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Economic Impact Study 2019: Profiling the Growth of Oregon's Bioscience Industry in 2017
(and Trends Since 2002)

Executive Summary

Independently Prepared for the Oregon Bioscience Association by Pinnacle Economics, Inc.

pinnacle economics

3030 NW 12th Avenue
Camas, WA 98607
(503) 816-0295
www.pinnacleecon.com

Oregon Bioscience Association

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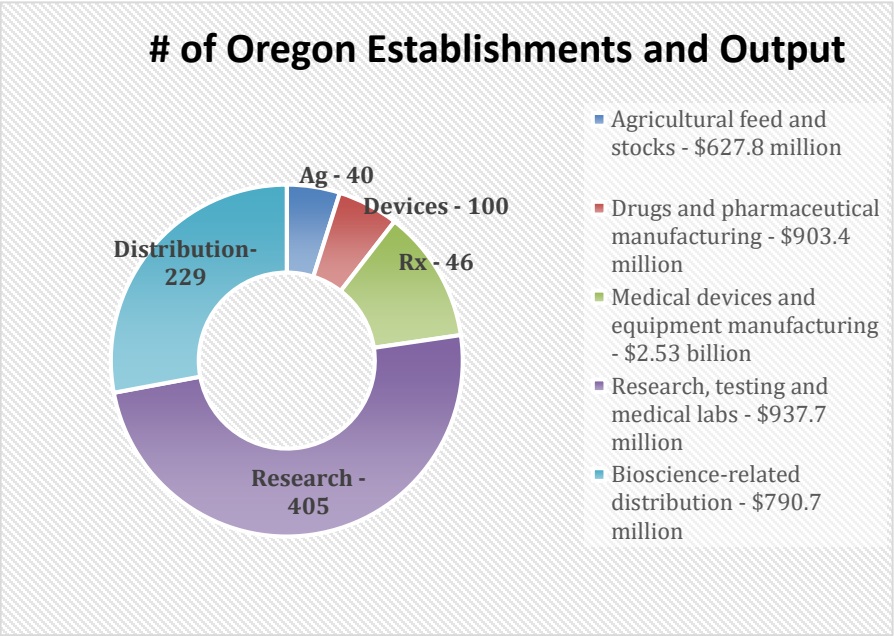
May, 2019

Dear Colleagues,

With its dedication to improving the quality of life for people around the world, Oregon's growing life science industry continues to shine. From new and better therapies for cancer and heart disease to improvements in wound care, drug delivery methods and use of artificial intelligence to advance precision medicine, Oregon companies are at the forefront of innovation. Considering Oregon's renowned academic and research institutions along with recent significant investments in the state, the trends noted in this study are expected to accelerate.



Oregon's 800+ life sciences companies and leading academic and research institutions employed over 19,000 **individuals earning $1.96 billion** and directly **contributed $6.5 billion** to Oregon's economy in 2017. With **$3.9 billion in exports**, bioscience brings new money to the state. When indirect and induced employment is added—jobs that support and are supported by the sector—we find more than **47,000 people employed** by the industry in Oregon who generated **$400 million in state and local tax fees and revenues**. These are impressive contributions to Oregon, but they pale in comparison to the medicines, devices and diagnostic tests brought to patients everywhere.

This year's ***Economic Impact Study: Profiling the Growth of Oregon's Bioscience Industry*** outlines these and many other measures of success. While Oregon's life sciences sector has done well, we must continue to foster a supportive environment in the state encouraging bioscience companies to start, grow and stay in Oregon. Oregon Bioscience Association is working with industry, academia and policymakers to streamline regulations, increase education and research funding, improve the tax climate and deliver other policy changes that will advance health innovation and patients' access to care and therapies.

Sincerely,

Liisa Bozinovic

Liisa Bozinovic, Executive Director

Introduction

Pinnacle Economics, Inc.,[1] ("Pinnacle") was engaged by the Oregon Bioscience Association ("Oregon Bio") to measure the economic impacts of the bioscience industry in Oregon in 2017. This represents the fifth such study, and updates previous efforts that measured the bioscience industry in 2002, 2007, 2009, and 2014. Similar to previous studies, Oregon's bioscience industry consists of the following two general categories:

1) **Private bioscience** represents bioscience-related activities carried out by private companies within industry sectors originally defined in Battelle's 2006 national study and updated in TEConomy's recent 2018 study;[2] and
2) **Life science research** at universities and hospitals.

