%	17
Mississippi	13,307	5,124	39%	18
Indiana	58,906	22,487	38%	19
New Hampshire	9,777	3,633	37%	20
Missouri	32,849	12,198	37%	21
South Carolina	23,897	8,867	37%	22
Tennessee	36,055	13,165	37%	23
Montana	1,578	576	37%	24
North Carolina	67,502	24,458	36%	25
Alabama	22,959	8,215	36%	26
Pennsylvania	75,457	26,860	36%	27
South Dakota	3,015	1,056	35%	28
Ohio	89,399	30,632	34%	29
Utah	8,559	2,836	33%	30
Wisconsin	44,021	14,466	33%	31
Virginia	31,792	10,196	32%	32
Maine	5,561	1,774	32%	33
Maryland	14,955	4,626	31%	34
New Jersey	50,198	15,360	31%	35
Nevada	3,066	937	31%	36
Kansas	14,004	4,240	30%	37
New York	81,644	23,575	29%	38
California	189,962	53,141	28%	39
Florida	32,590	9,005	28%	40
Delaware	5,535	1,520	27%	41
Illinois	73,413	20,142	27%	42
Minnesota	32,459	8,381	26%	43
Vermont	3,179	787	25%	44
Colorado	16,257	3,938	24%	45
Rhode Island	4,450	1,077	24%	46
Michigan	85,465	18,078	21%	47
Washington	26,625	5,629	21%	48
Connecticut	24,897	5,044	20%	49
Massachusetts	37,956	6,528	17%	50
District of Columbia	833	(188)	-23%	51

Source: Bureau of Census, U.S. Commerce Department.

The profit margin of Illinois manufacturing was not only lower than the national average in the year 2000, it has been consistently lower for the last quarter of a century. Unfortunately, in recent years the gap has grown. In 1977, Illinois lagged by only 2%, but by 2000, this difference had increased to 6%.

Profit Margin in Manufacturing: Illinois and the U.S., 1977 to 2000
Property-Type Income as a Percent of Manufacturing Output

	U.S.	IL	Difference between IL and U.S.
1977	26%	24%	-2%
1978	26%	25%	-1%
1979	25%	24%	-1%
1980	22%	22%	-1%
1981	24%	23%	-1%
1982	23%	22%	-1%
1983	25%	24%	-1%
1984	27%	24%	-3%
1985	25%	25%	-1%
1986	25%	26%	1%
1987	28%	28%	0%
1988	30%	29%	-1%
1989	30%	29%	-2%
1990	30%	28%	-2%
1991	29%	27%	-2%
1992	29%	26%	-3%
1993	29%	26%	-3%
1994	31%	32%	1%
1995	33%	32%	-2%
1996	34%	30%	-4%
1997	35%	30%	-4%
1998	34%	29%	-5%
1999	34%	29%	-6%
2000	33%	27%	-6%

Source: Bureau of Census, U.S. Commerce Department.

The above table indicates that the gap between Illinois and the rest of the country increased dramatically in the second half of the 1990s. This was a period of high profits for manufacturing nationally, but Illinois manufacturing profits actually declined below their 1994-5 peak. Unfortunately, the figures are not available after 2000, so it is unclear how Illinois' performance compares during the most recent recession. The figures for the 1990s are troubling nonetheless.

There are many interrelated causes for Illinois' decline in manufacturing. Some of the causes are the result of national and international trends in manufacturing that have occurred that put Illinois and other Midwestern and Northeastern states at a disadvantage. Other causes are more specific to Illinois. Let us summarize the national trends responsible for the shift in manufacturing, and then the more local trends. We conclude this chapter with a brief summary of the foreign manufacturing competition that poses a challenge to all U.S. manufacturers.

National Trends Responsible for Manufacturing Relocation¹³

The shift in manufacturing from the Midwest and Northeast to the South has somewhat different causes than the shift to the West. The South has an increasing share of the traditional manufacturing that used to be located in states like Illinois. In contrast, the West has a large share of high-tech, high-wage manufacturing, particularly in the electronics and aerospace industries, and a large low-skill, low-wage sector in industries such as garment manufacturing. This bifurcation has allowed manufacturing in the West to grow at the expense of the Midwest and Northeast both by attracting industries that seek low wages and those that seek highly skilled workers. Thus, the industries that have moved out of the Midwestern and Northeastern states are more likely to have moved to the South, while newer industries are concentrated more heavily in the West.

Lack of Job Creation

Analysts agree that the location shift in manufacturing lies much more in a differential rate of job creation and output growth than job destruction. The South and the West—also known as the Sunbelt—have lost just as many jobs proportionately as the Midwest or Northeast, but they have created many more to replace them. Manufacturing companies have not closed plants in the Midwest or Northeast any more than they have anywhere else. The problem is that they have not chosen to locate their new production in these regions.

There is disagreement among analysts about who is building new manufacturing facilities in the South and West. Some authors argue that many companies are actually transferring production to their Southern and Western facilities and closing their Midwestern and Northeastern plants. Others argue that new companies are emerging in the South that can compete effectively with their Northern counterparts. It appears that both of these factors contribute to the overall shift of manufacturing. In general, new single-plant firms that cannot shift production are increasingly replacing multi-plant firms, but within multi-plant firms, production has shifted towards the South and West. Thus, both small new companies and older, larger companies are shifting production to the Sunbelt.

¹³ This section is based on the following works: Emilio Casetti, "Manufacturing Productivity and Snowbelt-Sunbelt Shifts," in *Economic Geography*, Volume 60, Issue 4, October 1984, 313-324; Robert Crandall, *Manufacturing on the Move*, Washington DC: The Brookings Institution, 1993; William G. Deming, "A Decade of Economic Change and Population Shifts in U.S. Regions," in *Monthly Labor Review*, November, 1996; R. Jason Faberman, "Job Flows and Labor Dynamics in the U.S. Rustbelt," in *Monthly Labor Review*, September, 2002; R. D. Norton, "Industrial Policy and American Renewal," in *Journal of Economic Literature*, Volume 24, Issue 1, March, 1986, 1-40; Richard Peet, "Relations of Production and the Relocation of United States Manufacturing Since 1960," in *Economic Geography*, Volume 59, Issue 2, April, 1983, 112-143; Paul W. Rhode, *The Evolution of California Manufacturing*, San Francisco: Public Policy Institute of California, 2001; David Rigby, "The Impact of Output and Productivity Changes on Manufacturing Employment," in *Growth and Change*, Volume 23, Issue 4, Fall, 1992, 405-427; Scott Schuh, Robert Triest, "The Evolution of Regional Manufacturing Employment: Gross Job Flows within and between Firms and Industries," in *New England Economic Review*, (2002, Third Quarter), 35-53; and John Ullmann, *The Anatomy of Industrial Decline: Productivity, Investment and Location in U.S. Manufacturing*, (New York: Quorum Books, 1988).

Industrial Mix

One cause of the manufacturing decline in the Midwest is the industrial composition of the region. Primary metals manufacturing, particularly steel, has been historically concentrated in the Midwest and Northeast. Of the 150.8 million tons of steel produced in 1973, 122.4 million tons, or 81%, were produced in these two regions. Between 1973 and 1990, Midwestern steel production declined by more than 20%. In the Chicago area alone, Republic Steel, U.S. Steel and Wisconsin Steel all closed plants after 1976. While a great deal of steel production remains concentrated in the Midwest, this industry as a whole is in decline.

