



**PRINTING INDUSTRY**  
midwest

*Demonstrating the Importance of the  
Printing Industry to the North Dakota State and Local Governments*

# North Dakota Printing Industry Economic & Fiscal Contribution

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*The printing industry in North Dakota contributes value to the state economy in many ways. The industry generates and supports many jobs, economic output and government programs. The industry contributes over \$224 million in output, 1,253 jobs, \$47.1 million in labor income, and \$4.9 million in state and local tax revenues.*

## The U.S. Printing Industry

America's commercial printing industry has a significant economic footprint. It employs almost 450,000 people in more than 25,000 establishments with annual shipments of over \$83 billion. It is one of America's oldest manufacturing industries having been established long before the founding of the United States. Today, it continues to evolve as a high-tech, innovative communication and advertising media and also includes non-media elements such as packaging and wrappers. It is also America's most geographically dispersed manufacturing industry with a significant presence in every state.

### Definition

For this report "printing" is defined as North American Industrial Classification System Code 323—Printing and Related Support Activities. This sector encompasses many segments: general commercial printing, quick printing, digital imaging, magazines, newspapers, book and display graphics, financial and legal printing, screen printing, forms printing, label and tag printing, packaging, greeting cards, and trade and finishing services.

Due to the rapid technological changes and broadening of the scope of services provided by many printing companies today it is commonly referred to as the graphic communications industry.

Companies in the printing industry have expanded services to include creative design, retail display design, e-commerce, webpage design and hosting, mailing, fulfillment, and a host of other ancillary services that provide horizontal marketing well beyond the core printing model. This is a description that accurately represents the broad range of what printers do today.

### What is an Economic & Fiscal Contribution Study?

The aim of this study is to establish the economic importance of the printing industry to the North Dakota economy. We define "importance" as the total contribution to the regional economy in terms of shipments, employment, labor income, and value-added (GDP).

The results from our economic and fiscal contribution study will show the interconnectedness of the printing industry with the North Dakota economy. We will gain a clear understanding of how much

## The Economic Contribution Model

$$\begin{array}{r} \text{Direct Contribution} \\ + \\ \text{Indirect Contribution} \\ + \\ \text{Induced Contribution} \\ = \\ \text{Total Economic Contribution} \end{array}$$

economic activity is being cycled through the North Dakota economy due to the printing industry. We will also calculate how much economic activity was associated with the printing industry.

North Dakota print industry fiscal contributions include federal, state, and local taxes. We estimated these fiscal contributions using data from the PIA *Ratios* financial benchmarking database, Fiscal Year 2015 Analytical Perspectives Budget of the U.S. government from the Office of Management and Budget (OMB), and the Tax Foundation. See *Appendix for definitions*.

### Economic Contributions

In 2015, the printing industry directly contributed \$142.2 million in output, 764 jobs, and \$27.6 million in labor income to the North Dakota economy. After calculating backward-linked supply chain effects (i.e., indirect economic contributions) and household spending generated by labor income (i.e., induced economic contributions), these values increased significantly. Total economic contributions to the North Dakota economy amounted to \$224.0 million in output, \$99.0 million in value-added (GDP), 1,253 jobs, and \$47.1 million in labor income.

Backward-linked supply chain effects or indirect contributions accounted for 19.6% or \$43.9 million of total economic contribution, 18.1% of employment contributions or 227 jobs, and 22.3% of labor income contributions or \$10.5 million. Household spending generated by labor income or induced economic contributions accounted for \$37.9 million or 16.9% of total economic contributions, 20.9% of employment contributions or 262 jobs, and 19.1% of labor income contributions or \$9.0 million.

The printing industry in North Dakota generates \$99.0 million in value-added (GDP) annually through its

## PRINTING INDUSTRY ECONOMIC CONTRIBUTION IN NORTH DAKOTA

	Direct Contribution	Indirect Contribution	Induced Contribution	Total Economic Contribution
Output (\$1,000s)	\$142,180.4	\$43,919.5	\$37,905.3	<b>\$224,005.1</b>
Employment	764	227	262	<b>1,253</b>
Labor Income (\$1,000s)	\$27,586.3	\$10,491.1	\$9,012.4	<b>\$47,089.8</b>
Value-Added (GDP) (\$1,000s)	\$66,824.8	\$4,684.5	\$22,891.0	<b>\$99,042.8</b>

Source: RIMS II multipliers and Census Bureau County Business Patterns Database

Figure 1

direct economic impact and indirect/induced effects or approximately 0.18% of the state's \$55.9 billion total economic output. Compared to the overall national figures, the North Dakota printing industry drives a smaller percentage of GDP than other states. The national average is 0.49% of GDP.

