



The Economic Value of the
**IOWA INDUSTRIAL NEW JOBS
TRAINING PROGRAM**
at Iowa's Community Colleges

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Executive Summary

The Iowa Industrial New Jobs Training (260E) Program improves the state's economy by supporting businesses that will create new jobs for Iowa residents. The Program helps to address the skills gap in the state, upskills Iowans, and encourages businesses to invest in their own employees. This analysis considers the impact the 260E Program generated on the Iowa economy. By training these employees, the 260E Program not only improves the state economy but also the individual employees by providing them with skills and knowledge, making them more employable in the workforce. Specifically, this analysis measures the impacts of the 542 businesses that participated in the program between FY 2013¹ and FY 2018. We also include added tax revenues as a result of the 260E Program.

Job Creation Impact



The main mission of the 260E Program is to encourage business growth and development, thus increasing the workforce in Iowa and expanding the Iowa economy as a whole. The businesses participating in the program created an impact on the state economy through the creation of new jobs. By FY 2018, businesses who participated in the program had created 29,367 new jobs. As the businesses create these positions, the state not only reaped the benefits of added jobs, but also the benefits of additional economic activity from the new employees spending their earnings.

From FY 2013 to FY 2018, the 260E Program created a present value of \$14.7 billion in total added income for the state. This is adjusted downward to account for the idea that some businesses would have been able to create a number of positions even if the 260E Program did not exist.

Added Tax Revenues

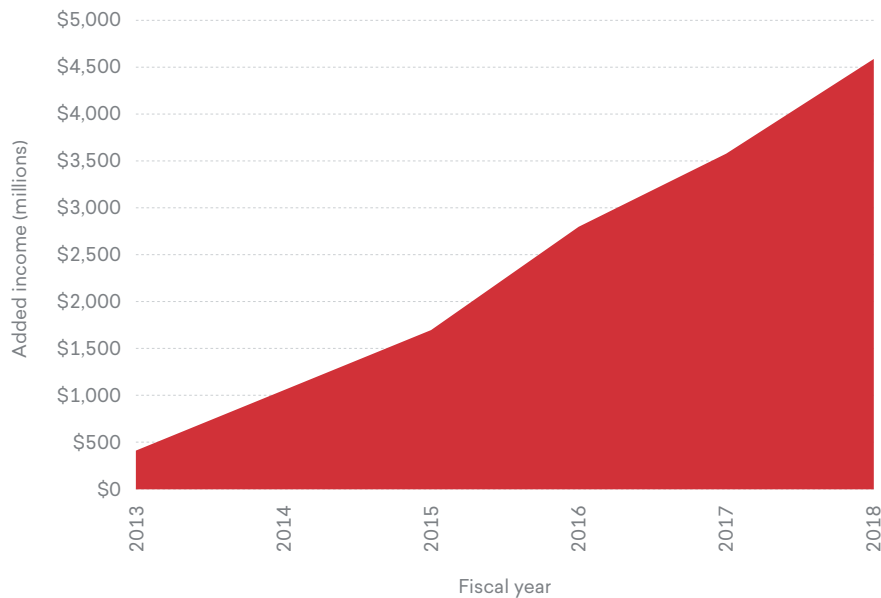


Beyond increasing Iowa's gross state product (GSP) through the economic impacts, the state also experienced added tax revenues. The state and local governments applied tax rates to the employees' earnings and the businesses' profits, increasing Iowa's tax revenues. From

¹ Even though the 260E Program started prior to FY 2013, reliable and consistent data collection began in FY 2013.

FY 2013 to FY 2018, Iowa saw a present value of \$1.3 billion in added tax revenues. This tax revenue has been adjusted downward to account for the payroll tax withholdings used to pay for the program.

THE 260E PROGRAM'S TOTAL IMPACT FROM FY 2013 TO FY 2018, UNDISCOUNTED



Source: Emsi impact model.

Economic Value by Business Type



Of the total \$14.7 billion in added present value job creation income between FY 2013 and FY 2018, approximately \$12.6 billion stemmed from expansion businesses. The remaining \$2.1 billion was created by businesses attracted to Iowa. Of the total \$1.3 billion added in present value net tax revenues between FY 2013 and FY 2018, expansion businesses added \$1.1 billion in net tax revenues for the state of Iowa and attraction businesses added \$0.2 billion.

Acknowledgments

Emsi gratefully acknowledges the excellent support of the staff at Iowa's Community Colleges in making this study possible. Special thanks go to Stephanie Bredman, Director of Job Training/Legislative Relations, and the individual college data teams who collected much of the data and information requested. Any errors in the report are the responsibility of Emsi and not of any of the above-mentioned individuals.



Profile of the Iowa Industrial New Jobs Training Program and the State Economy

Profile of the Iowa Industrial New Jobs Training Program

All community colleges are crucial players in the development of state and regional economies; the skilled workers they produce are the cornerstone of growth for businesses of every size and variety. But to optimize that support, Iowa's community colleges are administering the Iowa Industrial New Jobs Training Program, or 260E Program, in order to work with growing businesses to create effective employee training options. The program helps address the skills gap in the state, upskills Iowans, and encourages businesses to invest in their own employees.

The 260E Program was originated by the Iowa Economic Development Authority to assist businesses that are creating new jobs in Iowa, whether by relocating to the state or creating new positions at existing state locations. More specifically, the 260E Program supports businesses that are “engaged in interstate or intrastate commerce for the purpose of manufacturing, processing, assembling products, warehousing, wholesaling, conducting research and development,” or service. In addition, the business must create positions that didn't exist six months ago. However, one of the most difficult parts of developing a new business is finding qualified employees. To clear this hurdle, the 260E Program partners colleges and other organizations with local businesses to create specialized training programs that produce a skilled workforce at essentially no cost to the employer. Programs are designed by the college or organization delivering the training.

While the 260E Program is led by the state, each of the 15 colleges finances their portion of the program, which they administer by selling their own bonds. Funds provided by these bonds are awarded to businesses at rates based on the number of jobs involved and the wages they'll pay, after which the college and the employer create a cooperative training plan. Depending on wages paid, the business then diverts 1.5% to 3% of the Iowa state withholding taxes generated by the new positions to the community colleges to retire the bonds.