While the Midwest's primary manufacturing industry, steel, has declined, many of the high growth industries of the last 40 years have centered in the South and West. Electronic products manufacturing, for example, has expanded and is concentrated in the area around Silicon Valley. A great deal of the chemical industry is concentrated in the South, and some parts of this industry in particular have experienced growth, such as pharmaceuticals. Aircraft manufacturing is also concentrated in the West, though this industry has experienced both ups and downs in output over the period under study.

The industrial mix of the different regions, though, can only explain part of the shift in manufacturing. Different analysts offer different figures about what share of Midwestern and Northeastern manufacturing loss can be attributed to an unfavorable mix of industries, but they all agree that it does not account for the entire loss. In fact, even within industries that have been historically concentrated in these regions, much of the new production has shifted to the South and West.

Unionization and Wages

Although wage rates are lower on average in some manufacturing industries in the South as compared to Midwestern and Northeastern states, wage rates are not the dominant factor in the shift to the Sunbelt. In the steel industry, wages are comparable between Southern minimills and Northern integrated firms. One difference is that almost all of the old integrated companies have unions, while many of the minimills do not. Right-to-work laws and production sites located far from the strongholds of the old unions in the Midwest and Northeast make it much easier for producers in the South to avoid unions.

The avoidance of unions appears to be a major general cause of the manufacturing shift to the South. Robert Crandall (1993), an economist with the Brookings Institution, studied a wide range of factors that might contribute to regional manufacturing employment and output growth, including local taxes, infrastructure, energy costs, education, wages and unionization. He found that the only two factors that correlated strongly with manufacturing growth were low wages and low rates of unionization. All of the other factors were statistically insignificant. In addition, low unionization was a much stronger predictor of manufacturing growth than low wages. It appears, then, that companies avoid unions more than they avoid high wages when determining where to locate new production.

The negative impact of unionization rates on job creation, however, must be tempered with Crandall's findings that unions also tend to decrease rates of job destruction. The auto industry, for example, is still overwhelmingly concentrated in the Midwest, and a large part of the reason appears to be the role of the union. In fact, while the auto industry has moved slightly Southward over the last few decades, the West has experienced the greatest regional decline in auto production.

Population Growth

One factor encouraging production to move to the South is the general population shift to the Sunbelt. Industries that serve construction or that rely on local markets, such as many food industries, are likely to expand in areas of rapid population growth. For example, because California has experienced a rapid growth in population, food and construction-related manufacturing have also increased over the last half century. Ultimately, much of this aspect of the population shift is due to the attractiveness of the Sunbelt's warmer climate. While the creation of new jobs in the Sunbelt encourages population movement, that same population movement encourages the creation of new jobs. In addition, population expansion encourages construction. Another reason to move where there is population growth is that for industries with low value per weight, like steel, as well as stone, clay and glass products, there is a high incentive to locate near markets.

Momentum

An additional problem for Illinois and the rest of the Midwest and Northeast is that because new facilities have been located in the South and West for many decades now, as older plants close, the Midwestern and Northeastern states continue to lose their share of manufacturing. In the short term, new enterprises are more likely to fail than older established ones. This is one reason why the South and the West have similar or even higher rates of job destruction than the Midwest. In the long run, however, production has shifted towards the newer facilities across the manufacturing sector, and those regions with younger establishments fare better.

Some analysts, such as Emilio Casetti, also argue that productivity growth is greater in economic sectors and regions that are expanding. If productivity growth is higher in the South and West, this adds additional momentum to the shift in manufacturing production to these regions. Since new facilities with higher productivity are concentrated in the Sunbelt, multi-plant firms are likely to shift production to those facilities and away from their older and less productive plants, and single-plant firms in the Sunbelt with higher productivity growth are likely to beat out their older competitors in the Midwest and Northeast.

This trend, however, varies widely within the Midwest and Northeast. According to R. Jason Faberman of the Bureau of Labor Statistics, certain metropolitan areas within these regions had high employment and wage growth throughout the 1990s, while others suffered. As in the South, those metropolitan areas with newer enterprises, higher job creation and higher job destruction fared better than those metropolitan areas with older

enterprises, even if those areas had less job destruction. Unfortunately, his study only included Michigan, Ohio and Pennsylvania, but we can assume that the same basic trends apply in Illinois.

In order to *build* Illinois' manufacturing sector, then, the primary problem is to attract new production rather than to retain that which exists. However, retention is important in order to *sustain* the sector that exists now.

There are other more local factors for Illinois' decline in manufacturing, some of which might be influenced by policy makers. We now focus our attention on the challenges of Illinois manufacturing that are rooted here in Illinois.

State Factors Relating to Manufacturing Relocation

Electricity Costs

Electricity consumption constitutes a major production cost for manufacturers. Because manufacturers often use very large amounts of electricity, small price differences can have a very big effect on costs. For example, one reason that new steel manufacturing production has mostly shifted to the South and West is that the use of electric furnaces and scrap allows manufacturers to locate far from the iron and coal mines that initially attracted the industry to the Midwest, Pennsylvania and upstate New York. This technological development encouraged the movement to the South and the Pacific Northwest where electricity is cheaper than average.

The following table shows the difference in electricity costs and electricity use between Illinois and U.S. manufacturers as a whole.

Electricity Costs in Illinois and U.S., 2000

	Cost per kWh	kWh Used per Dollar of Shipments	Electricity Cost per Dollar of Shipments
Illinois	\$0.053	0.17	\$0.0091
U.S.	\$0.047	0.21	\$0.0097
Ratio IL to U.S.	112%	84%	94%

Source: U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufacturers, Geographic Area Statistics, 2000*.

Illinois' cost per kilowatt hour (kWh) in the year 2000 was 12% higher than the national average. This encourages industries that require large amounts of electricity to locate elsewhere. Illinois manufacturers use only .17 kilowatt hours per dollar of manufacturing shipments, compared to .21 for the nation as a whole. This means that Illinois manufacturers use 16% less electricity per unit of output than the national average. Because of that, electricity costs represent a smaller share of Illinois manufacturing output than in other states. However, this may be due to the fact that Illinois is not competitive in attracting manufacturers that require large amounts of electricity.

The table below compares Illinois' manufacturing electricity costs to the four other Great Lakes states. Illinois and Michigan tie for the highest manufacturing electricity costs per kWh.

Illinois Electricity Costs for Manufacturers Compared to Other Great Lakes States, 2000

	Cost per kWh	kWh Used per Dollar of Shipments	Cost of Power per Dollar of Shipments
Illinois	0.053	0.17	0.0091
Michigan	0.053	0.15	0.0078
Ohio	0.043	0.25	0.0110
Wisconsin	0.043	0.19	0.0080
Indiana	0.042	0.23	0.0097

Source: U.S. Bureau of Census *Annual Survey of Manufacturers, Geographic Area by Industry, 2000*.

The above table also shows that those states with lower electricity costs are more likely to attract industries that require high electricity inputs. In Ohio, for instance, where electricity is almost 20% cheaper than it is in Illinois, .25 kilowatt hours are used per dollar of shipments, whereas in Illinois only .17 kilowatts are used. This is because electricity-consuming industries are more likely to locate in Ohio than in Illinois or Michigan. Even though Illinois has the fourth lowest amount of kilowatts used per dollar of shipments, it has the second highest cost of electricity per dollar of shipments (last column in the above table).

