



INNOVATION IN MANUFACTURING & CHICAGOLAND'S ADVANTAGES



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Executive Summary

The manufacturing industry plays a vital role in driving economic growth and development, and innovation within this sector is a major contributing factor. This report examines the significance of innovation in the manufacturing industry and provides insights into the extent of innovation within this sector.

Innovation enables all companies, regardless of industry, to gain a competitive advantage by developing new and improved products, processes, and business models. For manufacturers, innovation allows them to meet evolving customer demands, stay ahead of market trends, and differentiate themselves from competitors. Innovation in manufacturing also enhances operational efficiency and productivity - by embracing new technologies and processes, manufacturers can streamline operations, reduce costs, and optimize resource utilization.

The manufacturing industry has been actively pursuing innovation across various dimensions. Technological advancements, such as automation, artificial intelligence, and the Internet of Things (IoT), are revolutionizing manufacturing processes, enabling higher precision, speed, and customization. Furthermore, collaborative efforts between manufacturers, suppliers, and academic institutions are fostering innovation ecosystems, where knowledge sharing, research partnerships, and open innovation initiatives are prevalent. Although the level of innovation varies across sub-sectors and individual companies, the manufacturing industry as a whole is embracing innovation as a means to thrive in an increasingly competitive global landscape.

Findings:

- 1. All manufacturing sub-sectors innovate, but some have higher rates of innovation than others. High tech manufacturers report a vast majority engage in innovation activities. That said, because of the size of heavy industry sub-sectors, like fabricated metal, even low rates of innovation mean that on aggregate there are many more companies actively engaged in innovation. For every 1 high tech manufacturer engaged in innovation, there are 3 fabricated metal manufacturers innovating.
- 2. While all manufacturers need a strong ecosystem with collaborative partners to innovate, the type of partner varies highly across sectors. High tech manufacturers most often partner with universities or the federal government to innovate, while food and beverage manufacturers rely on household and individual consumers. Most manufacturers report that they rely upon their customers or suppliers to provide specialized knowledge that manufacturers cannot acquire or develop in-house.
- 3. Manufacturers report that lack of partnerships and sources of expertise are the most frustrating barriers to innovation. Chicagoland offers manufacturers a distinct advantage: manufacturers are able to access a robust ecosystem of suppliers and customers within the region. In fact, manufacturers in Chicago source nearly 50% of inputs in-region.
- 4. Lack of government funding was the second highest barrier to innovation. **Of the manufacturers that use government support for innovation, nearly half report using programs other than tax incentives or credits.** U.S. companies report lack of internal funding and costs of innovation were among the lowest barriers to innovation, which suggests that increased government funding or programs would be supplemental to existing efforts.
- 5. Illinois ranks higher for innovation activities 5th than it does for Research and Development (R&D) — 10th. R&D is but one type of innovation activity, suggesting that Illinois is often overlooked as a research and innovation hub. Moreover, Illinois has one of the highest effectiveness in value and revenue creation for its manufacturing sector.

FACT SHEET

The Chicago region's manufacturing industry is the nation's second largest (2022):

> **\$99B** annual output

410K+ employment

12K+ manufacturing firms







Manufacturing Industry Ecosystem

Manufacturing has elevated Chicago's economy, business landscape, and international reputation since the late 1800's.

Illinois is an advanced manufacturing powerhouse. The Chicago region boasts a history in industrial excellence, which has evolved into an advanced, technology-led sector of today's economy. In addition to being the center of the Midwest — which gives rise to a top-ranked passenger and freight transportation network — manufacturing companies in Illinois reap the benefits of affordable energy rates and deregulation, including a low-cost, high-quality water supply.

Chicagoland has a deep manufacturing history. By 1856, the city was built up as perhaps the greatest railroad center in the world, giving Chicago manufacturers access to an abundance of raw materials. By 1890, Chicago was the national center of manufacturing sub-sectors like meat production, lumber production, and furniture manufacturing. By the early twentieth century, Chicago earned the reputation of being a "manufacturing metropolis," a status championed by its factories and talented workforce.