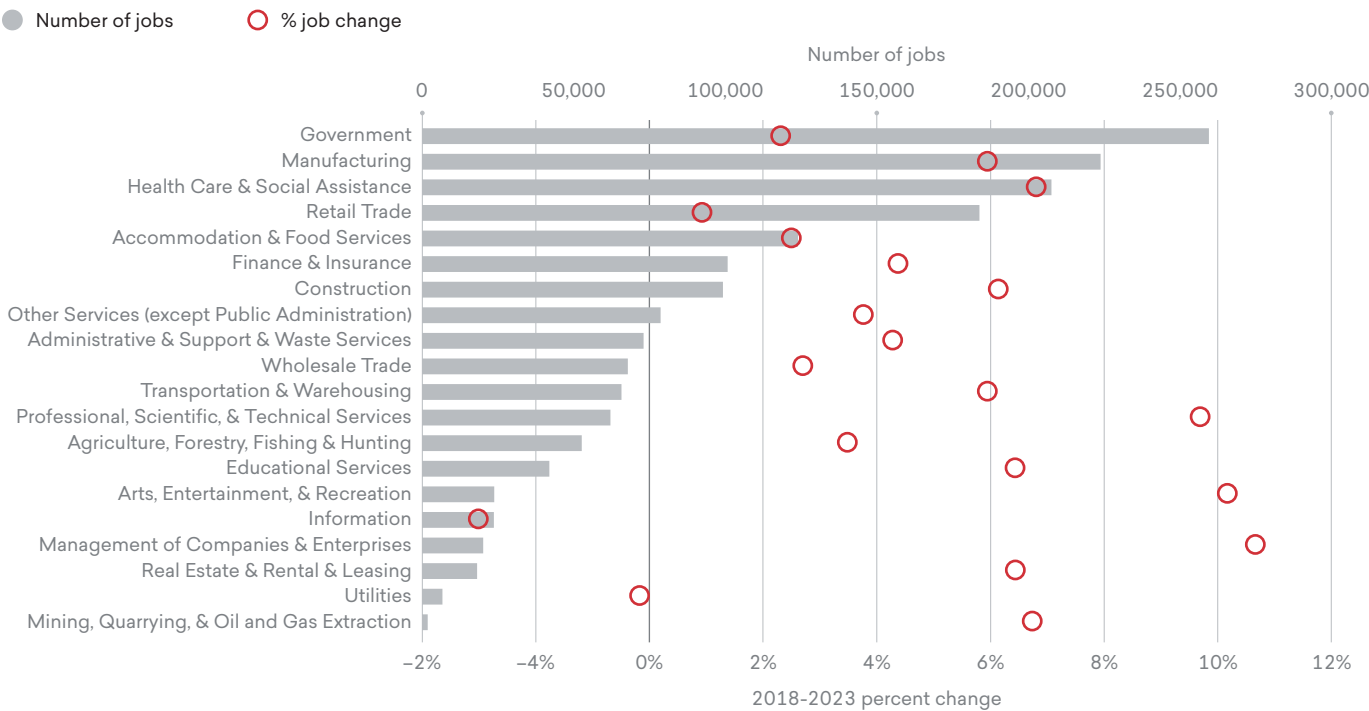
As a result, colleges are able to provide training at little to no cost; while the employers do repay the award, this is done with funds that would otherwise have been paid as state withholding tax.

The Iowa Economy

Since the 260E Program was first created, it has served Iowa by assisting in the growth and attraction of businesses in the state, thus growing the state's economy. Before we look at the impacts and benefits created by the 260E Program on the state economy, it is important to gain context on the state's industry composition.

Figure 1.1 provides the breakdown of 2018 jobs by industry sector in Iowa. The Government sector is the largest employer, supporting 258,732 jobs or 15% of total employment in the state. The second largest employer is the Manufacturing sector, supporting 225,374 jobs or 13% of the state's total employment. Altogether, the state supports 1.7 million jobs.² Many of these larger industry

FIGURE 1.1: CURRENT JOBS AND FUTURE JOB GROWTH BY MAJOR INDUSTRY SECTOR IN IOWA, 2018*



* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.
Source: Emsi.

2 Job numbers reflect Emsi's complete employment data, which includes the following four job classes: 1) employees that are counted in the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW), 2) employees that are not covered by the federal or state unemployment insurance (UI) system and are thus excluded from QCEW, 3) self-employed workers, and 4) extended proprietors.



sectors are expected to grow, with the growth of Government expected to be 3% and Manufacturing 6%. However, the top three sectors in terms of growth over the next five years are the Management of Companies & Enterprises; Professional, Scientific, & Technical Services; and Arts, Entertainment, & Recreation industry sectors, each with around a 10% growth rate.

Table 1.1 summarizes the breakdown of the state economy by major industry sector, with details on labor and non-labor income. Labor income refers to wages, salaries, and proprietors' income. Non-labor income refers to profits, rents, and other forms of investment income. Together, labor and non-labor income comprise the state's total income, which can also be considered as the gross state product (GSP). As shown in Table 1.1, the total income, or GSP, of Iowa is approximately \$188.9 billion, equal to the sum of labor income (\$107.9 billion) and non-labor income (\$81.0 billion).