Illinois is not competitive in electricity costs compared to other states. This cuts into the profit margin for Illinois manufacturers, and makes it difficult for the state to attract manufacturers that require large amounts of power.

Capital Investment

On average, Illinois manufacturers do not invest as much money in maintaining and upgrading their plants as do manufacturers in other states. As the following table shows, Illinois manufacturers have been investing less per worker than have U.S. manufacturers as a whole. This is both a cause and effect of Illinois' manufacturing decline. Over time, this low rate of investment causes problems, as the plant and equipment that exist age and become obsolete. Also, higher investment tends to lead to higher productivity. Thus, when cutbacks come, Illinois plants are more likely to be closed than those in states with higher rates of investment and thus newer and more productive facilities.

New Capital Investment: Illinois and U.S.

	U.S. Investment per Employee	IL Investment per Employee	Ratio of Illinois to U.S.
2000	\$7,815	\$8,165	104%
1999	9,009	8,243	91%
1998	9,012	8,995	100%
1997	9,016	8,315	92%
1996	8,453	7,150	85%
1995	7,711	6,385	83%
1994	6,956	6,350	91%
1993	6,411	5,791	90%
1992	6,528	5,472	84%

Source: U.S. Bureau of the Census, *Annual Survey of Manufacturers, Geographical Statistics*, 2000 and 1996, and *Census of Manufacturers 1997*.

Taxes

Taxes are a cost of manufacturing over which Illinois policy makers have control. Businesses face two types of taxes: direct taxes, such as income tax on corporate profits, and indirect taxes, including excise, sales and other user and license fees. Illinois manufacturers face a tax burden of both types that is comparable to the taxes levied in many other states.

Illinois ranked seventh out of the top ten manufacturing states when the ratio of indirect business taxes to Gross State Product is ranked from lowest to highest. Compared to all other U.S. states, including the District of Columbia, Illinois ranked 26th on this measure.

Indirect Business Taxes Paid by Manufacturers in Top 10 Mfg. States, 2001 (Millions of Dollars)

	Gross State Product (GSP)	Indirect Business Taxes (IBT)	IBT % of GSP
US	1,566,579	64,528	4.1%
Pennsylvania	75,457	1,874	2.5%
Wisconsin	44,021	1,098	2.5%
California	189,962	5,024	2.6%
Michigan	85,465	2,275	2.7%
Ohio	89,399	2,438	2.7%
Indiana	58,906	1,686	2.9%
Illinois	73,413	2,215	3.0%
Texas	101,105	3,849	3.8%
New York	81,644	4,967	6.1%
North Carolina	67,502	8,800	13.0%

Source: Bureau of Census, U.S. Department of Commerce.

Illinois' indirect business taxes were slightly higher than the average in the Great Lakes and the West, slightly lower than the average in the Southwest, and considerably lower than the average for the Southeast.

Indirect Business Taxes Paid by Region, 2001

	Gross State Product (GSP)	Indirect Business Taxes (IBT)	IBT % of GSP
Great Lakes	351,203	9,711	2.80%
West	252,629	6,971	2.80%
Illinois	73,413	2,215	3.00%
Southwest	149,173	4,647	3.10%
Plains	111,677	3,702	3.30%
Rocky Mountains	36,195	1,421	3.90%
Mid Atlantic	228,623	9,504	4.20%
New England	85,821	4,101	4.80%
Southeast	351,257	24,472	7.00%

Source: Bureau of Census, U.S. Department of Commerce.

The following table shows the top corporate profit tax rate in the various 44 states that had this tax in 2001. Illinois' direct corporate tax rate of 7.3% is 0.3% lower than the 7.6% average of the 44 states that have this tax. This rate ranks Illinois in the middle of its competitors. (Some firms with a small number of owners are organized as subchapter S corporations or partnerships. The tax rate in Illinois on profits for these entities is 4.5%, which consists of 1.5% at the level of the firm plus an additional 3% at the level of the owners.) Some major manufacturing states, such as Ohio and California, have higher corporate profits taxes, while others, particularly in the South, have lower corporate profits taxes. A number of the states with low direct taxes, however, have high indirect business taxes, as seen in the table above. Virginia, for instance, has a relatively low direct tax rate, but a high level of indirect taxes.

Top Corporate Profits Tax Rate, 2003

States with Corporate Profit Taxes (44 states)	Corp. Profit Tax Rate
Average 44 states	7.6
Kansas	4.0
Colorado	4.6
South Carolina	5.0
Mississippi	5.0
Utah	5.0
Florida	5.5
Oklahoma	6.0
Georgia	6.0
Virginia	6.0
Missouri	6.3
Hawaii	6.4
Arkansas	6.5
Tennessee	6.5
Alabama	6.5
Oregon	6.6
Montana	6.8
North Carolina	6.9
Maryland	7.0
Arizona	7.0
Illinois	7.3
New York	7.5
Connecticut	7.5
Idaho	7.6
New Mexico	7.6
Nebraska	7.8
Wisconsin	7.9
Louisiana	8.0
Kentucky	8.3
Ohio	8.5
Indiana	8.5
New Hampshire	8.5
Delaware	8.7
California	8.8
Maine	8.9
Rhode Island	9.0
New Jersey	9.0
West Virginia	9.0
Alaska	9.4
Massachusetts	9.5
Minnesota	9.8
Vermont	9.8
Pennsylvania	10.0
North Dakota	10.5
Iowa	12.0

Source: Federation of Tax Administrators: Range of State Corporate Income Tax Rates. Michigan has a Single Business Tax which includes profits. Texas has a Franchise Tax which includes profits. No tax: Nevada, Washington, South Dakota and Wyoming.

Overall, Illinois' level of corporate taxes is not low enough to offer a competitive advantage for manufacturing companies, but neither is it unusually high.

Succession in Ownership

There is a major problem convincing the younger generation to stay in family owned manufacturing businesses. It is also challenging to recruit the best, the brightest, and the most entrepreneurial into manufacturing. This is particularly true among small firms. There is lots of attention in the Mergers and Acquisitions sector for larger companies. However, 90% of manufacturing companies have less than 100 employees and represent the life-blood of the manufacturing economy. Despite the importance of this sector, it is frequently off the radar screen of major investors and the public. And this is particularly acute in larger urban areas where the standard challenge of the generations is impacted by changing demographics. In Chicago, a study was completed in 1989 of 800 companies with less than 100 employees. Of those companies with a principal 55 years or older, 40% were at risk of closing only because of problems in ownership succession.¹⁴ Young men did not want to go back into the inner city to work at the business where the family had created its wealth, or if they went to business school, the attraction was to understand investment and finance, not making a manufactured product. This type of study was repeated in New York City with the same findings.

Availability of Skilled Workers

Illinois has a shortage of skilled workers able to fill the approximately 25,000 new manufacturing jobs that open every year in manufacturing. Out of these 25,000 workers, 6,400 are needed to fill jobs in growing manufacturing occupations, and another 18,000 are needed to replace workers who change industries or leave the workforce.¹⁵ These numbers do not include workers who change jobs within manufacturing, a vastly larger number than new and replacement workers. See Appendix C for a detailed breakdown of these estimates.

Workers need progressively more advanced skills to fulfill the requirements of manufacturing jobs. The industry is becoming increasingly high-tech with more frequent use of fully computerized packaging lines, inventory management and delivery systems. Companies' growing demands for efficiency require workers to quickly share information with other team members, read directions, and program equipment, all of which require good communication and technical skills.