Today, manufacturing is one of Chicagoland's largest industries and Chicagoland is one of the top manufacturing hubs for the nation. Across the city and suburbs, the manufacturing industry is composed of 12,000 business establishments that employ just over 410,000 people and generate \$99 billion within Chicagoland's economy. This economic activity makes Chicagoland the nation's second largest manufacturing hub by both employment and output.

Please note: throughout the issue, we refer to the broader Chicagoland region as: Chicagoland, the Chicago metro, or simply Chicago. All of these terms reflect the Chicago Metropolitan Statistical Area.







Top 10 Manufacturing Metro Ecosystems in 2022 by Output



Despite the historical relevance and relative size, manufacturing overall has declined within the U.S. since 1979, though COVID-19 partially reversed this trend.

From 1979 — the peak of employment in manufacturing — to 2019, employment in manufacturing declined by 6.7 million. While the U.S. remains a global leader in the development of advanced technologies, the COVID-19 pandemic brought the national decline of production capabilities since 1979 into sharp relief. At the same time, the COVID-19 pandemic also illustrated how rapidly manufacturing operations within the U.S. could adopt advanced technologies in order to meet changing needs.

This issue seeks to illuminate which manufacturing sub-sectors are innovating the most, how they are innovating, and what they needs in order to successfully innovate. Finally, this issue demonstrates how Chicago offers competitive advantages to any manufacturer advanced manufacturing or not.





What is "Innovation"?

In order to compare innovation across geographies and industries, a common definition is needed.

Innovation means different things within different industries, and something different to each reader. This issue of the Chicago Business Bulletin reviews the Annual Business Survey (ABS) and the Business Enterprise Research and Development Survey (BERD), both of which cover innovation activity across all industries within the U.S. Accordingly, both have adopted the same definition of 'innovation,' which was developed by the Oslo Manual.

The Oslo Manual is an internationally recognized survey that has adopted a universal definition for innovation that may be used to compare activity across industries. The Oslo Manual defines innovation as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (such as a new product) or brought into use by the unit (such as a new process)." The Oslo Manual recognizes both product and process innovation, and that is reflected within the ABS and BERD surveys.

The Oslo Manual refines 'innovation' further into a set of activities that include: 1) research and development, 2) engineering design and other creative activities, 3) marketing and brand equity activities, 4) intellectual property (IP) related activities, 5) employee training activities, 6) software development and database activities, 7) activities related to the acquisition or lease of tangible assets, and 8) innovation management activities.

The ABS and BERD surveys illustrate innovation activities within U.S. manufacturing sub-sectors, and are useful to better understand how manufacturers within the Chicago region innovate.

As the second largest manufacturing hub within the U.S., the Chicago region plays an important role in the nation's broader manufacturing activities. Moreover, Chicagoland has a particularly diverse manufacturing ecosystem. Thus, the ABS and BERD survey results are relevant to understanding innovation here, even though neither survey explicitly covers the Chicago region.



Chicago's Diverse Manufacturing Ecosystem by Output







Innovation across Industries and Regions

Innovation varies across both geographies and industry sub-sectors.

Illinois ranks fifth in the nation for number of businesses engaged in innovation activities, with a total of almost 67,000 companies that engage in either product or business process innovation. Illinois businesses innovate at a rate that is slightly above the national average.

Chicago ranked 28 for **R&D paid for by others** versus a rank of 10 for **R&D paid for by the company.** As a result, Chicago is often overlooked by outsiders as a location where research can be performed. The Illinois Science & Technology Coalition reports that Illinois ranks within the top 10 in domestic R&D paid for by the company with **Chicago making up 83% of Illinois's total of \$14.1B**.



The rate of innovation within each manufacturing sub-sector varies widely.