TABLE 1.1: LABOR AND NON-LABOR INCOME BY MAJOR INDUSTRY SECTOR IN IOWA, 2018*

Industry sector	Labor income (millions)	Non-labor income (millions)	Total income (millions)**	% of total income	Sales (millions)
Agriculture, Forestry, Fishing & Hunting	\$4,280	\$2,022	\$6,302	3.3%	\$17,428
Mining, Quarrying, & Oil and Gas Extraction	\$243	\$356	\$600	0.3%	\$1,037
Utilities	\$947	\$2,820	\$3,766	2.0%	\$5,863
Construction	\$6,981	\$1,790	\$8,771	4.6%	\$16,955
Manufacturing	\$17,113	\$18,974	\$36,087	19.1%	\$109,449
Wholesale Trade	\$5,381	\$7,701	\$13,082	6.9%	\$21,323
Retail Trade	\$6,578	\$4,316	\$10,894	5.8%	\$17,799
Transportation & Warehousing	\$4,616	\$1,303	\$5,919	3.1%	\$12,254
Information	\$1,773	\$3,413	\$5,186	2.7%	\$8,500
Finance & Insurance	\$10,708	\$10,907	\$21,615	11.4%	\$37,027
Real Estate & Rental & Leasing	\$2,482	\$2,011	\$4,493	2.4%	\$10,688
Professional & Technical Services	\$5,346	\$1,376	\$6,722	3.6%	\$10,094
Management of Companies & Enterprises	\$2,088	\$180	\$2,269	1.2%	\$3,369
Administrative & Waste Services	\$3,157	\$778	\$3,935	2.1%	\$6,391
Educational Services	\$1,592	\$354	\$1,946	1.0%	\$2,844
Health Care & Social Assistance	\$11,188	\$1,448	\$12,636	6.7%	\$20,681
Arts, Entertainment, & Recreation	\$673	\$400	\$1,073	0.6%	\$1,815
Accommodation & Food Services	\$2,555	\$1,559	\$4,114	2.2%	\$7,696
Other Services (except Public Administration)	\$2,855	\$16,940	\$19,795	10.5%	\$27,950
Government, Non-Education	\$8,885	\$2,355	\$11,240	6.0%	\$49,906
Government, Education	\$8,433	\$0	\$8,433	4.5%	\$9,601
Total	\$107,875	\$81,002	\$188,877	100.0%	\$398,670

* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.

** Numbers may not add due to rounding.

Source: Emsi.





Economic Impact of the Iowa Industrial New Jobs Training Program

The Iowa Industrial New Jobs Training (260E) Program impacts the Iowa economy in a variety of ways. The purpose of the 260E Program is to improve the state's economy by supporting businesses that create jobs for Iowa residents. This section provides an overview of economic impact terminology and then discusses the economic impact of the 260E Program.

Economic Impact Terminology

For this analysis, we consider the following hypothetical question:

How would economic activity change in Iowa if the 260E Program did not exist?

To answer this question, we measure net impacts, not gross impacts. Gross impacts represent an upper-bound estimate in terms of capturing all activity stemming from the program; however, net impacts provide a truer measure since they demonstrate what would not have existed in the state economy if not for the program.

Economic impact analyses use different types of impacts to estimate the results. The impacts focused on in this study assess the change in income; however, multiple measures of impact are calculated. One measure is similar to the commonly used GSP. Income may be further broken out into the **labor income impact**, also known as earnings, which assesses the change in employee compensation; and the **non-labor income impact**, which assesses the change in business profits. Together, labor income and non-labor income sum to total income.

Another way to state the impact is in terms of **jobs**, a measure of the number of full- and part-time jobs that would be required to support the change in income. Finally, a frequently used measure is the **sales impact**, which comprises the change in business sales revenue in the economy as a result of increased economic activity. It is important to bear in mind, however, that much of this



sales revenue leaves the state economy through intermediary transactions and costs.³ All of these measures—added labor and non-labor income, total income, jobs, and sales—are used to estimate the economic impact results presented in this section. The analysis breaks out the impact measures into different components, each based on the economic effect that caused the impact. Note that jobs are only used as a measure when presenting annual impacts because jobs are duplicated across years when presenting the total impact. The following is a list of each type of effect presented in this analysis:

- The **initial effect** is the exogenous shock to the economy caused by the initial spending of money, whether to pay for salaries and wages or purchase goods or services.
- The initial round of spending creates more spending in the economy, resulting in what is commonly known as the **multiplier effect**. The multiplier effect comprises the additional activity that occurs across all industries in the economy and may be further decomposed into the following three types of effects:
 - The **direct effect** refers to the additional economic activity that occurs as the industries affected by the initial effect spend money to purchase goods and services from their supply chain industries.
 - The **indirect effect** occurs as the supply chain of the initial industries creates even more activity in the economy through their own inter-industry spending.
 - The **induced effect** refers to the economic activity created by the household sector as the businesses affected by the initial, direct, and indirect effects raise salaries or hire more people.

The terminology used to describe the economic effects listed above differs slightly from that of other commonly used input-output models, such as IMPLAN. For example, the initial effect in this study is called the “direct effect” by IMPLAN, as shown in the table below. Further, the term “indirect effect” as used by IMPLAN refers to the combined direct and indirect effects defined in this study. To avoid confusion, readers are encouraged to interpret the results presented in this section in the context of the terms and definitions listed above. Note that, regardless of the effects used to decompose the results, the total impact measures are analogous.

Emsi	Initial	Direct	Indirect	Induced
IMPLAN	Direct	Indirect		Induced

3 See Appendix 2 for an example of the intermediary costs included in the sales impact but not in the income impact.



Multiplier effects in this analysis are derived using Emsi's Multi-Regional Social Accounting Matrix (MR-SAM), which is an input-output model that captures the interconnection of industries, government, and households in the state. The Emsi MR-SAM contains approximately 1,000 industry sectors at the highest level of detail available in the North American Industry Classification System (NAICS) and supplies the industry-specific multipliers required to determine the impacts associated with increased activity within a given economy. For more information on the Emsi MR-SAM model and its data sources, see Appendix 4.

In the next section, we estimate the 260E Program impact from the jobs that businesses added because of the support they received from the 260E Program.

Job Creation Impact

In this study, we consider the economic impact of the jobs created by businesses that participated in the 260E Program. To calculate these impacts, Iowa's community colleges provided us with information on the businesses that participated in the program and the number of new employees the colleges trained for those businesses. Between FY 2013 and FY 2018, 542 businesses participated in the 260E Program at the colleges.⁴ Of the 542 businesses that participated in the program, 71 were attraction businesses, meaning they originated from outside the state, and 471 were expansion businesses, meaning they already existed in Iowa and the 260E Program helped them grow.

Ideally, we would use detailed financial information for all businesses to estimate their impacts. However, this isn't feasible for confidentiality reasons. As an alternative, we use the number of employees trained by the colleges' 260E Program (Table 2.1). However, we must consider the idea that some of these jobs may have been created, even if the 260E Program did not exist. According to a survey administered by the colleges, businesses claim that approximately 71% of their job positions would not have been created if the 260E Program did not exist. Thus, we apply an attribution factor of 71% to the number of jobs. In other words, the 260E Program is only responsible for 71% of the jobs, so only 71% of the jobs are included in the impact analysis.⁵

4 This analysis only considers businesses that added jobs to the Iowa economy. Some businesses may have agreed to participate in the 260E Program; however, they have not added new jobs, thus they were excluded.