This is not just an Illinois problem:

In 2001, NAM [the National Association of Manufacturers] conducted a study of workforce issues in the manufacturing sector. The survey found that more than 80 percent of manufacturers reported a 'moderate to serious' shortage of qualified job applicants—even as manufacturers were reducing workforces. The study notes that 'what manufacturing is facing is not a lack of employees, but a shortfall of highly qualified employees with specific educational backgrounds and skills.' This problem is felt especially among small firms where, at times, it has impacted

¹⁴ *Intervening with Aging Owners to Save Industrial Jobs: A Report to the Economic Development Commission Foundation of Chicago*, Center for Labor and Community Research, August 1989.

¹⁵ Illinois Department of Employment Security, *Industry Projections 2000 to 2010*, for 2000.

a company's ability to accept work.¹⁶

Many jobs in manufacturing require workers to have a high school degree, and some require a college degree. Illinois is competitive with the other top manufacturing states regarding the percentage of its population with high school and college degrees. Illinois ranks 5th out of the top 10 manufacturing states in terms of the percentage of people in the state aged 25 and older to have received a high school diploma. All of the states with a higher rate of high school graduates than Illinois—Ohio, Wisconsin, Michigan and Pennsylvania—are also located in the Midwest and Northeast.

Percentage of Population Aged 25 and Over with a High School Degree: Top 10 Manufacturing States

Top 10 Mfg. States	% with High School Diploma
Ohio	87.0%
Wisconsin	86.7%
Michigan	86.2%
Pennsylvania	85.7%
Illinois	85.5%
Indiana	84.6%
New York	82.5%
California	81.2%
Texas	79.2%
North Carolina	79.2%

Source: U.S. Department of Labor, Bureau of Labor Statistics, *Employment by States and Areas*.

Illinois ranks 3rd out of the top 10 manufacturing states in terms of the percentage of people in the state aged 25 and older to have received a college degree.

Percentage of Population Aged 25 and Over with a College Degree: Top 10 Manufacturing States

Top 10 Mfg. States	% College Graduate
New York	28.7%
California	27.5%
Illinois	27.1%
Ohio	24.6%
Pennsylvania	24.3%
Texas	23.9%
Wisconsin	23.8%
North Carolina	23.2%
Michigan	23.0%
Indiana	17.1%

Source: U.S. Department of Labor, Bureau of Labor Statistics, *Employment by States and Areas*.

¹⁶ Popkin, 2003, *op. cit.* p.40.

Even though Illinois' population over the age of 25 is competitive with other states in educational attainment, recent studies show that Cook County manufacturers, like manufacturers across the U.S., have great difficulty finding workers with the education and skills needed for manufacturing jobs.¹⁷ This may be because most high school classes and college degrees do not necessarily prepare people for jobs in manufacturing. Another problem may be that many people with high school or college degrees do not pursue careers in manufacturing because they are not aware of the opportunities for high wages and advancement in this field.

In order to compete, Illinois must be able to provide educational services to upgrade the skills of workers to be able to meet the needs of increasingly skilled manufacturing jobs. This is an area over which state and local governments have considerable influence. In addition to upgrading the skills of workers, efforts are needed to increase awareness about the critical value of manufacturing to our state economy and the high-paying jobs and careers that the manufacturing sector holds for young people. In the next chapter, we address these issues and recommend other policy initiatives that hold promise for keeping Illinois' manufacturing a vibrant foundation of our economy.

Foreign Competition

One final difficulty facing not only Illinois manufacturers but all U.S. manufacturers is growing foreign competition. Although a full discussion of this complex matter is outside the scope of this report, a brief overview of the main issues is in order. A recent report published by the National Association of Manufacturers (NAM) pointed out that after two decades of relative stability, the U.S. share of world manufactured exports declined from 13.5% of the world total in 2001 to about 11% in 2002.¹⁸ This reflects a worsening of the U.S. position relative to other nations producing manufactured exports. This situation is not only the result of competition from foreign-owned manufacturers. It also results from U.S. manufacturers' foreign purchases, as the NAM explains:

Part of the growth in the merchandise trade deficit can be attributed to the growing purchases by U.S. "Original Equipment Manufacturers" (OEMs) of foreign-produced parts and components for their products. A measure of this hollowing out of the supply chain can be found in the statistics on 'related party trade'—that is, imports to the United States from U.S.-owned foreign factories or from foreign companies to their U.S. affiliates. In 2001, the Department of Commerce estimated that \$526 billion, or 47 percent of all U.S. merchandise imports fell under this category of trade.¹⁹

Foreign competition increases the pressure for Illinois manufacturers—like other U.S. companies—to lower their prices. This pressure comes first from their immediate customers, whether retailers such as Wal-Mart or original equipment manufacturers

¹⁷ Dan Swinney, David Pflieger and James Jacobs, eds., *Creating a Manufacturing Career Path System in Cook County*, Chicago: Center for Labor and Community Research, 2001.

¹⁸ Joel Popkin, *Securing America's Future: The Case for a Strong Manufacturing Base*, Washington DC: NAM Council of Manufacturing Associations, 2003.

¹⁹ *Ibid.*, p. 32

(OEMs), but ultimately it comes from consumers that choose to buy on the basis of price. Local manufacturers must price low enough to compete with foreign-owned companies, which operate with dramatically lower labor costs, and which often use more sophisticated technology and a more highly skilled workforce.

Some American companies have been hurt by foreign sourcing, while some have been architects and beneficiaries of this increasing trend. Just as U.S. firms own offshore subsidiaries, many U.S. manufacturing facilities are owned by foreign firms. Whether foreign sourcing is good or bad for a firm depends on that firm's situation. Illinois companies can benefit from foreign direct investment by smart global procurement and by responding to offshore competition by innovating and adding value to their production processes. Higher productivity, innovation and value can result in better pay and jobs for workers, and can make local firms competitive on a global scale.²⁰

On the other hand, companies are often pressured by the investment community to pursue the "Low Road"—an emphasis on short-term stock price at the expense of long-term shareholder value. This can include shifting production offshore to find very low-cost labor and less regulation. This strategy is harmful to the state and its workers. Firms that engage in this "race to the bottom" find long-term survival elusive, as there will always be somebody who can make a cheaper product. We will talk more about the differences between High Road and Low Road strategies in Chapter Five.

²⁰ For a sampling of High Road strategies see the *Wall Street Journal's* series on "Battling Imports:" Carlos Tejada, "The Allure of Bundling," October 7, 2003, p. B1; Clare Ansberry and Timothy Aepfel, "Surviving the Onslaught," and Timothy Aepfel, "Three Countries, One Dishwasher," both October 6, 2003, p.B1; and William M. Bulkeley, "Plexus Strategy: Smaller Runs of More Things," October 8, 2003, p.B1.

Chapter 5: Recommendations

Although Illinois' manufacturing sector is one of the top in the nation in terms of the number of people it employs, its output, and its productivity, its position is declining relative to states in the Southern and Western regions of the U.S. Illinois manufacturing, like the rest of the U.S., also faces increasing global competition from both low-wage countries, as well as countries in the developed world such as Japan, Germany, and other European countries that compete on the basis of superior use of technology and a more highly skilled workforce. This slow decline has meant the loss of thousands of jobs for Illinois residents as plants close or move production to other states. Moreover, the loss of these jobs ripples throughout the economy and results in job losses in other sectors, decreases in disposable income that would have been spent in retail sectors, decreases in needed tax revenues and increases in social spending such as unemployment and welfare. Illinois manufacturing companies often close or move because of the failure to resolve solvable problems before they become crises.