To quantify the **direct** dimensions Oregon's bioscience industry, Pinnacle relied on detailed, firm-level wage and employment data from the Oregon Employment Department ("OED"), as well as funding, expenditure, payroll, and employment data gathered by Oregon Bio from research universities and hospitals in Oregon. These two primary datasets were then augmented with additional data from an economic impact model of Oregon developed using the IMPLAN software, as well as additional government data sources.

The **total** economic impacts of Oregon's bioscience industry in Oregon include the direct economic activity plus secondary or multiplier effects generated as a result of supply-chain (indirect impacts) and consumption-driven (induced impacts) spending in other industries. The contributions of the bioscience industry are larger than the industry itself because bioscience spending and incomes generate additional economic activity in other sectors of the Oregon economy. These multiplier effects were measured using an IMPLAN economic impact model of the Oregon economy in 2017.

Key Findings

The key findings of the bioscience industry in Oregon in 2017 include:

1. **Private bioscience consisted of 820 establishments that directly generated $5.8 billion in output, and employed 14,603 workers who received just over $1.0 billion in wages.** Adding in payroll taxes and other non-income benefits, the total income for employees in private bioscience was over $1.4 billion. With $3.8 billion in exports (66 percent of industry output), private bioscience brings "new" money to the state. In 2017, private bioscience firms and employees directly generated $182.8 million in state and local tax and fee revenues.

[1] Alec Josephson, economist and president of Pinnacle Economics, is the sole author of this report. With 25 years of economic consulting experience, Mr. Josephson is a nationally recognized expert in economic impact analysis and has directed, conducted, and/or authored well over 500 economic impact projects. See www.pinnacleecon.com.

[2] The private bioscience industry is defined using North American Industry Classification System ("NAICS") codes identified in Battelle's national studies conducted for 2006, 2007, 2010, 2012, and 2014. Private bioscience includes the following five sectors: 1) agricultural feed stocks and chemicals manufacturing, 2) drugs and pharmaceutical manufacturing, 3) medical devices and equipment manufacturing, 4) research, testing, and medical laboratories, and 5) bioscience-related distribution. This definition continues with the recent study conducted by TEConomy Partners, LLC., entitled *Investment, Innovation, and Job Creation in a Growing U.S. Bioscience Industry*, 2018.

- According to OED data, the average annual wage in private bioscience was $70,451 or 40 percent greater than the statewide average wage ($50,483) for private sector employment in 2017.
- Private bioscience exists in nearly every county and is well represented outside of the three-county Portland area. In 2017, 433 private bioscience firms (52 percent of total private bioscience) were located outside of Portland, and they employed 6,778 persons (46 percent) and generated $427.2 million in wages (42 percent). Most of the growth in private bioscience between 2014 and 2017 occurred outside of the three-county Portland area.
- Private bioscience generated $1.4 billion (24 percent of output) in other income such as profits, royalties, rents and dividends.
- In the 15 year period between 2002 and 2017, private bioscience employment increased 77 percent (+4,800 jobs), total wages increased 178 percent (+$489.7 million), and average annual wages increased 57 percent (+$25,200).[3]

2. **Life science research at Oregon universities and hospitals directly generated $669.0 million in economic activity, including $422.8 million in wages and 4,554 jobs.** In addition, life science research institutions and employees generated $25.7 million in state and local taxes.
   - Based on payroll data supplied by life science research institutions, the average annual wage was $92,840 in 2017, or 84 percent greater than the statewide average wage for private sector employment.
   - Similar to private bioscience, life science research has experienced significant and steady growth. Between 2002 and 2017, employment in life science research increased 73 percent (+1,924 jobs), total wages increased 191 percent (+$277.2 million), and average annual wages increased 68 percent (+$37,500).