5 A sensitivity analysis around the attribution factor can be found in Appendix 3.



TABLE 2.1: 260E PROGRAM-SUPPORTED BUSINESSES AND JOBS BY YEAR*

Year	Number of businesses	Number of gross jobs	Number of net jobs
FY 2013	80	3,169	2,245
FY 2014	131	7,358	5,213
FY 2015	212	10,967	7,770
FY 2016	375	17,664	12,516
FY 2017	438	22,921	16,241
FY 2018	542	29,367	20,808

* The number of businesses and jobs are cumulative and not unique across years. For example, this means that if a job was created in FY 2013, and the job still existed in FY 2014, then it is also counted in the FY 2014 jobs. On the flip side, job loss, though uncommon, is accounted for across the years.

Source: Iowa's community colleges and the Emsi impact model.

Iowa's community colleges provided the six-digit NAICS code of each business. We assume the businesses have earnings and spending patterns—or production functions—similar to their respective industry averages. We use industry-specific jobs-to-earnings and then earnings-to-sales ratios to estimate the sales of each business. Once we have the sales estimates, we follow a similar methodology as outlined in the previous section by running sales through the MR-SAM to generate the direct, indirect, and induced multiplier effects. Table 2.2 outlines this process for each year between FY 2013 and FY 2018, the final year of our analysis.

TABLE 2.2: 260E PROGRAM JOB CREATION IMPACTS BY YEAR, UNDISCOUNTED

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)	Jobs
FY 2013					
Initial effect	\$141,847	\$115,723	\$257,571	\$636,063	2,245
Multiplier effect					
Direct effect	\$25,820	\$21,286	\$47,106	\$125,741	419
Indirect effect	\$7,602	\$6,193	\$13,795	\$37,873	127
Induced effect	\$56,615	\$41,631	\$98,246	\$211,898	920
Total impact	\$231,883	\$184,834	\$416,717	\$1,011,575	3,712
FY 2014					
Initial effect	\$343,359	\$310,777	\$654,136	\$1,949,725	5,213
Multiplier effect					
Direct effect	\$71,693	\$65,318	\$137,011	\$464,800	1,095
Indirect effect	\$23,613	\$20,977	\$44,590	\$154,811	369
Induced effect	\$126,730	\$103,309	\$230,039	\$582,194	1,981
Total impact	\$565,395	\$500,381	\$1,065,775	\$3,151,531	8,658
FY 2015					
Initial effect	\$510,785	\$548,550	\$1,059,335	\$3,067,454	7,770
Multiplier effect					
Direct effect	\$103,139	\$104,737	\$207,876	\$688,824	1,573
Indirect effect	\$33,023	\$31,692	\$64,715	\$223,711	516
Induced effect	\$186,159	\$181,980	\$368,139	\$915,348	2,880
Total impact	\$833,105	\$866,959	\$1,700,065	\$4,895,336	12,739



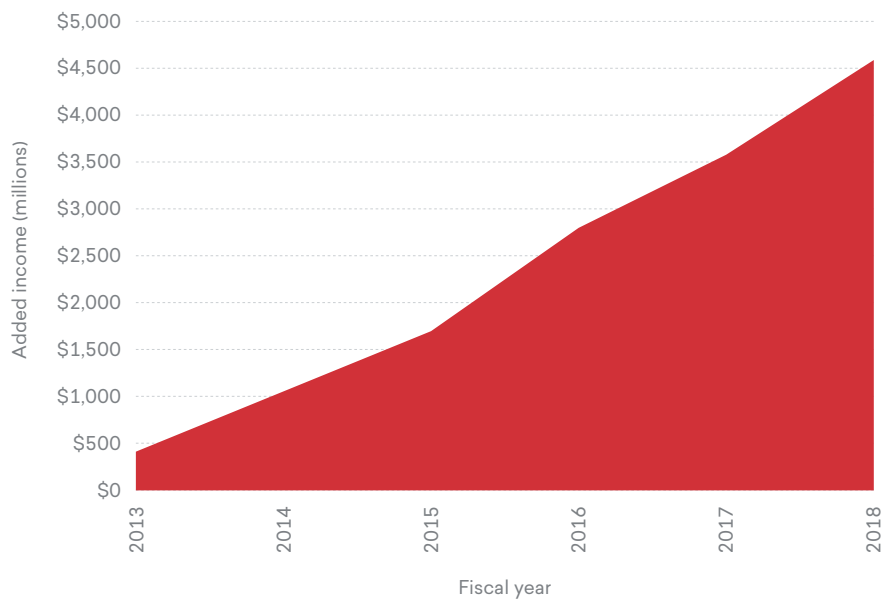
TABLE 2.2 (CONTINUED): 260E PROGRAM JOB CREATION IMPACTS BY YEAR, UNDISCOUNTED

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)	Jobs
FY 2016					
Initial effect	\$841,678	\$927,139	\$1,768,817	\$5,214,182	12,516
Multiplier effect					
Direct effect	\$170,834	\$181,274	\$352,108	\$1,156,316	2,547
Indirect effect	\$53,960	\$54,621	\$108,582	\$366,877	821
Induced effect	\$303,411	\$307,393	\$610,803	\$1,530,541	4,526
Total impact	\$1,369,883	\$1,470,427	\$2,840,310	\$8,267,917	20,410
FY 2017					
Initial effect	\$1,118,218	\$1,131,938	\$2,250,156	\$6,624,689	16,241
Multiplier effect					
Direct effect	\$227,927	\$227,222	\$455,148	\$1,492,513	3,342
Indirect effect	\$72,537	\$70,193	\$142,730	\$480,971	1,084
Induced effect	\$400,781	\$378,535	\$779,315	\$1,957,434	5,800
Total impact	\$1,819,462	\$1,807,887	\$3,627,349	\$10,555,607	26,467
FY 2018					
Initial effect	\$1,445,266	\$1,435,703	\$2,880,969	\$8,745,811	20,808
Multiplier effect					
Direct effect	\$301,774	\$294,321	\$596,095	\$2,013,852	4,415
Indirect effect	\$98,049	\$93,894	\$191,943	\$664,337	1,458
Induced effect	\$507,334	\$470,307	\$977,641	\$2,535,874	7,260
Total impact	\$2,352,424	\$2,294,224	\$4,646,648	\$13,959,875	33,942

Numbers may not add due to rounding.