High tech manufacturing sub-sectors report high rates of innovation activities, but other manufacturing sub-sectors report higher aggregate numbers of companies engaged in innovation. The vast majority of companies manufacturing electrical equipment, computers, and other electronics report they engage in innovation activities, but collectively represent only 11,600 companies. Conversely, barely half of companies manufacturing fabricated metal products and printed materials report engaging in innovation activities, but collectively metal products and printed materials report engaging in innovation activities, but collectively represent 51,000 companies — three times the number of companies in high tech manufacturing.

Number and Percentage of Manufacturing Sub-Sectors Reporting Innovation Activities



Manufacturing Sub-Sectors

- Food
- Beverage
- TextileWood Products
- Paper
- Printing Activity
- Petroleum
- Chemicals
- Other Chemicals
- Plastics
- Nonmetallic Mineral
- Primary Metal
- Fabricated Metal
- Machinery
- Computers
- Other Electronic Products
- Electrical EquipmentTransportation Equip.
- Other Transportation
- Furniture
- Miscellaneous





How Manufacturers Innovate

Innovation does not occur in a silo; manufacturers need strong partners to innovate successfully.

Broadly speaking, manufacturers report that they rely most upon suppliers and customers — upstream and downstream supply chain members — as innovation partners. Moreover, manufacturers across sub-sectors and of various sizes need third party business partners to provide technical expertise they are not able to access through in-house talent. Manufacturers work closely with their third party partners to develop and deliver innovative products or business processes.

50% Innovation 46.1% 48.8% 40% of Manufacturers Reporting Partnerships 33.6% 30% 20% 13.1% 11.1% 10.8% 10% 7.1% 5.5% 4% 0% % Consultants/Commercial Labs Parent or Subsidiary Business Households or Individuals Other Businesses Non-Profit Orgs Universities suppliers Government Customers

Most manufacturers partner with their customers and suppliers, but some sub-sectors rely more on specialized partnerships.

With the exception of beverage manufacturers, all types of manufacturers reported at least 50% of companies have partnerships with their customers as they engage in innovation activities — and some types of manufacturers reported much higher rates of partnerships. Sub-sectors with the highest rates of customer partnerships include both high-tech and non-high tech sub-sectors, like paper, primary metals, and petroleum. Nearly 70% of petroleum product manufacturers report partnering with customers to innovate. Manufacturers within the sub-sectors of plastics, transportation, and printing reported the highest rates of partnering with suppliers.

Deviating from customary practice, barely 50% of manufacturers within the high-tech computer and electronic sub-sectors reported partnership with either suppliers or customers. Instead, these sub-sectors reported some of the highest rates of partnerships with higher education. Computer manufacturers also reported the highest rates of partnerships with government, with 11% reporting either federal, state, or local government partnerships. Perhaps unsurprisingly, food and beverage manufacturers reported the highest rates of partnerships with households or individuals, reflecting a need to connect with consumer tastes and preferences.





How Manufacturers Innovate

Manufacturers do not typically contract with third parties to perform manufacturing tasks.

Compared to other major food manufacturing ecosystems, Chicagoland firms purchase more inputs in-region. Nearly \$11B was spent on local businesses by food manufacturing firms here, with \$7.8B of that spent on other manufacturers, wholesalers, and transportation firms. Downstream in the supply chain, food manufacturers trade more outside the region, with \$4.2B in output being sold locally.

Instead, manufacturers use partners to perform other operational functions in order to successfully innovate.



Manufacturing is highly variable and involves specialized business operations within each sub-sector. As such, the specific functions of innovative partners reflect this specialization. For example, 33% of manufacturers rely upon distribution and logistics partners as they develop innovative products or business processes, which is driven mostly by chemical and plastics manufacturers, especially medical, pharmaceutical, and agricultural manufacturers. These types of manufacturers have some of the most stringent regulations governing transportation, or must maintain strict controls on environmental factors, such as cold chain storage. Manufacturers of complex products, like computers and electronics, may rely upon partners to produce specialized components involved in their core production operations - one third of communications equipment manufacturers and a quarter of semiconductor manufacturers rely upon third parties to perform some of their core production operations.