For every additional \$1 in output, the printing industry generates an additional \$0.58 in backward-linked, non-printing industry spending and household spending. To break that down further, every additional \$1 of output generated by the printing industry leads to an additional \$0.31 in backward-linked industries and \$0.27 in additional household spending.

In North Dakota, the backward-linked industries with the strongest relationship to the printing industry include wholesale trade; manufacturing; transportation and warehousing; professional, scientific, and technical services; and finance and insurance. The industries most affected by induced household spending generated by the printing industry include: real estate, rental, and leasing; health care and social assistance; retail trade; finance and insurance; and manufacturing. The combined industries most affected by backward-linked and induced household spending are shown in Figure 2.

Every additional job in the North Dakota printing industry supports an additional 0.64 non-print jobs, inter-industry effects support 0.30 jobs, and additional household spending 0.34 jobs. The printing industry has a strong inter-industry relationship with other manufacturers—43.3% of print's inter-industry effect is with other manufacturing industries.

Induced employment contributions are based on additional household spending cycling through the economy. The sectors of the North Dakota economy that are most affected by induced employment contributions include health care and social assistance (22.1%), retail trade (20.0%), and food services and drinking places (8.9%). Each job directly generated by the printing industry results in 0.34 being supported through induced employment contributions. The induced jobs are lower paying on average because they are in industries with lower wages on average. The industries that are most interconnected to the printing industry through the combination of indirect and induced employment contributions include manufacturing, health care and social assistance, retail trade, wholesale trade, and food services and drinking places (Figure 3).

The North Dakota economy generated \$55.9 billion of gross domestic product (GDP) in 2015 or approximately 0.31% of total U.S. output and 7.78% of PIM total output. Output decreased by 6.20% between 2014 and 2015 primarily as a result of declines in state extraction industries.

The largest industries in terms of percent of GDP in North Dakota are mining (13.0%), real estate, rental, and leasing (10.9%), wholesale trade (8.7%), construction (7.7%), and manufacturing (6.9%). We do not include government in the list above (10.2% of output) because it is considered a final use of GDP in the input-output models.

The size of the industry in the region has an effect on the indirect and induced impact the printing industry has on the regional economy. In other words, on

## INDUSTRIES MOST INTERCONNECTED WITH THE PRINTING INDUSTRY IN NORTH DAKOTA

(Percent of Indirect and Induced Output Generated by Print Economic Activity)