There are certainly some positive developments in Illinois manufacturing such as the growth of its productivity, but as warned in a recent report issued by the NAM, even though strong productivity growth has been maintained during the recession, this has been due to job cutbacks in manufacturing and other industries, which is not the most beneficial way for an economy to generate productivity growth. Robert J. Samuelson, in an op-ed piece, stated:

Over the long run, better productivity signifies higher living standards through new products, technologies and management methods. But at any one time, productivity depends on prevailing economic conditions—which may not be favorable. The present productivity surge reflects bad news more than good: layoffs, bankruptcies and cutbacks. The ruthless elimination of the least efficient plants and companies may improve productivity. But it doesn't necessarily signal a robust recovery.²¹

According to the NAM, Samuelson's analysis suggests that the recent gains in productivity may be masking long-term damage to the process through which economic gains are made, and adds, "Once the manufacturing 'heart' shrinks to the point that it can no longer support the complex inter-linked process of innovation and investment, the method by which productivity gains are translated into long-term gains in prosperity is lost."²²

This difficult environment constitutes a fork in the road for manufacturing companies and the public sectors.

²¹ *Washington Post*, March 19, 2003.

²² Popkin, 2003, *op. cit.*

Make Illinois the Destination State for High-Road Manufacturing

Traditional approaches are no longer sufficient, and failure to act can have disastrous consequences. The fork in the road is a choice between the “High Road” and the “Low Road.”

The High Road seeks a strong return on investment by:

- Being smarter and investing in innovation in the more competitive environment;
- Making a commitment to the continual enhancement of employees’ skills;
- Being more efficient and cutting waste;
- Having a long-term vision and commitment;
- Providing strong material incentives for high performance, as well as providing decent wages, benefits, and security;
- Promoting useful partnerships with stakeholders both within the firm, in the sector, and in the community; and
- Being transparent, straightforward and fair.

Some would see this as the way manufacturing was generally done in the past; it is not a particularly new concept.

In contrast, the Low Road seeks a strong return on investment by:

- Emphasizing short-term gains, even if they mean postponing or sacrificing improvements in the productive capacity of the company or sector;
- Keeping wages and benefits at the lowest possible levels;
- Managing by intimidation, undermining employee initiative, and discouraging the exercise of employee rights; and
- Ignoring the needs and concerns of those beyond the most short-sighted and powerful shareholders, investors, and/or managers.

The pursuit of the Low Road by some companies is made possible by new opportunities created by the global economy and new technology. Manufacturers can take the Low Road by responding to the challenge of domestic and global competition by slashing costs, reducing investment and lowering wages, or moving production to the state or country with the lowest wages at the moment. This is a risky strategy because there is always a competitor with even lower costs lurking down the road willing to engage in a

destructive “race to the bottom.” Jobs that were moved a few years ago from the U.S. to Mexico, for example, are now moving to China.

The other option for companies is to adopt a High Road strategy of high productivity based on a skilled workforce, adequate capital investment and innovation. Companies can expand their partnerships with those that do the work—encouraging participation in solving the problems of production through greater creativity and innovation. They can reward high performance with high pay. They can create networks of companies in the same cluster that can work locally together to better compete globally. They can build a web of loyalty and support from their suppliers, customers and the community with integrity, fairness, and an absolute commitment to good stewardship of the assets they control. For example, as noted in Chapter 3, the local food industry enjoys labor productivity that is 23% above the national average while workers in the industry earn 11% more than the national average. This combination, supported by above-average capital investment, leads to labor costs as a percentage of shipments 6% *below* the national average.

At the very heart of a High Road strategy is a commitment to innovation, such as developing new niches and markets, adding value to existing products, investing in research and development, expanding market share, and improving the efficiency of the productive process and the productivity of employees. Some Illinois companies have been quite successful at retaining and growing their Illinois operations using these strategies. For example, American Licorice, a confectionery manufacturing company in Cook County, increased efficiency by 30% through an employee education and training program. The increased performance reversed the company’s decision to move to Mexico, and it invested in a new training facility to maintain these gains.

Recommendation 1: Illinois manufacturing companies should embrace High Road business strategies and partnerships as the foundation for establishing their competitive advantage in our global economy.

Forge Partnerships with Government and Elected Leaders for High Road Manufacturing

One High Road strategy that has multiple benefits to companies as well as to the broader society is technological innovation, as Joel Popkin from the NAM explains:

Manufacturing’s innovation process is the key to past, present and future prosperity and higher living standards. The intricate process starts with an idea for a new product or process, prompting investments in research and development. R&D successes lead to investments in capital equipment and workers, and to ‘spillovers’ that benefit manufacturing and other economic sectors. This process not only generates new products and processes, but also leads to well-paying jobs, increased productivity, and competitive pricing. Yet while this process produces wealth and higher living standards, most of it is

hidden from view and poorly understood.²³

Although High Road strategies, such as innovation, benefit companies seeking long-term viability, pursuing them can be difficult, if not impossible, for a company acting alone. To succeed, a strategy that benefits the broader community requires the involvement of all the major stakeholders, including labor and community organizations, as well as government. They no longer have the luxury of concerning themselves only with the redistribution of wealth. They must also be concerned with its creation, and with creating the conditions in which a High Road business community can flourish.

Too often, in the last 25 years, government leaders have become passive as they observed the decline of manufacturing—convinced that there was little they could do but “get out of the way” of the private sector and the all-powerful trends that were sending manufacturing to low-wage countries. They accepted or even pursued the agenda of “less government” rather than seeing their responsibility to transform government and the services it can provide for the economy—particularly the manufacturing economy. This is the Low Road for government in today’s world.

However, the need for governmental support is more critical now than ever before, as U.S. manufacturing threatens to decline below the critical mass needed to maintain its long-term viability. Popkin warns:

...serious challenges threaten to undermine the critical mass of manufacturing necessary to maintain a dynamic innovation process. If the U.S. manufacturing base continues to shrink at its present rate and the critical mass is lost, the manufacturing innovation process will shift to other global centers. Once that happens, a decline in U.S. living standards in the future is virtually assured.²⁶

The High Road for government explores every possible way to encourage and assist the manufacturing economy to successfully compete in the global economy. This makes business sense for the companies and business sense for government. When faced with scarce public dollars and limited resources, it makes more sense than ever before to invest those dollars and resources into companies and practices that provide a city or a state with the greatest return on investment. This is the same criteria pursued by any entrepreneur. High Road strategies build the competitive advantage of companies over the mid- and long term in ways that maximize the positive impact on the local and regional economy.

Illinois needs a contemporary and comprehensive High Road strategy to become the destination point for advanced manufacturing in the United States and the world. This strategy must be led by a strong and formal partnership of businesses, business associations, labor, community-based organizations, educators, key intermediaries and

²³ Popkin, 2003, *op. cit.* p. 1

²⁴ *Manufacturing Matters: The Myth of the Post-Industrial Economy*, Stephen Cohen and John Zysman, Basic Books, Inc. Publishers, New York, 1987, p. 102; quoted in the NAM paper, p. 7.

²⁵ Popkin, 2003, *op. cit.* p. 3.

²⁶ Popkin, 2003, *op. cit.* p. 3.

others committed to a High Road vision of a powerful manufacturing sector in Illinois.