How Manufacturers Innovate

Most manufacturers had to acquire new technology — equipment or software — or modify existing technology in order to innovate.

58% of manufacturers report they acquired new technology in order to engage in innovative activities, and 46% reported they needed to modify or adapt existing technology. Respondents to the survey could have selected more than one response, so it is reasonable to presume that some manufacturers had to both acquire new technology and modify existing technology. Conversely, only a small minority of companies acquired intellectual property rights, with the exception of computer and electronic manufacturers — 40% to 50% of these companies purchased intellectual property. Only highly technical manufacturers were able to develop new technologies inhouse: over half of communication equipment, computer, electro-medical, and electronic manufacturers report they developed new technology in order to innovate.



Method of Obtaining Technology Capabilities — Percent of Manufacturers

Acquired Tech Products

Acquired IP Rights

Modified or Adapted Existing Tech

Developed New Tech In-House







Diversity

Minority owned companies report innovating at a higher rate than non-minority owned companies.

13.4% of minority owned companies report product innovation activities, whereas only 10.2% of non-minority owned companies report innovation activities. Moreover, 26% of minority-owed companies report process innovation activities, but only 21% of non-minority owned companies were business process innovators. However, when you look at R&D, non-minority owned companies utilize more R&D, at 31.9% when compared to minority owned companies, at 28.1%. ABS defines minority to include any racial or ethnic combination other than White, not Hispanic



Higher rates of innovation suggest that diverse perspectives lead to more comprehensive problem-solving and creative solutions that can boost productivity. Encouraging and empowering diverse innovators can contribute to the overall advancement of science, technology, arts, and entrepreneurship, leading to a richer and more vibrant global community.

Lower rates of R&D by minority owned companies suggests efforts to foster innovation and drive equitable growth should consider broader definitions of innovation activities, alongside efforts to increase diversity within more conventional R&D innovation activities.





Bringing Innovation to Market

Which manufacturing sub-sectors are able to bring new products to market?

Over 17,000 manufacturers across the U.S. report they were able to bring new products to market through various innovative activities, and over 24,000 manufacturers report they were able to develop products that were new to their business through the same types of innovation. While the aggregate totals appear large, they represent only 4% and 10% of manufacturers across the U.S. In fact, even among the most prolific innovators — computer and electronic manufacturers — only 20% of those manufacturers were able to bring new products to market. The vast majority of manufacturers surveyed reported they were not able to introduce new products into the marketplace nor were they able to bring products new to their business into use.

Number of Manufacturers Able to Bring New Products to Market



Manufacturers that were able to successfully commercialize products were rewarded with increased sales.

Collectively, manufacturers reported over \$230 billion from sales of their most important innovations from 2017 to 2019. This amount was driven primarily by transportation equipment manufacturers, which reported over \$97 billion in sales from their most important product developed through innovation activities. Computer, chemical, machinery, and fabricated metal manufacturers represent a distant second, with each reporting around \$20 billion in sales.



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Barriers to Innovation

Government support may be the missing component to driving innovation.

U.S. companies across all industries reported the most frustrating barriers to innovation were lack of both collaborative partners and external knowledge, followed by difficulties securing government funding. Strong partnerships that enhance a company's knowledge base was the preferred method of innovation and is to be expected as a top barrier to innovation when unavailable.



Percent of U.S. Companies Reporting as a Barrier to Innovation

Of the manufacturers that use government support for innovation, nearly half report using programs other than tax incentives or credits. U.S. companies report lack of internal funding and costs of innovation were among the least barriers to innovation, which suggests that increased government funding or programs would be supplemental to existing efforts.



Chicago's Ecosystem Drives Innovation

Chicago offers manufacturers access to more innovation partners.

Manufacturers have reported that they most often partner with suppliers and customers to perform specific innovative functions, and that lack of these partnerships and sources of expertise are the most frustrating barriers to innovation. Chicago offers manufacturers a distinct advantage: manufacturers are able to access a robust ecosystem of suppliers and customers. In fact, manufacturers in Chicago source nearly 50% of inputs inregion, compared to 26% in New York, 52% in Los Angeles, and 43% in Dallas.