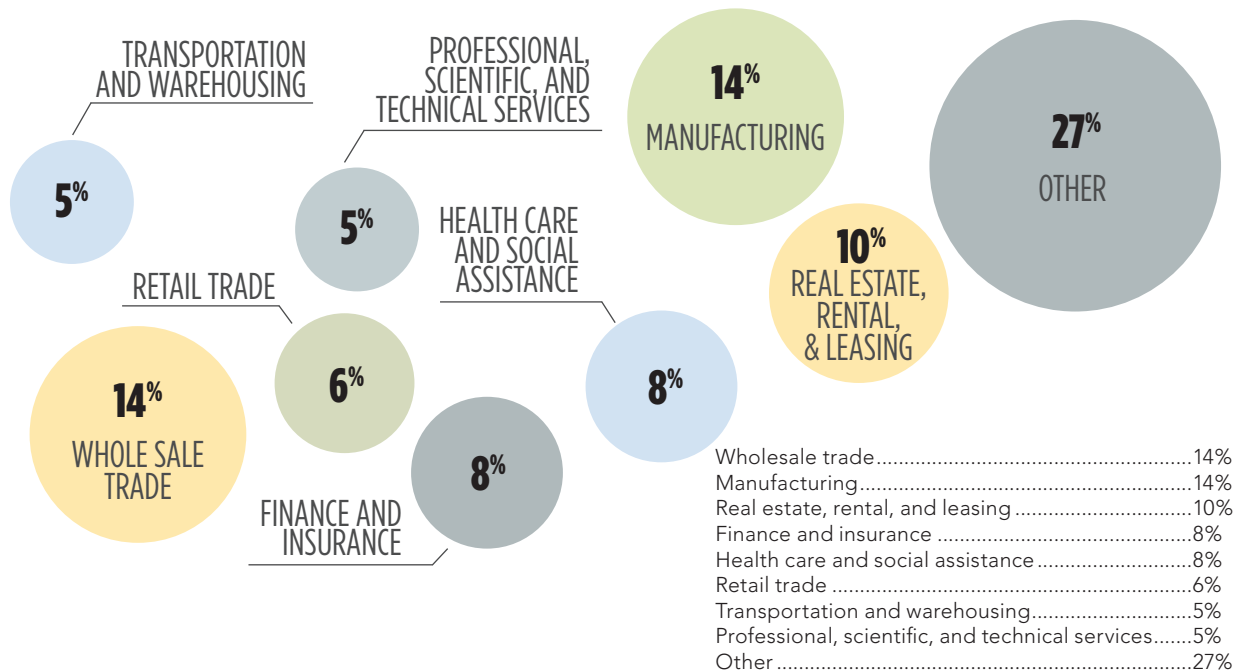


Figure 2

## INDUSTRIES MOST INTERCONNECTED WITH THE PRINTING INDUSTRY IN NORTH DAKOTA

(Percent of Indirect and Induced Employment Generated by Print Economic Activity)

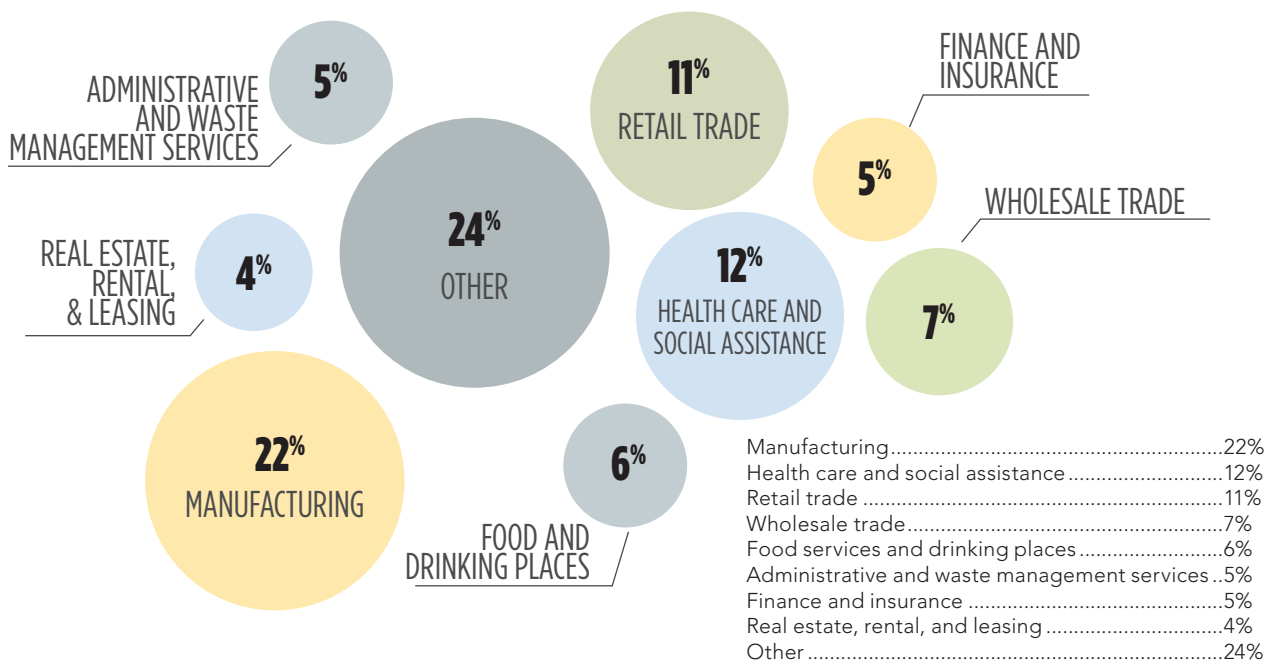


Figure 3



## GROSS DOMESTIC PRODUCT BY INDUSTRY IN NORTH DAKOTA

(millions of current dollars)