Recommendation 2: Illinois state government must create a strong partnership with Illinois manufacturing companies implementing High Road business practices. These partners should work together to do the following:

- ***Champion local manufacturing:*** Governor Blagojevich and other elected public officials should be the informed and effective champions of this strategy, using the strength of their offices to:
 - Insist on effective implementation by key state and municipal departments; and
 - Learn from international experience in order to become the most competitive international state in manufacturing.
- ***Attract and retain manufacturing companies:*** Key government departments must give the highest priority in retaining, promoting, and attracting advanced manufacturing companies—expanding the current initiatives by the Illinois Manufacturers’ Association, the Department of Commerce and Economic Opportunity, World Business Chicago, the Chicagoland Chamber of Commerce, the Civic Committee of the Commercial Club, and others. We must keep manufacturing land zoned for manufacturing. We need to expand the existing manufacturing districts, protecting them from encroachment by residential or commercial interests through effective zoning.
- ***Promote company innovation:*** The state public sector must find ways to assist and promote innovation in companies to create value-added products that can justify higher prices and higher wages through greater investments in research and development. The production of high value-added products at the cutting edge of an industry’s technology requires research and development investment and continuous innovation. Local government can foster and strengthen existing cluster-wide cooperative research and innovation through the creation of innovation and service centers. These centers can improve linkages with universities and area colleges with networks of smaller companies in their competition in the global market place.
- ***Recognize the value of Clusters:*** As was explained in Chapter 2, manufacturers tend to cluster in places where they have efficient access to specialized inputs, services, employees, information, institutions, and distribution channels they need. It is far easier to retain or attract a firm that is or will be part of an existing cluster. The important food, machinery-metals-electrical-automotive, and printing clusters in Illinois can be supported by:
 - Innovation Centers: Such a strategy has helped the Emilia Romagna region of Italy to go from being one of the most backward regions in

Europe to being one of the ten most prosperous of the 122 European regions. Per capita income is now 30% higher than the European average, and the unemployment rate is only 3.5%. For example, at a center for innovation for the food industry in Cesena, Italy, the staff of Centuria-Rit provide monthly reports to their participating companies on the patents that were approved for their competitors internationally as a way to stimulate improvements at local firms. Their approach is to find ways to produce higher value-added products by their local companies so they can *justify* higher prices, pay higher wages, and generate higher profit margins. This is key to High Road strategy based on innovation. Illinois can foster innovation centers, in partnership with firms, cluster service aggregators, universities, community colleges, community groups, labor and other stakeholders. Policy makers can also support this endeavor by providing political support when cluster stakeholders have a solid case for a change in federal or state policy.

- ***Target subsidies to reward High Road business practices.*** The state should:
 - Minimize location subsidies to firms except where clearly required by competitive situations;
 - Work with municipal and state officials in other jurisdictions to end bidding wars;
 - Establish claw-back provisions in subsidies to encourage returns in public investment if reasonable objectives are not met; and
 - Consider subsidizing the excess costs resulting from manufacturing development with an ancillary social purpose, such as the costs of cleaning a brown field site to make it equivalent to a greenfield site.
- ***Slash Bureaucratic Procedures:*** The state must provide easily accessible, cooperative, and speedy permitting and approvals, consistent with the public interest, and eliminate requirements that serve only bureaucratic purposes.

This is truly a moment of truth for the state. There is a broad and growing consensus among key business organizations and companies, labor, the intellectual and policy community, educators, and community leaders that a sustainable future for Illinois requires a comprehensive strategy to attract advanced manufacturing companies, as we retain and develop those we still have. This is a High Road vision that sees companies producing higher value-added products in order to better compete globally by capitalizing on the strengths of our system—not its weaknesses—to pay higher wages, create more jobs, and to sustain higher profit margins. This is a vision that requires a close and effective partnership between business, government, labor, and community.

Build an Illinois Early Warning Business Development System

As was discussed in Chapter 4, Illinois companies are faced with a variety of challenges that can result in a company failure or a plant closing, if their problems are not addressed in a timely way. Despite public perception to the contrary, 90% of all manufacturing companies in Illinois are not big, complex, fully integrated firms, but small companies with less than 100 workers. In their aggregate they are the bedrock of the manufacturing economy. They typically have local markets, adequate technology, and a skilled work force. They are frequently linked to larger companies, providing services and materials for production. For these reasons, the health of these small companies is a major variable in the success or failure of the larger companies and the community.

- Some companies, particularly those that are small, close because of the inability to solve a succession in ownership problem;
- Some companies face problems that can be solved with management and targeted financial assistance;
- Some companies need land and resources for expansion; and
- Others need assistance in worker training.

If these kinds of problems are identified in a timely way, solutions can be found including helpful technical and financial assistance, an acquisition by managers and employees of a company with owner succession difficulties, assistance in finding an expansion site in the local community, or assistance in securing training and education programs for employees.

Creating an Early Warning Business Development System is one way to address these aspects of retaining our industrial base. Such systems have been created in Chicago, in New York City, and in Pennsylvania and have been critical in regional retention initiatives. The Early Warning approach is not new. Gathering timely and accurate information, particularly of undervalued assets and business opportunities, is the life-blood of any investment or acquisition company, and this approach can be applied to retain companies in Illinois as well.

Recommendation 3: State government should initiate the building of a state-wide Early Warning Business Development System.

There are several key and interrelated parts of building an Early Warning Business Development System including:

- Building a coalition of the key stakeholders including business associations, local and state government, local development corporations, unions and labor organizations, business service providers, community-based organizations and

local churches, utility companies, and any others that might have useful information regarding local companies;

- Creating a small but specialized staff with adequate resources to recruit and train the system participants, and operationalize the system;
- Establishing a Development Fund that can provide funding for company assessments, business plans, and employee acquisition efforts;
- Gathering information about area companies;
- Identifying problems as well as opportunities, and a plan of action for assistance to the company; and
- Using the experience, information, and action as a springboard for further development of the community and regional economy.

Such a system can be supported by public and private financial sources, and can be a powerful and informed complement to the initiatives of individual companies and business associations.

Reform and Strengthen the Illinois Workforce Development System

Illinois lacks an effective system for recruiting, training, and educating workers for modern manufacturing. As a result, the foundation upon which our healthy economy has been built is at risk. While manufacturers say they cannot find workers with the skills they need to fill these jobs, including entry level workers, there are thousands of Illinois residents out of work and hundreds of government funded programs operating in the state that purport to prepare enrollees to work in manufacturing. Clearly, the present efforts at manufacturing workforce development have failed to meet the needs of employers or workers. The present morass is not intentional; most of the people involved in manufacturing workforce development are people of good will and good intentions. And there are a few bright spots. But the present system, more accurately the *non-system*, is generally composed of disconnected participants who infrequently communicate with each other and who operate without any organizing principle.

Systemic reform is needed in the system that educates Illinois workers to have the competencies required by Illinois manufacturers. We need a system based on standards, certification and credentialing that can overcome much of the deficit in the present situation. Skill standards that embody the actual requirements of real jobs lay the foundation for a curriculum that results in graduates who can meet these performance standards. Programs (and instructors) that are able to produce graduates who meet the standards can be certified so both potential students and employers know what they are getting if they choose to obtain services from that provider. Similarly, graduates who can perform to the standards can be certified, making the employment process easier for all concerned.