Chicago is home to 24 innovation centers, 72 incubators and accelerators, 32 R&D labs, 3 R1 research universities, and 2 federal labs.

Chicago is home to a vibrant innovation ecosystem that includes incubators and accelerators, along with dozens of research labs, fostering innovation and supporting the growth of startups across various industries. These organizations serve as catalysts, providing essential resources and expertise to early-stage manufacturing ventures. In Chicago, prominent incubators like mHUB and the Polsky Center for Entrepreneurship and Innovation at the University of Chicago offer dedicated spaces equipped with state-of-the-art facilities and advanced machinery. These spaces serve as collaborative environments where startups can access prototyping labs, workshops, and specialized equipment to bring their manufacturing ideas to life. Additionally, the UIC Innovation Center offers a wide range of resources and programs to support startups and early-stage ventures. These include access to co-working spaces, prototyping labs, and cutting-edge technologies, providing entrepreneurs with the tools they need to develop and commercialize their ideas. These manufacturing-focused incubators and accelerators play a vital role in driving innovation, job creation, and economic growth in Chicago's manufacturing sector.







Spotlight

Chicago's Manufacturing Innovation Centers

MxD | The Digital Manufacturing and Cybersecurity Institute



MxD operates from a state-of-the-art innovation center near downtown Chicago, equipping U.S. factories with essential digital tools, cybersecurity measures, and specialized workforce expertise therefore enabling them to continuously improve the quality of every part they produce. Working with the Department of Defense and over 300 other partners, MxD drives increased productivity, expands business opportunities, and fortifies the strength of U.S. manufacturing.

Materials Manufacturing Innovation Center (MMIC)



MMIC accelerates the scale-up of advanced materials, process technologies, and aids companies with Argonne's top-notch infrastructure. MMIC works to increase American manufacturing competitiveness, reduce overall energy use and carbon emissions across industries, and provide innovators with tools to drive technological advancement.

mHUB Chicago



Located in the heart of Chicago's historic manufacturing district, mHUB provides resources, equipment, and support to entrepreneurs, startups, and manufacturers, enabling them to turn their ideas into tangible products. Their state-of-the-art facility offers prototyping labs, manufacturing equipment, co-working spaces, and educational programs to foster collaboration and drive innovation.





Illinois' Value Proposition

Manufacturers in Illinois perform well across areas such as value creation, worker productivity, and innovation.

Illinois' manufacturing sector demonstrated robust performance and a competitive edge in 2021, through significant capital expenditures of \$7.9 billion, the nation's fourth-largest total capital expenditures. The value added by the manufacturing sector amounted to \$119 billion, the fifth largest in the U.S., underscoring its pivotal role in creating value and fostering economic growth. Illinois' manufacturing sector stands as a beacon of success, driving innovation, employment, and economic prosperity in the Midwest.

Overall, the state of Illinois is a leading figure in generating economic value while maintaining a high level of productivity, as measured through the total value added per unit of productivity in thousands of **dollars per capita.** Illinois is among the top ten states, ranking ninth at \$211,056 per capita - closely comparable to New York. Its performance surpasses manufacturingheavy states such as Wisconsin, Minnesota, and North Carolina. The state's ability to generate significant value per capita highlights its competitive edge and underscores its position as a key player in driving prosperity and innovation within the economy. California has a large lead over the rest of the U.S., with a total value added per unit of productivity of \$554,578 per capita due to the presence of Silicon Valley and other high-tech manufacturing facilities in Southern California.



Total Value Added per Unit of Productivity

Nationally, Illinois has of the highest one effectiveness in value and revenue creation for its manufacturing sector, which is measured through the productivity-adjusted relative value added. thousands of dollars. Texas leads the pack with an impressive value of \$431 million, followed closely by California at \$280 million. Illinois secured a strong position at \$124 million, the sixth largest in the nation and outperforming several key manufacturing states such as North Carolina, Pennsylvania, Michigan, and Georgia. This demonstrates Illinois' competitiveness and ability to generate value when accounting for employee productivity. The benchmark for the U.S. stands at \$55 million, slightly less than half of Illinois' metric, emphasizing the state's impressive performance and its ability to produce concrete results when taking into account the employee productivity with respect to the national average.