Industry	GDP (millions of current dollars)		Percent Change 2014 to 2015	Contribution to Change in Output	Percent Share of State Output	
	2014	2015			2014	2015
Mining	11,177	7,254	-35.1%	-6.6%	18.7%	13.0%
Real estate, rental, and leasing	6,041	6,106	1.1%	0.1%	10.1%	10.9%
Wholesale trade	4,956	4,840	-2.4%	-0.2%	8.3%	8.7%
Construction	4,316	4,299	-0.4%	0.0%	7.2%	7.7%
Manufacturing	3,662	3,848	5.1%	0.3%	6.1%	6.9%
Health care and social assistance	3,475	3,759	8.2%	0.5%	5.8%	6.7%
Retail trade	3,252	3,333	2.5%	0.1%	5.5%	6.0%
Transportation and warehousing	3,539	3,290	-7.0%	-0.4%	5.9%	5.9%
Finance and insurance	2,342	2,563	9.4%	0.4%	3.9%	4.6%
Agriculture, forestry, fishing, and hunting	3,076	2,445	-20.5%	-1.1%	5.2%	4.4%
Professional, scientific, and technical services	1,817	1,832	0.8%	0.0%	3.0%	3.3%
Utilities	1,357	1,404	3.4%	0.1%	2.3%	2.5%
Accommodation and food services	1,305	1,258	-3.6%	-0.1%	2.2%	2.2%
Information	1,138	1,152	1.2%	0.0%	1.9%	2.1%
Other services, except government	970	1,007	3.8%	0.1%	1.6%	1.8%
Administrative and waste management services	895	899	0.4%	0.0%	1.5%	1.6%
Management of companies and enterprises	562	599	6.6%	0.1%	0.9%	1.1%
Arts, entertainment, and recreation	158	169	6.8%	0.0%	0.3%	0.3%
Educational services	139	140	1.3%	0.0%	0.2%	0.3%
Government	5,452	5,731	5.1%	0.5%	9.1%	10.2%
<b>All industry total</b>	<b>59,627</b>	<b>55,927</b>	<b>-6.2%</b>	<b>-6.2%</b>	<b>100.0%</b>	<b>100.0%</b>

Figure 4

average, the larger the industry the more inter-related it is with various industries within a region. This trend has held constant for Iowa, Minnesota, and Nebraska, but in North Dakota the largest industries are not as inter-related to the printing industry both in terms of backward-linked supply chain effects and additional household spending generated from printing industry labor incomes.

For example, mining accounts for 13.0% of total economic output in North Dakota and it is the largest industry. Only 2.2% of the printing industry's indirect and induced contributions to the regional economy

are circulated through the mining industry. Wholesale trade and manufacturing are the two most inter-related industries with the printing industry but are the third and fifth largest industries in North Dakota. See the chart above for the complete list of industry output as a percentage of total regional output compared to indirect and induced printing industry economic contributions by industry. (Figure 5).

## Fiscal Contributions

Federal, state, and local tax revenues generated by the North Dakota printing industry totaled \$17.15 million.

## SIZE OF NORTH DAKOTA INDUSTRIES COMPARED TO INDUSTRIES' INDIRECT AND INDUCED RELATIONSHIP WITH THE PRINTING INDUSTRY

Industry	Rank		Percent of	
	By Size of Industry (\$ Output)	By Interconnectedness with the Printing Industry	Total Iowa Regional GDP	Printing Industry Indirect and Induced Output
Mining	1	15	13.0%	2.2%
Real estate, rental, and leasing	2	3	10.9%	10.3%
Wholesale trade	3	1	8.7%	14.0%
Construction	4	16	7.7%	2.0%
Manufacturing	5	2	6.9%	13.9%
Health care and social assistance	6	5	6.7%	7.9%
Retail trade	7	6	6.0%	6.3%
Transportation and warehousing	8	7	5.9%	5.4%
Finance and insurance	9	4	4.6%	8.4%
Agriculture, forestry, fishing, and hunting	10	17	4.4%	1.2%
Professional, scientific, and technical services	11	8	3.3%	4.5%
Utilities	12	9	2.5%	4.4%
Accommodation and food services	13	10	2.2%	4.1%
Information	14	12	2.1%	3.7%
Other services, except government	15	11	1.8%	3.8%
Administrative and waste management services	16	13	1.6%	3.2%
Management of companies and enterprises	17	14	1.1%	3.0%
Arts, entertainment, and recreation	18	19	0.3%	0.6%
Educational services	19	18	0.3%	1.1%

Figure 5

The printing industry added \$66.82 million in direct value-added output to North Dakota's gross domestic product and 25.7% of this output was collected by the federal, state, and local governments in taxes. The main sources of federal tax revenues were individual income taxes and social security taxes. North Dakota's printing industry revenues generated \$4.91 million in revenue for the state and local governments. Property taxes (32.5% of state and local collections) and general sales/use taxes (31.9%) were the two main sources of revenue for state and local governments (Figure 6).