The fundamentals of such a system design are reasonably simple. Every individual occupation in every industry requires the ability to demonstrate competency to a specified level in a knowable set of skills. Some skills are common to more than one occupation and may be found in more than one industry. Therefore, much training and education can be provided that meets common needs of a variety of industry segments.

Skill standards are not new. As described elsewhere,²⁷ there is much current work in some industries around standards. However, using standards as a foundation for a state system is new in this country.

The goal is to create a career path based on these standards that goes from lower-skill to higher-skill level jobs, and to take into account the areas of overlap that occur as a worker moves from entry-level jobs to more skilled occupations (e.g., machine repairers, maintenance mechanics). The skill clusters also encompass high-tech and knowledge-based occupations such as computer-assisted design and manufacturing. The system must maximize the involvement and effectiveness of the various stakeholders and facilitate the advancement of workers from lower to higher skill levels.

Recommendation 4: Illinois state government, in partnership with the Illinois AFL-CIO, the business community, and the education community must create a comprehensive Illinois Manufacturing Career Path System.

An Illinois Manufacturing Career Path System must have the following key characteristics:

- It is anchored in a sectoral analysis;
- It groups job and skill clusters in the context of a career path as the foundation for the training and education system;
- Training and education curriculum are developed in the context of industry standards and employer requirements;
- Training and education lead to certification;
- It relies on a partnership of business, labor, government, and educators to develop all aspects of the system, including its objectives, standards, design, and implementation; and
- It is flexible and able to respond to changing economic developments as well as changing needs among the stakeholders.

²⁷ Swinney et al., 2001, *op. cit.*

Create Broad Public Support for Manufacturing

For those in the choir, it is clear that manufacturing plays a critical role in our state and national economies. The sector faces challenges that must be addressed with creativity, determination and resources. Companies and public-sector agencies already linked directly to manufacturing in one way or another will see the need and rise to the challenge. However, to successfully implement the recommendations of this report, mobilizing those already participating in the manufacturing sector is not sufficient. There must also be broad public understanding and support for these initiatives.

Unfortunately, the broad public view of manufacturing is negative and cynical. Manufacturing exists in a societal context. As one employer put it:

It seems to me that the issue at stake is to raise the bar on what it means to be in the [manufacturing] trades in society. In Europe it's wonderful to be in the trades, you're considered at par with other respected trades. It is just another path that you have chosen for your career. Here it's, "Oh, you work in a factory — gee, I'm sorry to hear that." We need to change that, and that is largely a cultural issue...²⁸

Society holds manufacturing in low esteem and views it as an economy of the past. High-school students, career counselors, and parents do not see manufacturing as an attractive career option, and thus it is difficult to recruit interest in the field. Public officials and elected leaders at all levels question the value of investment in manufacturing as pouring good money after bad. Because of the changes in manufacturing over the last few decades, the emergence of new technologies, and the hype around globalization, even informed people assume that even though manufacturing was critical to our past, it will not necessarily be part of our future. Often manufacturing suffers from being counter posed to the field of information technology, with information technology depicted as absolutely good and manufacturing depicted as absolutely bad. Many people think of manufacturing careers as suitable only for those of lower intelligence.

A required step for developing a vibrant and innovative manufacturing economy, and making the investment necessary to build Illinois as the destination state for High Road manufacturing, is building informed public support at all levels. One employer made a succinct suggestion: "We need a good sitcom starring an engineer" and a labor leader in Chicago suggested we need a popular movie that depicts a manufacturing entrepreneur in the same way *Top Gun* depicted a young pilot.

Recommendation 5: Our state needs a public relations and education campaign to promote manufacturing.

A coordinated, multi-year public relations and education campaign is needed. It should be designed to address three distinct audiences: policymakers and opinion-shapers, including elected officials, industry leaders, community leaders, and the media; parents

²⁸ Swinney et al., 2001, *op. cit.*

and school and community college officials, principals, teachers, and guidance counselors; and children in grades 6–12.

Activities should include:

- Developing an education campaign including academic studies, articles, and events directed at policymakers and elected officials;
- Initiating a multi-media campaign and educational materials directed at parents, school officials and teachers, augmented by tours of modern manufacturing facilities, in-school workshops, and manufacturing workers' participation in career fairs and career days; and
- Convening public meetings in the region to discuss and debate the issues.

While the campaign should target messages and materials tailored to the needs of the different audiences, it will need to address several broad themes. Manufacturing should be depicted as what it is: essential to the 21st-century economy; technologically advanced and generally clean and healthful; and capable of providing career paths leading to good-paying, interesting jobs grounded in lifelong learning and advancement.

This ambitious campaign should call upon the talents of our region's best educators, journalists, advertising agencies, and marketing firms, as well as labor, the religious community, and community-based organizations. Potential partners could include the key workforce development institutions, industry associations, and area advertising and marketing firms. The very substantial costs of this campaign should be as widely shared as possible. Efforts to mitigate costs by donating services should of course be encouraged, but it should be recognized at the outset that this is a vitally important investment that must be funded accordingly. This will serve as the critical foundation for expanding the public policy and legislative initiatives to support building a modern manufacturing economy in Illinois.

Chapter 6: Conclusion

The strength of the manufacturing sector is fundamental to the overall economic performance of Illinois and the U.S. as a whole. It creates large numbers of jobs that pay high wages to workers, purchases more goods and services from within the state than any other sector, and constitutes a main component of the state export economy. For these and other reasons, manufacturing needs to be at the center of all government discussions on economic policy.

- Manufacturing directly employs 961,000 workers in Illinois. The indirect and induced demand effects of manufacturing generate another 1.4 million positions in other industries. This means that manufacturing is responsible for nearly one-third of total Illinois employment.
- Manufacturing is the base of the Illinois export economy, amounting to \$35.8 billion in 2000—66% of total state exports.
- Illinois manufacturing ranks fourth among the nation's leading manufacturing states in productivity and labor costs. Labor costs per unit of output are quite low even though workers are relatively well paid.
- Like other U.S. states, Illinois faces increasing competition from low-wage producers in the developing world. This new reality constitutes a fork in the road for our manufacturing economy. Illinois manufacturing cannot successfully compete by pursuing the Low Road; it must embrace a High Road vision of innovation, higher productivity, and effective partnerships.
- Manufacturing companies require support from public- and private-sector leaders to meet the challenges they face. These challenges cannot be met by manufacturing companies alone. A High Road strategy must be embraced by government, labor, and the broader community and must be reflected in tangible ways that support and assist companies who are engaged in High Road manufacturing practices.

These times require bold and creative steps if we are to maintain our competitive advantage in the global manufacturing economy. We recommend the following steps to be undertaken by leaders in the private and public sectors:

- Illinois manufacturing companies should embrace High Road business strategies and partnerships as the foundation for establishing their competitive advantage in our global economy;
- Illinois state government must create a strong partnership with Illinois manufacturing companies implementing High Road business practices.

- State government should initiate the building of a state-wide Early Warning Business Development System;
- Illinois state government, in partnership with the Illinois AFL-CIO, the business community, and the education community must create a comprehensive Illinois Manufacturing Career Path System; and
- Our state needs a public relations and education campaign to promote manufacturing:

Now is the time for bold and creative leadership in the private and public sectors to establish Illinois as the destination state for High Road manufacturing in today's global economy.