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Illinois' Value Proposition

Illinois emerges as a leading performer among key states, demonstrating strong wage-adjusted value added per employee, in thousands of dollars per capita, positioning the state at the forefront of productivity and economic growth. Although Texas takes the lead with a value of \$1.76 million per capita, closely followed by California at \$1.54 million per capita, Illinois secures a respectable position at number five at \$783,798 per capita, surpassing several manufacturing-heavy states such as Pennsylvania, North Carolina, Michigan, Wisconsin, and Georgia. The benchmark for the United States stands at \$343,402 per capita, less than half of what Illinois provides. While Illinois' performance falls below that of Texas and California, it demonstrates competitiveness and a solid contribution to value generation per employee. It underscores Illinois' commitment to productivity and economic prosperity, further setting up the state as a significant player in the realm of value-added industries.



Wage-Adjusted Value Added per Employee

- Total Value Added per Unit of Productivity: [Total Value Added (Thousands of Dollars)/ Employee Productivity (Thousands of Dollars person)] / 1000. Units: Thousands of Dollars per Capita (Dollars per Capita before dividing by 1000). Employee Productivity is calculated by dividing the Sales, value of shipments, or revenue by the number of employees.
- **Productivity-Adjusted Relative Value Added:** Total Value Added * (Employee Productivity / National Average Employee Productivity).
- Wage-Adjusted Value Added per Employee: Total Value Added per Employee * Wage Ratio. Wage ratio is computed by dividing the wage of the state by the national average wage. This metric reflects the value generated per employee, taking into account the wage levels relative to the national average.





Funding Innovation

Manufacturing is a growing industry segment in Chicagoland's startup ecosystem, with investment increasing 27% between 2019 and 2021.

Venture capital investments serve as a crucial avenue for manufacturers to secure the necessary funds to drive innovation within their organizations. By partnering with venture capitalists, manufacturers can tap into a pool of capital specifically allocated for supporting high-risk, high-potential ventures. These investments provide manufacturers with the financial resources needed to explore and implement innovative ideas, develop new products and technologies, and expand their operations. Venture capitalists bring more than just funding to the table; they often possess extensive industry knowledge and expertise, as well as a vast network of contacts, which can greatly benefit manufacturers seeking to innovate. Through venture capital investments, manufacturers gain access to not only the capital required for innovation but also the invaluable guidance and support needed to turn their innovative ideas into successful commercial endeavors.

There are increasingly more private investments in Chicagoland's manufacturing firms. Between 2019 and 2022, the number of deals increased 35%. Chicago's manufacturing industry fared better than average in the 2022 venture capital slowdown: while the total number of deals decreased by 11% between 2021 and 2022 among all industries in Chicagoland, deals only decreased by 6% in manufacturing.

Chicagoland's manufacturing startup ecosystem has a healthy mix of smaller, early stage deals and larger, later stage deals. Approximately 70% of deals since 2019 are early stage VC or pre-VC. However, the number of pre-VC deals completed isn't keeping pace with VC deals: the count of pre-VC deals completed between 2019 and 2022 increased by just 19%, while the number of VC deals (both earlier and later stage) deals nearly doubled.

Chicagoland is also commanding an increasingly larger share of nationwide investments. In 2022, 2.8% of growth capital deals in manufacturing firms occurred in the Chicago area, up from 2.0% in 2019.

Chicagoland's manufacturing startups overlap in key emerging verticals. Since 2019, top overlapping verticals by deal count for startups receiving growth capital include TMT (technology, media & telecom), e-commerce, wellness, cleantech, and AI & machine learning.