Source: Emsi impact model.

FIGURE 2.1: 260E PROGRAM JOB CREATION IMPACTS BY YEAR, UNDISCOUNTED



Source: Emsi impact model.

Table 2.2 and Figure 2.1 present the undiscounted job creation impacts that accumulated year-by-year between FY 2013 and FY 2018. The total job creation impacts, summed across those years and discounted to 2019 dollars, are presented in Table 2.3. From FY 2013 to FY 2018, the businesses' new jobs added a present value of \$7.4 billion in labor income and \$7.3 billion in non-labor income. This equates to a present value of \$14.7 billion in total added income for the Iowa economy. Note that the impact from improving the employees' skills and increasing their knowledge is not measured beyond the jobs that the employees fill at the program participating businesses is not included in this analysis. Nevertheless, employees are gaining a value by participating in the 260E Program that will stay with them throughout their working lives.

TABLE 2.3: THE 260E PROGRAM JOB CREATION IMPACT, TOTAL FROM FY 2013 TO FY 2018, PRESENT VALUE*

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
Initial effect	\$4,510,566	\$4,580,278	\$9,090,844	\$26,879,671
Multiplier effect				
Direct effect	\$923,395	\$916,056	\$1,839,451	\$6,086,635
Indirect effect	\$295,870	\$284,313	\$580,183	\$1,975,319
Induced effect	\$1,620,858	\$1,520,000	\$3,140,858	\$7,924,269
Total impact	\$7,350,689	\$7,300,646	\$14,651,335	\$42,865,895

* Jobs are not reported because the jobs reported by year in Table 2.2 are duplicated, meaning that a job in one year likely exists in the following year. Thus, due to this duplication across years, the job impact cannot be summed together in the total impact table.

Source: Emsi impact model.





Growth in Tax Revenues

The 260E Program assists businesses creating new positions with new employee training. With these new positions, the total taxable earnings in the state increases and business increase their profits resulting in higher tax payments and thus increase tax revenues for the state of Iowa.

Calculating the increased tax revenues as a result of the 260E Program begins with the earnings from the jobs the businesses created between FY 2013 and FY 2018. To this, we apply the Iowa income tax rate to measure the tax from the new positions' payroll. As employees become more skilled and knowledgeable through their training, businesses grow through investments and business profits. The employee earnings and business profits increase not just the state economy but grows the state's GSP each year as well. To the increase in GSP, we apply a rate of taxes on production and imports as a percentage of GSP to capture the tax revenues received by the state and local governments from this additional GSP.

Summing the taxes from the businesses' job creation each year, we calculate the present value of Iowa's added tax revenues, equal to \$1.3 billion. However, this does not consider the fact that as part of the 260E Program bond payback plan, some of the payroll tax is withheld. This withheld payroll tax is removed from the added tax revenues to the state because it is used to retire the bonds sold by the colleges. Table 3.1 outlines the gross (before adjusting for the withheld payroll tax) and net undiscounted tax revenues by year. The net added tax revenues amount to a present value of \$1.3 billion.

TABLE 3.1: 260E PROGRAM TAX REVENUES, UNDISCOUNTED AND PRESENT VALUE

Year	Gross added tax revenues (millions)	Withheld payroll tax revenues (millions)	Net added tax revenues (millions)
FY 2013	\$41.0	\$0.6	\$40.4
FY 2014	\$105.4	\$4.3	\$101.2
FY 2015	\$163.1	\$9.0	\$154.1
FY 2016	\$271.9	\$14.7	\$257.2
FY 2017	\$354.0	\$21.8	\$332.2
FY 2018	\$456.0	\$23.2	\$432.8
Present value	\$1,343.2	\$70.9	\$1,272.3

Source: Emsi impact model.





Economic Value by Business Type

As part of this analysis, we calculated the impact each type of business generated on Iowa. The total impact of \$14.7 billion consists of the impacts from businesses that expanded in Iowa and businesses that were new to the state.

There were 542 businesses considered in this analysis—471 expansion and 71 attraction businesses. Given the majority of the businesses and jobs are classified under expansion businesses, it is no surprise that 86% of the impact stemmed from expansion businesses, or \$12.6 billion of the \$14.7 billion (Table 4.1). The remaining \$2.1 billion stemmed from businesses attracted to Iowa. Of the present value \$1.3 billion in net added tax revenues, expansion businesses added \$1.1 billion in tax revenues for the state of Iowa and attraction businesses added \$0.2 billion.

TABLE 4.1: ECONOMIC VALUE OF THE 260E PROGRAM FROM FY 2013 TO FY 2018 BY BUSINESS TYPE, PRESENT VALUE*

	Expansion businesses	Attraction businesses
Job creation impact	\$12.6 billion	\$2.1 billion
Net added tax revenues	\$1.1 billion	\$0.2 billion

* Numbers may not add due to rounding.
Source: Emsi impact model.

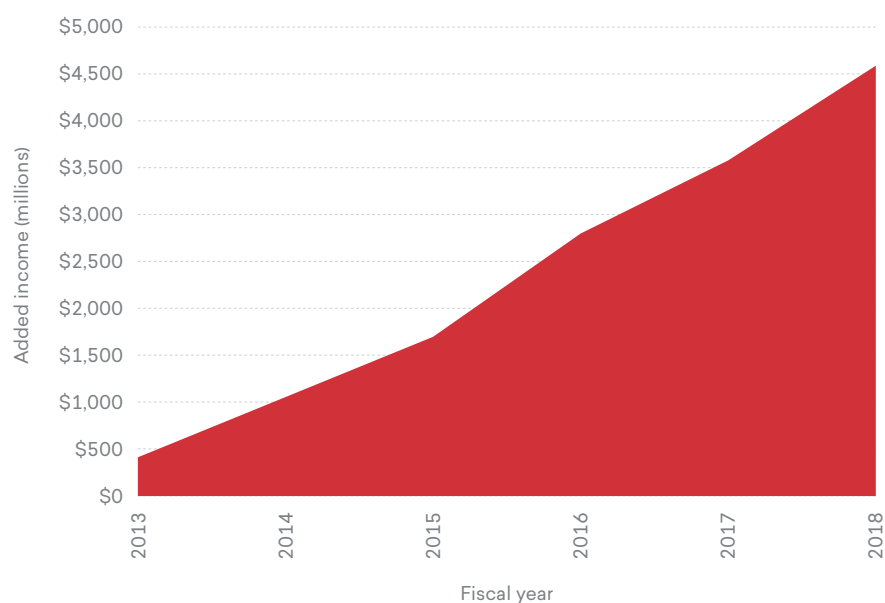


Conclusion

While the 260E Program's value to Iowa is larger than simply its economic impact, understanding its dollars and cents value is an important factor in understanding the program's overall value. This report has evaluated the program from the perspective of the impact from job creation and growth in tax revenues as a result of businesses participating in the 260E Program. Note that the value the program provides individual employees in terms of skills and knowledge is not measured within this report but should not be overlooked.