Appendix A: Harvard's List of Clusters for Illinois

Cluster Name	Employment
Metal Manufacturing	112,440
Processed Food	108,827
Publishing and Printing	62,336
Plastics	59,482
Automotive	57,728
Production Technology	54,198
Lighting and Electrical Equipment	45,033
Communications Equipment	39,135
Heavy Machinery	38,709
Building Fixtures, Equipment and Services	29,303
Medical Devices	27,457
Analytical Instruments	24,994
Chemical Products	22,409
Information Technology	21,563
Motor Driven Products	19,520
Prefabricated Enclosures	11,333
Biopharmaceuticals	10,700
Apparel	7,528
Leather Products	7,418
Furniture	6,564
Sporting, Recreational and Children's Goods	5,098
Aerospace Vehicles and Defense	4,091
Textiles	2,489
Footwear	194
Total	1,092,484

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, 2000.

Appendix B: Sub-clusters of Illinois' Largest Manufacturing Clusters

Metal Manufacturing Cluster

Sub-cluster Name	Employment
Metal Processing	22,270
Iron and Steel Mills and Foundries	17,152
Fasteners	16,227
Fabricated Metal Products	14,227
Precision Metal Products	12,173
Wire and Springs	8,168
Nonferrous Mills and Foundries	6,566
General Industrial Machinery	3,957
Pumps	2,490
Metal Furniture	2,380
Laundry and Cleaning Equipment	2,185
Environmental Controls	2,079
Metal Armaments	1,810
Primary Metal Products	475
Saw Blades and Handsaws	280
Metal Alloys	2
Total	112,441

Processed Food Cluster

Sub-cluster Name	Employment
Paper Containers and Boxes	19,791
Meat and Related Products and Services	17,690
Baked Packaged Foods	17,490
Specialty Foods and Ingredients	15,031
Candy and Chocolate	14,184
Milling	9,004
Metal and Glass Containers	3,753
Flour	3,403
Milk and Frozen Desserts	2,879
Food Products Machinery	1,881
Malt Beverages	1,750
Processed Dairy and Related Products	1,719
Coffee	252
Total	108,827

Publishing and Printing Cluster

Sub-cluster Name	Employment
Printing Services	19,807
Publishing	17,004
Paper Products	7,311
Signs and Advertising Specialties	5,665
Specialty Paper Products	3,476
Radio, TV, Publisher Representatives	2,329
Printing Inputs	2,125
Photographic Services	1,552
Photographic Equipment and Supplies	1,301
Office Equipment and Supplies	970
News Syndicates	621
Inked Paper and Ribbons	175
Total	62,336

Lighting and Electrical Equipment Cluster

Sub-cluster Name	Employment
Metal Parts	19,588
Electrical Parts	13,767
Switchgear	6,144
Lighting Fixtures	3,907
Electric Lamps	874
Batteries	753
Total	45,033

Communications Cluster

Sub-cluster Name	Employment
Communications Equipment	29,886
Electrical and Electronic Components	7,650
Specialty Office Machines	1,598
Total	39,134

Appendix C: The Need for Manufacturing Workers

The following table shows 46 occupations found in manufacturing, each of which needs 150 or more new workers each year. The total number of occupations needing at least one new worker a year is 373 with 25,000 new workers needed each year. The table below covers 61% of all workers needed.

The column “Mfg. Workers” lists the total number of workers in each occupation in Illinois manufacturing in 2000. The column “All Workers” shows the total number of workers in the occupation in the state, regardless of industry. For example, there are 20,000 laborers in manufacturing, but there are 110,000 laborers in the state, employed in warehouses, construction and many other industries.

Annual Training Needs for Manufacturing Workers

Occupation	Mfg. Workers	All Workers	Needed for Growth	Needed for Replacement	Total
Team Assemblers	54,193	56,258	-	948	948
Laborers & Freight, Stock, & Material Movers, Hand	19,768	110,200	187	660	847
First-Line Supervisors of Production Workers	31,921	35,870	-	839	839
Welders, Cutters, Solderers, & Brazers	15,845	20,338	252	445	696
Packers & Packagers, Hand	16,773	46,314	201	427	628
Packaging & Filling Machine Operators & Tenders	13,872	18,530	209	305	514
Helpers-Production Workers	17,388	46,936	47	437	484
Machinists	20,540	22,814	53	421	474
Inspectors, Testers, Sorters, Samplers, & Weighers	20,715	24,385	-	458	458
Computer-Controlled Machine Tool Operators	9,449	10,040	106	336	441
General & Operations Managers	14,386	114,685	153	242	395
Electrical & Electronic equipment Assemblers	18,953	15,349	-	394	394
Sales Representatives, Wholesale & Manufacturing	12,808	72,079	33	348	380
Cutting, Punching, & Press Machine Setters, Operators	18,332	18,946	-	358	358
Customer Service Representatives	10,256	99,984	261	87	348
Shipping, Receiving, & Traffic Clerks	13,993	41,330	64	282	345
Office Clerks, General	10,635	136,365	136	204	340
Computer Software Engineers, Applications	3,496	19,211	300	23	323
Computer Software Engineers, Systems Software	4,136	7,515	276	28	303
Industrial Truck & Tractor Operators	12,877	26,388	103	179	282
Maintenance & Repair Workers, General	16,859	51,763	48	219	267
Stock Clerks & Order Fillers	6,825	82,457	21	243	264
Truck Drivers, Heavy & Tractor-Trailer	8,385	90,521	148	115	263
Mechanical Engineers	7,257	11,678	46	213	259
Production, Planning, & Expediting Clerks	8,180	19,138	120	137	257
Printing Machine Operators	10,694	9,804	5	247	252
Industrial Machinery Mechanics	6,748	9,480	48	182	231
Editors	4,630	5,860	79	150	229
Machine Feeders & Offbearers	8,358	6,574	-	228	228
Electrical & Electronic Engineering Technicians	6,061	9,544	97	123	220
Computer Support Specialists	2,662	21,944	201	11	212
Bookkeeping, Accounting, & Auditing Clerks	9,983	72,233	19	189	209
Molding & Casting Machine Setters, Operators	9,392	10,346	-	191	191
Lathe & Turning Machine Tool Setters, Operators	4,782	6,261	-	188	188
Janitors & Cleaners	6,087	118,218	76	110	186
Tool & Die Makers	7,287	10,536	-	183	183
Executive Secretaries & Administrative Assistants	6,994	66,167	57	119	176
Sales Managers	4,255	22,742	105	61	166
Computer Systems Analysts	2,853	27,248	140	25	165

Chief Executives	3,621	37,945	51	114	165
Accountants & Auditors	5,708	47,945	74	85	158
Sheet Metal Workers	3,765	10,259	80	78	158
Coating, Painting Operators, & Tenders	5,220	5,759	41	117	158
Advertising Sales Agents	3,586	7,886	84	73	157
Industrial Production Managers	9,335	10,378	3	152	156
Purchasing Agents	5,948	9,783	32	118	150
Total of above	515,811	1,726,006	667	11,092	15,045
Total all occupations	873,785	4,722,445	6,406	18,410	24,809

Sources: Manufacturing workers are from Illinois Department of Employment Security, *Industry Projections 2000 to 2010*, for 2000. The number of workers in each occupation was developed by applying the U.S. industry-occupation matrix based on 2 digit SIC industries to the 2 digit employment in Illinois. The numbers of manufacturing workers in each industry is an approximation and the total number is a little short of the total number of Illinois manufacturing workers in 2000 due to the fact that the more detailed makeup of each 2 digit industry in Illinois is different from the U.S. average.