Startups raising capital are found throughout the region. In fact, the largest known deal occurring since 2019 involved a Downers Grove-based company: Duravant, which raised \$3.56B in private equity development capital in 2022 to support its growth in automation solutions. Since 2019, 46% of deals involve startups based in the suburbs. Excluding Duravant's \$3.56B megadeal, 49% of capital deployed was captured by suburban startups.

Growth capital and deal count in Chicagoland's manufacturing startups, 2019-2022



Growth capital deal count in Chicagoland's manufacturing startups by county, 2019-2022



Findings

1. All manufacturing sub-sectors innovate, but some have higher rates of innovation than others.

High tech manufacturing sub-sectors report high rates of innovation activities, but other manufacturing sub-sectors report higher aggregate numbers of companies engaged in innovation. The vast majority of companies manufacturing electrical equipment, computers, and other electronics report they engage in innovation activities, but collectively represent only 11,600 companies. Barely half of companies manufacturing fabricated metal products and printed materials report engaging in innovation activities, but collectively represent 31,000 companies — three times the number of companies in high tech manufacturing.

2. Manufacturers need a strong ecosystem with collaborative partners to innovate.

All manufacturers report they need strong collaborative partners in order to innovate, but the type of partner varies highly across sectors. For example:

- High tech manufacturers most often need government and university partners in order to innovate.
- Food producers and beverage manufacturers report they most often partner with individuals and households in order to develop innovative products.
- Most other manufacturers rely upon customers or suppliers as innovative partners. This is especially true for suppliers that provide specialized services or goods.

Bulletin

3. Chicagoland offers the right mix of supply chain density and innovating partners.

Manufacturers have reported that they most often partner with suppliers and customers to perform specific innovative functions, and that lack of these partnerships and sources of expertise are the most frustrating barriers to innovation. Chicagoland offers manufacturers a distinct advantage: manufacturers are able to access a robust ecosystem of suppliers and customers within the region. In fact, manufacturers in Chicago source nearly 50% of inputs in-region.

4. Government funding is a significant barrier to innovation.

Lack of government funding was the second highest barrier to innovation. Of the manufacturers that use government support for innovation, nearly half report using programs other than tax incentives or credits. U.S. companies report lack of internal funding and costs of innovation were among the least barriers to innovation, which suggests that increased government funding or programs would be supplemental to existing efforts.

5. Illinois is a hub for innovation and ranks #5 in the U.S. for innovation.

Illinois ranks 5th in the U.S. for innovation activities by private companies, but ranks 10th for R&D. Chicago companies invest \$11.7 billion into R&D, representing 83% of R&D performed by companies in Illinois. These expenditures rank Chicago as the 10th largest metro for R&D.



2019 Company Expenditures on R&D

Appendix

Throughout this issue, we use "Chicago" and "Chicagoland" interchangeably. Manufacturing is a key industry for the entire region: nearly 40% of firms are located outside of Cook County. Each of the seven counties that make up the Greater Chicagoland Economic Partnership have different assets that contribute to the region's strengths — from farmlands, to transportation networks, to financial and tech hubs.

The data in following charts was sourced through Moody's Analytics and detail the criteria used to query the top ten <u>metropolitan statistical areas</u>' 2022 GDP (gross domestic product) in manufacturing industry sub-sectors. The GDP value recorded in the charts below is in \$ billions. The numbers in the titles of the charts, (e.g. Food Manufacturing 311), correspond to <u>NAICS codes</u> (the North American Industry Classification System for business establishments by type of economic activity, as defined by the U.S. Census Bureau).