Between FY 2013 and FY 2018, 542 businesses and **29,367 employees** participated in the 260E Program. Without the program, businesses may not have been able to offer these positions let alone fill them with skilled and knowledgeable workers. As the businesses employed these tens of thousands of workers, the state not only reaped the benefits of added jobs, but also the benefits of additional economic activity from the new employees spending their earnings. This impact began in FY 2013 and will continue long after the final year of this

FIGURE 5.1: 260E PROGRAM TOTAL IMPACT FROM FY 2013 TO FY 2018, UNDISCOUNTED



Source: Emsi impact model.

analysis in FY 2018. During this limited six-year timeframe, the jobs created by the businesses who participated in the 260E Program added a present value of **\$14.7 billion** in income to the state economy. Figure 5.1 outlines the impact in terms of added income by year.

Beyond increasing Iowa's GSP, the state also experienced added tax revenues. The state and local governments applied tax rates to the employees' earnings and the businesses' profits, thus increasing Iowa's tax revenues. From FY 2013 to FY 2018, Iowa saw a present value of **\$1.3 billion** in net added tax revenues.

Of the total present value impact of \$14.7 billion in added income between FY 2013 and FY 2018, approximately **\$12.6 billion** stemmed from expansion businesses. The remaining **\$2.1 billion** was generated by businesses attracted to Iowa. Of the total present value \$1.3 billion in net tax added revenues between FY 2013 and FY 2018, expansion businesses added **\$1.1 billion** in net tax revenues for the state of Iowa and attraction businesses added **\$0.2 billion**.



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Appendix 1: Glossary of Terms

Discounting Expressing past or future revenues and costs in present value terms.

Earnings (labor income) Income that is received as a result of labor; i.e., wages.

Economics Study of the allocation of scarce resources among alternative and competing ends. Economics is not normative (what ought to be done), but positive (describes what is, or how people are likely to behave in response to economic changes).

Gross State Product Measure of the final value of all goods and services produced in a state after netting out the cost of goods used in production. Alternatively, Gross State Product (GSP) equals the combined incomes of all factors of production; i.e., labor, land and capital. These include wages, salaries, proprietors' incomes, profits, rents, and other. GSP is also sometimes called value added or added income.

Initial effect Jobs created by the businesses that participated in the 260E Program and their associated earnings (labor income) and business profits (non-labor income).

Input-output analysis Relationship between a given set of demands for final goods and services and the implied amounts of manufactured inputs, raw materials, and labor that this requires. When institutions pay wages and salaries and spend money for supplies in the state, they also generate earnings in all sectors of the economy, thereby increasing the demand for goods and services and jobs.

Multiplier effect Additional income created in the economy as employees spend money in the state. It consists of the income created by the supply chain of the industries initially affected by the spending of the employees (i.e., the direct effect), income created by the supply chain of the initial supply chain (i.e., the indirect effect), and the income created by the increased spending of the household sector (i.e., the induced effect).

NAICS The North American Industry Classification System (NAICS) classifies North American business establishment in order to better collect, analyze, and publish statistical data related to the business economy.

Net cash flow Benefits minus costs, i.e., the sum of revenues accruing from an investment minus costs incurred.

Non-labor income Income received from investments, such as rent, interest, and dividends.

Appendix 2: Example of Sales versus Income

Emsi's economic impact study differs from many other studies because we prefer to report the impacts in terms of income rather than sales (or output). Income is synonymous with value added Gross State Product (GSP). Sales include all the intermediary costs associated with producing goods and services. Income is a net measure that excludes these intermediary costs:

$$\text{Income} = \text{Sales} - \text{Intermediary Costs}$$

For this reason, income is a more meaningful measure of new economic activity than reporting sales. This is evidenced by the use of gross domestic product (GDP)—a measure of income—by economists when considering the economic growth or size of a country. The difference is GSP reflects a state and GDP a country.

To demonstrate the difference between income and sales, let us consider an example of a baker's production of a loaf of bread. The baker buys the ingredients such as eggs, flour, and yeast for \$2.00. He uses capital such as a mixer to combine the ingredients and an oven to bake the bread and convert it into a final product. Overhead costs for these steps are \$1.00. Total intermediary costs are \$3.00. The baker then sells the loaf of bread for \$5.00.

The sales amount of the loaf of bread is \$5.00. The income from the loaf of bread is equal to the sales amount less the intermediary costs:

$$\text{Income} = \$5.00 - \$3.00 = \$2.00$$

In our analysis, we provide context behind the income figures by also reporting the associated number of jobs. The impacts are also reported in sales and earnings terms for reference.

Appendix 3: Sensitivity Analysis of Attribution Factor

Sensitivity analysis measures the extent to which a model's outputs are affected by hypothetical changes in the background data and assumptions. This is especially important when those variables are inherently uncertain. This analysis identifies a plausible range of potential results that would occur if the value of the attribution factor assumption is in fact different from what we modeled.

The attribution factor determines how many of the jobs created can be attributed to the 260E Program. In other words, if the 260E Program did not exist, how many of the jobs would have been created anyway? There are other factors, other than the 260E Program, that may lead to a business expanding or being attracted to Iowa. For example, without the 260E Program, some businesses may have expanded anyway, although they may not have had the ability to create as many positions as they were able to with the support of the 260E Program. In addition, without the 260E Program, some attraction businesses under this analysis may not have been able to relocate, which may allow other competitor businesses to grow and create jobs in their stead. Thus, we conduct a sensitivity analysis since no one knows for certain how many of these new jobs were in fact attributable to the 260E Program. We hold all other variables constant (Table A3.1).