## Conclusions

The printing industry in North Dakota is a large and moderately interconnected industry. Each additional dollar generated by the printing industry in North Dakota leads to an additional \$0.58 in backward-linked supply chain spending and additional household spending. Each print job supports 0.64 jobs in the North Dakota labor market due to spending of labor income in the backward-linked supply chain industries and household spending. Print industry output in North Dakota is most interconnected with wholesale trade; manufacturing; real estate, rental, and leasing; finance and insurance; and health care and social assistance. Print industry employment in North Dakota is most interconnected with the following industries: manufacturing, health care and social assistance, and retail trade. The effects of an industry on the local economy add to total output, employment, wages, and also support of government programs. In North Dakota 7.3% of the printing industry's \$66.82 million in value-added output went to support state and local governments. Data used in this study are based on many sources, including BEA RIMS II multipliers, the Tax Foundation, County Business Patterns Database, PIA *Print Market Atlas*, and the PIA *Ratios* financial database for the printing industry.

## 2015 FEDERAL, STATE, AND LOCAL TAXES GENERATED BY THE PRINTING INDUSTRY IN NORTH DAKOTA

Type of Tax	Taxes Collected (\$ Millions)
<b>Federal Taxes</b>	
Individual income tax	\$5.63
Corporate income tax	\$1.65
Social security taxes	\$3.87
Excise taxes	\$0.41
Other taxes	\$0.68
<b>Total Federal Taxes</b>	<b>\$12.23</b>

Type of Tax	Taxes Collected (\$ Millions)
<b>State and Local Taxes</b>	
Individual income tax	\$0.62
Corporate income tax	\$0.27
Sales or use tax	\$1.57
Excise taxes	\$0.55
Property taxes	\$1.60
Other taxes	\$0.20
License taxes	\$0.20
<b>Total State and Local Taxes</b>	<b>\$4.91</b>
<b>Total Fiscal Contribution</b>	<b>\$17.15</b>

Sources: U.S. Census, Office of Management and Budget, and Tax Foundation

Figure 6



## Definitions

### *Direct Contribution or Final-Demand Industry:*

The “Direct” contribution relates to the first round of inputs purchased from the final-demand industry or the figure we calculate in the Print Market Atlas. It is the portion of print shipments that are purchased for consumption by the final user. It includes the consumption of the goods and services that are produced and distributed in the economy. In the input-output accounts, final-use transactions consist of transactions that make up the final-expenditure components of GDP: personal consumption expenditures, private fixed investment, change in private inventories, exports of goods and services, imports of goods and services, federal, state, and local government consumption expenditures, and gross investment.

*Indirect Contribution:* Relates to the subsequent rounds of inputs purchased by supporting industries. Some of the supporting industries include: mining, utilities, construction, manufacturing, wholesale trade, retail trade, information, educational services, healthcare and social services, arts, entertainment, and recreation, etc. The sum of the “Direct” and “Indirect” contributions is called the inter-industry effect or inter-industry total. This takes into account the spending the printing industry generates in other industries—the impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value-added.

*Induced Contributions:* RIMS Type II multipliers not only account for the inter-industry effect but also account for the induced economic contribution to final-demand. The induced contribution relates to spending of workers whose earnings or labor income are affected by the final demand contribution. This contribution is called the household-spending contribution. We use the multipliers to measure the total contribution to the state economy.

*Total Economic Contribution:* Includes the final demand generated by the printing industry, the inter-industry contributions or indirect effects, and the induced contribution from household spending that the printing industry supports.



*For more information on how Input-Output multipliers are developed by the Bureau of Economic Analysis (BEA) we recommend reading the RIMS II handbook, “An essential tool for regional developers and planners.”*





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