Table ES1: Bioscience Direct Impacts, 2017 ($ millions)

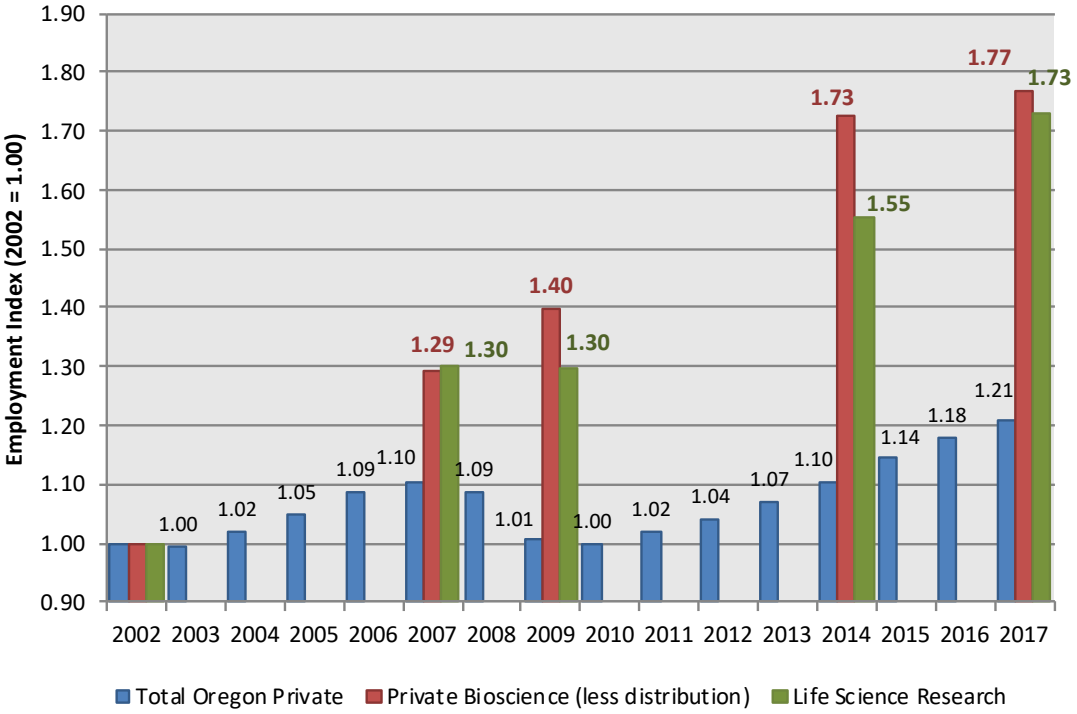
Measure	Private Bioscience	Life Science Research	Total Bioscience
Output	$5,799.1	$669.0	$6,468.1
Income	$1,443.3	$516.3	$1,959.6
• Wages	$1,028.8	$422.8	$1,451.6
Other Income	$1,380.5	$41.7	$1,422.3
Exports	$3,833.2	$115.2	$3,948.4
Jobs	**14,603**	**4,554**	**19,157**
Average Annual Wage	$70,451	$92,840	$75,773
State and Local Tax Revenues	$182.8	$25.7	$208.6
Federal Tax Revenues	$343.3	$88.2	$431.5

[3] These changes were estimated after controlling for Battelle's revised definition of private bioscience in 2014.

3. **Oregon's combined bioscience industry (private bioscience plus life science research) <u>directly</u> generated $6.5 billion in economic activity, including $1.5 billion in wages, 19,157 jobs, and $3.9 billion in exports in 2017.**[4] Bioscience firms and employees directly generated $208.6 million in state and local taxes.

   - Total bioscience employment increased 76 percent between 2002 and 2017, with substantial employment growth in both private bioscience (+77 percent) and life science research (+73 percent).

Figure ES1: Bioscience Employment Changes, 2002-2017



4. The direct economic activity associated with Oregon's bioscience industry will have secondary or "multiplier" effects for other sectors of Oregon's economy. **Pinnacle estimates that the <u>total</u> economic activity attributed to Oregon's bioscience industry amounts to $10.7 billion in output (or sales), including $3.4 billion in income and over 47,200 jobs in 2017.** In addition, Oregon's bioscience industry is linked to economic activity that supports $401.9 million in tax and fee revenues for state and local governments, as well as $789.6 million in federal government tax revenues.