TABLE A3.1: SENSITIVITY ANALYSIS OF THE BUSINESS ATTRIBUTION FACTOR

% variation in assumption	-50%	-25%	-10%	Base case	10%	25%	50%
Attribution factor	35%	53%	64%	71%	78%	89%	>100%
Present value total job creation impact							
Total added income (billions)	\$7.3	\$11.0	\$13.2	\$14.7	\$16.1	\$18.3	N/A
Present value of total tax revenues							
Added tax revenues (billions)	\$0.6	\$0.9	\$1.1	\$1.3	\$1.4	\$1.6	N/A

Source: Emsi impact model.

Based on this sensitivity analysis, the conclusion can be drawn that the 260E Program analysis results are not very sensitive to relatively large variations in the attribution factor. Even when the attribution factor is decreased by as much as 50% (from 71% to 35%), the total present value job creation impact from FY 2013 to FY 2018 is \$7.3 billion. The conclusion is that although the assumption is difficult to specify, even with the most conservative scenario, the 260E Program's impact on the Iowa economy is significant.

Appendix 4: Emsi MR-SAM

Emsi's MR-SAM represents the flow of all economic transactions in a given region. It replaces Emsi's previous input-output (IO) model, which operated with some 1,000 industries, four layers of government, a single household consumption sector, and an investment sector. The old IO model was used to simulate the ripple effects (*i.e.*, multipliers) in the regional economy as a result of industries entering or exiting the region. The MR-SAM model performs the same tasks as the old IO model, but it also does much more. Along with the same 1,000 industries, government, household and investment sectors embedded in the old IO tool, the MR-SAM exhibits much more functionality, a greater amount of data, and a higher level of detail on the demographic and occupational components of jobs (16 demographic cohorts and about 750 occupations are characterized).

This appendix presents a high-level overview of the MR-SAM. Additional documentation on the technical aspects of the model is available upon request.

Data sources for the model

The Emsi MR-SAM model relies on a number of internal and external data sources, mostly compiled by the federal government. What follows is a listing and short explanation of our sources. The use of these data will be covered in more detail later in this appendix.

Emsi Data are produced from many data sources to produce detailed industry, occupation, and demographic jobs and earnings data at the local level. This information (especially sales-to-jobs ratios derived from jobs and earnings-to-sales ratios) is used to help regionalize the national matrices as well as to disaggregate them into more detailed industries than are normally available.

BEA Make and Use Tables (MUT) are the basis for input-output models in the U.S. The *make* table is a matrix that describes the amount of each commodity made by each industry in a given year. Industries are placed in the rows and commodities in the columns. The *use* table is a matrix that describes the amount of each commodity used by each industry in a given year. In the use table, commodities are placed in the rows and industries in the columns. The BEA produces two different sets of MUTs, the benchmark and the summary. The benchmark set contains about 500 sectors and is released every five years, with a five-year lag time (e.g., 2002 benchmark MUTs were released in 2007). The summary set contains about 80 sectors and is released every year, with a two-year lag (e.g., 2010 summary MUTs were released in late 2011/early 2012).

The MUTs are used in the Emsi MR-SAM model to produce an industry-by-industry matrix describing all industry purchases from all industries.

BEA Gross Domestic Product by State (GSP) describes gross domestic product from the value added (also known as added income) perspective. Value added is equal to employee compensation, gross operating surplus, and taxes on production and imports, less subsidies. Each of these components is reported for each state and an aggregate group of industries. This dataset is updated once per year, with a one-year lag. The Emsi MR-SAM model makes use of this data as a control and pegs certain pieces of the model to values from this dataset.

BEA National Income and Product Accounts (NIPA) cover a wide variety of economic measures for the nation, including gross domestic product (GDP), sources of output, and distribution of income. This dataset is updated periodically throughout the year and can be between a month and several years old depending on the specific account. NIPA data are used in many of the Emsi MR-SAM processes as both controls and seeds.

BEA Local Area Income (LPI) encapsulates multiple tables with geographies down to the county level. The following two tables are specifically used: CA05 (Personal income and earnings by industry) and CA91 (Gross flow of earnings). CA91 is used when creating the commuting submodel and CA05 is used in several processes to help with place-of-work and place-of-residence differences, as well as to calculate personal income, transfers, dividends, interest, and rent.

Bureau of Labor Statistics Consumer Expenditure Survey (CEX) reports on the buying habits of consumers along with some information as to their income, consumer unit, and demographics. Emsi utilizes this data heavily in the creation of the national demographic by income type consumption on industries.

Census of Government's (CoG) state and local government finance dataset is used specifically to aid breaking out state and local data that is reported in the MUTs. This allows Emsi to have unique production functions for each of its state and local government sectors.

Census' OnTheMap (OTM) is a collection of three datasets for the census block level for multiple years. **Origin-Destination** (OD) offers job totals associated with both home census blocks and a work census block. **Residence Area Characteristics** (RAC) offers jobs totaled by home census block. **Workplace Area Characteristics** (WAC) offers jobs totaled by work census block. All three of these are used in the commuting submodel to gain better estimates of earnings by industry that may be counted as commuting. This dataset has holes for specific years and regions. These holes are filled with Census' Journey-to-Work described later.

Census' Current Population Survey (CPS) is used as the basis for the demographic breakout data of the MR-SAM model. This set is used to estimate the ratios of demographic cohorts and their income for the three different income categories (i.e., wages, property income, and transfers).

Census' Journey-to-Work (JtW) is part of the 2000 Census and describes the amount of commuting jobs between counties. This set is used to fill in the areas where OTM does not have data.

Census' American Community Survey (ACS) Public Use Microdata Sample (PUMS) is the replacement for Census' long form and is used by Emsi to fill the holes in the CPS data.

Oak Ridge National Lab (ORNL) County-to-County Distance Matrix (Skim Tree) contains a matrix of distances and network impedances between each county via various modes of transportation such as highway, railroad, water, and combined highway-rail. Also included in this set are minimum impedances utilizing the best combination of paths. The ORNL distance matrix is used in Emsi's gravitational flows model that estimates the amount of trade between counties in the country.