Appendix

324 - PETRO (\$ million dollars)



325 - CHEM (\$ million dollars)

\$1198

\$1196

\$1091

\$955

\$883

\$859

\$24468 San Jose, CA

Los Angeles

San Francisco

Green Bay, WI

Philadelphia

Oshkosh, WI

Minneapolis

Cincinnati

Dallas

San Diego

326 - PLASTICS (\$ million dollars)



327 - MINERAL (\$ million dollars)



313 PRIMARY METAL (\$ million dollars)



332 - FAB. METAL (\$ million dollars)



333 - MACHINERY (\$ million dollars)



334 - COMPUTERS (\$ million dollars)



335 - ELEC. EQUIP. (\$ million dollars)



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Appendix





Appendix: Manufacturing Industry Timeline

Chicago has a rich history in manufacturing that dates back to the mid-19th century. The city's central location, proximity to transportation networks, and access to natural resources, like waterways, made it an ideal hub for industrial development. Chicago quickly emerged as a major manufacturing center, specializing in industries such as steel, meatpacking, machinery, and automobiles. Over the years, the city's manufacturing sector has evolved and adapted to changing times, experiencing both periods of growth and challenges, but remaining a vital contributor to the city's economy and identity.

1848

The Illinois and Michigan Canal opens.

1857 Chicago's first large-scale iron works begin to appear.

1900

Chicago is now home to 3 of the nation's 14 giant factories.

1930s

Depression Era: Illinois manufacturers and industrial plants close. Once a leader in furniture manufacturing, the sub-sector gradually moves to the South.

1945

Post-war, Illinois becomes the leading U.S. state for manufacturing. Between 1947 and 1951, nearly 800 industrial buildings are built.

Context

Today, nearly 40% of manufacturers are located outside of Cook County.

Context

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Chicagoland has a legacy in automobile manufacturing; the Chicago Assembly is Ford's oldest continually operating plant. Today, Chicagoland is a leader in auto components manufacturing, and actively pursuing opportunity in the evolving EV industry.

1965

More than half of manufacturing jobs move from the city to the suburbs.

20<u>21</u>

Lion Electric announces a new plant in Illinois: 745 new clean energy jobs.

First industrial boom — early manufacturing activities include lumber processing, milling, and meatpacking.

1851 — 1856

Construction of the Illinois Central Railroad.

1865

1823

The Union Stock Yards open, establishing Chicago as a leader in meat processing.

1920s

Illinois becomes an industrial powerhouse, especially in iron and steel production.

1939 — 1945

Illinois' manufacturing industry is revived to aid in World War II efforts.

1947

Chicagoland manufacturing employment peaks at 667K workers; the region becomes a leader in communication equipment, candy production, and commercial printing. Chicago's manufacturing value add is equal to the state of California, and twice of Texas.

1970s — 1990s

Deindustrialization continues, especially in the city. The region loses 18% of industrial jobs between 1947 and 1981.

2022

The Illinois Defense Manufacturing Consortium is awarded \$5M by the Dept. of Defense.

Context

The railroad helps Chicago's manufacturers reach new markets; for example, agricultural products grown in the Midwest and processed here were now able to reach East Coast and even international markets.

Context

Chicago was second only to Detroit in total wartime goods output. Over 1,400 local companies produced military goods — Chicago was a leader in aircrafts and aircraft parts production. Chicago also produced over half of military electronics used in the war.

Context

This grant, led in part by UIC and Cook County, focuses on metals manufacturing, and will establish the Casting, Forging, and Energy Storage Center of Excellence. The grant exemplifies Chicago's opportunity to compete for federal grants.





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About

World Business Chicago is Chicago's public-private economic development agency. Our mission is to drive inclusive economic growth and job creation, support businesses, and promote Chicago as a leading global city. Our vision is to ensure that all Chicagoans prosper.

The Research Center



Robin Ficke

Senior Vice President, Research rficke@worldbusinesschicago.com



Hannah Loftus

Regional Director, Research hloftus@worldbusinesschicago.com



Ferdinando "Nando" Guerra Director, Research fguerra@worldbusinesschicago.com



Himashi Jayasundera Research Analyst hjayasundera@worldbusinesschicago.com



Justine Ingram Research Coordinator jingram@worldbusinesschicago.com



Edward Gu Research Intern egu@worldbusinesschicago.com



Chris Antosiewicz Research Intern cantosiewicz@worldbusinesschicago.com

Contact Us research@worldbusinesschicago.com

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