   - As the direct dimensions of the bioscience industry grows, so, too, does its total economic impacts. Between 2014 and 2017, the total output and income attributed to Oregon's bioscience industry increased by $408.6 million (+4 percent) and $314.4 million (+10 percent), respectively. Similarly, the total employment impacts attributed to

[4] Bioscience export activity is largely attributed to private bioscience. However, much of life science research is funded by local and non-local private sources, and the federal government. In 2017, the National Institute of Health funded $312.2 in medical research in Oregon. Similar to exports, non-local funding represents new dollars for the Oregon economy.

the bioscience industry increased by 1,200 jobs (+4%) over this three-year period.

Table ES2: Bioscience Total Impacts, 2017 ($ millions)

Measure	Direct	Secondary (Indirect + Induced)	Total
Output	$6,468.1	$4,249.8	$10,717.9
Income	$1,959.6	$1,486.7	$3,446.2
Other Income	$1,422.3	$825.6	$2,247.8
Jobs	**19,157**	**28,081**	**47,238**
State and Local Taxes	$208.6	$193.4	$401.9
Federal Taxes	$431.5	$358.1	$789.6

5. **As shown in Table ES3, the bioscience industry generates economic activity in every sector of the Oregon economy.** Secondary impacts attributed to bioscience include:

   - Indirect or supply-chain impacts of $2.3 billion in economic activity, including $814.5 million in income and 12,932 jobs. Approximately 20 percent of indirect job impacts accrue to the professional and technical services sector, benefiting employees and firms in marketing, management services, accounting, legal, advertising, and architectural and engineering.
   - Induced or consumption-driven impacts of $2.0 billion in economic activity, including $672.2 million in income and 15,149 jobs. These relatively large induced impacts are attributed to the high-paying jobs in bioscience, as well as indirect impacts in Oregon that occur in high-wage sectors.

Table ES3: Bioscience Total Impacts by Major Industry Sector, 2017 ($ millions)

Major Industry Sector	Output	Income	Jobs	Jobs % of Total
Natural Resources	$21.3	$6.4	231	0.5%
Utilities	$106.6	$14.1	103	0.2%
Construction	$57.9	$21.9	371	0.8%
Manufacturing	$4,323.4	$694.2	7,173	15.2%
Trade	$1,333.2	$550.0	7,899	16.7%
Transportation	$196.6	$69.2	1,234	2.6%
Services	$4,558.9	$2,049.0	29,504	62.5%
Government	$119.9	$41.4	723	1.5%
Total All Industries	$10,717.9	$3,446.2	47,238	100.0%

6. **From an economic impact perspective, the bioscience industry generates multiplier spending effects that benefit workers and business owners in other sectors of the Oregon economy.** All else considered, the larger the multiplier, the greater the interdependence between an industry and the rest of the economy. According to the economic impact model of Oregon, the bioscience industry, in aggregate, has the following multipliers:

   - An **employment multiplier of 2.5**, which suggests that every 10 jobs in the bioscience industry supports an additional 15 jobs in other sectors of the Oregon economy.

- An **income multiplier of 1.8**, which shows that every $1 million in income directly generated in the bioscience industry is linked to another $800,000 in income for workers and business owners in other industries in Oregon.

7. **In 2017, of the 47,238 <u>total</u> jobs that are linked to Oregon's bioscience industry, approximately 21,740 jobs were held by women and 10,430 jobs were held by minorities, including 1,270 jobs for Blacks, 4,280 jobs for Hispanics, 3,060 jobs for Asians, and 1,820 jobs for all other races.**

    - In 2017, the bioscience industry <u>directly</u> employed 8,940 women (47 percent of bioscience employment) and 4,160 minority workers (22 percent of bioscience employment).

Table ES4: Bioscience Job Impacts for Women and Minorities, 2017

Demographic Group	Direct	Secondary	Total
Women	8,940	12,800	21,740
All Minorities	4,160	6,270	10,430
• Black	400	870	1,270
• Hispanic	1,460	2,820	4,280
• Asian	1,650	1,410	3,060
• All Other Races	650	1,170	1,820