Overview of the MR-SAM model

Emsi's MR-SAM modeling system is a comparative static model in the same general class as RIMS II (Bureau of Economic Analysis) and IMPLAN (Minnesota Implan Group). The MR-SAM model is thus not an econometric model, the primary example of which is PolicyInsight by REMI. It relies on a matrix representation of industry-to-industry purchasing patterns originally based on national data which are regionalized with the use of local data and mathematical manipulation (i.e., non-survey methods). Models of this type estimate the ripple effects of changes in jobs, earnings, or sales in one or more industries upon other industries in a region.

The Emsi MR-SAM model shows final equilibrium impacts—that is, the user enters a change that perturbs the economy and the model shows the changes required to establish a new equilibrium. As such, it is not a dynamic model that shows year-by-year changes over time (as REMI's does).

NATIONAL SAM

Following standard practice, the SAM model appears as a square matrix, with each row sum exactly equaling the corresponding column sum. Reflecting its kinship with the standard Leontief input-output framework, individual SAM elements show accounting flows between row and column sectors during a chosen base year. Read across rows, SAM entries show the flow of funds into column accounts (also known as receipts or the appropriation of funds by

those column accounts). Read down columns, SAM entries show the flow of funds into row accounts (also known as expenditures or the dispersal of funds to those row accounts).

The SAM may be broken into three different aggregation layers: broad accounts, sub-accounts, and detailed accounts. The broad layer is the most aggregate and will be covered first. Broad accounts cover between one and four sub-accounts, which in turn cover many detailed accounts. This appendix will not discuss detailed accounts directly because of their number. For example, in the industry broad account, there are two sub-accounts and over 1,000 detailed accounts.

MULTI-REGIONAL ASPECT OF THE MR-SAM

Multi-regional (MR) describes a non-survey model that has the ability to analyze the transactions and ripple effects (i.e., multipliers) of not just a single region, but multiple regions interacting with each other. Regions in this case are made up of a collection of counties.

Emsi's multi-regional model is built off of gravitational flows, assuming that the larger a county's economy, the more influence it will have on the surrounding counties' purchases and sales. The equation behind this model is essentially the same that Isaac Newton used to calculate the gravitational pull between planets and stars. In Newton's equation, the masses of both objects are multiplied, then divided by the distance separating them and multiplied by a constant. In Emsi's model, the masses are replaced with the supply of a sector for one county and the demand for that same sector from another county. The distance is replaced with an impedance value that takes into account the distance, type of roads, rail lines, and other modes of transportation. Once this is calculated for every county-to-county pair, a set of mathematical operations is performed to make sure all counties absorb the correct amount of supply from every county and the correct amount of demand from every county. These operations produce more than 200 million data points.

Components of the Emsi MR-SAM model

The Emsi MR-SAM is built from a number of different components that are gathered together to display information whenever a user selects a region. What follows is a description of each of these components and how each is created. Emsi's internally created data are used to a great extent throughout the processes described below, but its creation is not described in this appendix.

COUNTY EARNINGS DISTRIBUTION MATRIX

The county earnings distribution matrices describe the earnings spent by every industry on every occupation for a year—i.e., earnings by occupation.

The matrices are built utilizing Emsi's industry earnings, occupational average earnings, and staffing patterns.

Each matrix starts with a region's staffing pattern matrix which is multiplied by the industry jobs vector. This produces the number of occupational jobs in each industry for the region. Next, the occupational average hourly earnings per job are multiplied by 2,080 hours, which converts the average hourly earnings into a yearly estimate. Then the matrix of occupational jobs is multiplied by the occupational annual earnings per job, converting it into earnings values. Last, all earnings are adjusted to match the known industry totals. This is a fairly simple process, but one that is very important. These matrices describe the place-of-work earnings used by the MR-SAM.

COMMUTING MODEL

The commuting sub-model is an integral part of Emsi's MR-SAM model. It allows the regional and multi-regional models to know what amount of the earnings can be attributed to place-of-residence vs. place-of-work. The commuting data describe the flow of earnings from any county to any other county (including within the counties themselves). For this situation, the commuted earnings are not just a single value describing total earnings flows over a complete year, but are broken out by occupation and demographic. Breaking out the earnings allows for analysis of place-of-residence and place-of-work earnings. These data are created using Bureau of Labor Statistics' OnTheMap dataset, Census' Journey-to-Work, BEA's LPI CA91 and CA05 tables, and some of Emsi's data. The process incorporates the cleanup and disaggregation of the OnTheMap data, the estimation of a closed system of county inflows and outflows of earnings, and the creation of finalized commuting data.

NATIONAL SAM

The national SAM as described above is made up of several different components. Many of the elements discussed are filled in with values from the national Z matrix—or industry-to-industry transaction matrix. This matrix is built from BEA data that describe which industries make and use what commodities at the national level. These data are manipulated with some industry standard equations to produce the national Z matrix. The data in the Z matrix act as the basis for the majority of the data in the national SAM. The rest of the values are filled in with data from the county earnings distribution matrices, the commuting data, and the BEA's National Income and Product Accounts.

One of the major issues that affect any SAM project is the combination of data from multiple sources that may not be consistent with one another. Matrix balancing is the broad name for the techniques used to correct this problem.

Emsi uses a modification of the “diagonal similarity scaling” algorithm to balance the national SAM.

GRAVITATIONAL FLOWS MODEL

The most important piece of the Emsi MR-SAM model is the gravitational flows model that produces county-by-county regional purchasing coefficients (RPCs). RPCs estimate how much an industry purchases from other industries inside and outside of the defined region. This information is critical for calculating all IO models.

Gravity modeling starts with the creation of an impedance matrix that values the difficulty of moving a product from county to county. For each sector, an impedance matrix is created based on a set of distance impedance methods for that sector. A distance impedance method is one of the measurements reported in the Oak Ridge National Laboratory’s County-to-County Distance Matrix. In this matrix, every county-to-county relationship is accounted for in six measures: great-circle distance, highway impedance, rail miles, rail impedance, water impedance, and highway-rail-highway impedance. Next, using the impedance information, the trade flows for each industry in every county are solved for. The result is an estimate of multi-regional flows from every county to every county. These flows are divided by each respective county’s demand to produce multi-regional RPCs.