# Performance of the Manufacturing Industries in Hawaii and the U.S.

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# Table of Contents

# EXECUTIVE SUMMARY

The North American Industry Classification System (NAICS) defines 472 detailed manufacturing industries at the 6-digit level. At the 3-digit level, the manufacturing sector includes 21 industry groups. Since some industry groups were very small in Hawaii, they were combined with the "other" group category.

The table below summarizes jobs for each of the respective NAICS-based manufacturing industry groups within the manufacturing sector. The total manufacturing sector had 18,767 jobs and 12 industry groups in 2015.

For nondurable goods, the food and beverage and tobacco group had the most jobs in 2015. The 8,666 jobs in this group accounted for 46.2 percent of the total manufacturing jobs in 2015. The two next largest groups in the nondurable category were the apparel and leather and allied product group and the printing and related support activities, each of which had more than 1,100 jobs in 2015. The top group in durable goods manufacturing is miscellaneous manufacturing, with about 1,800 jobs in 2015, followed by nonmetallic mineral products with more than 1,200 jobs in 2015.

**TABLE S-1. CONDENSED MANUFACTURING INDUSTRY GROUPS**

| Industry Group | 2015 Jobs | % of Total Manufacture Jobs | NAICS | 2015 Earnings |
|---|---|---|---|---|
| Manufacturing | 18,767 | 100.0 | 31 | 49,607 |
| Durable Goods Manufacturing | 6,014 | 32.0 | | 54,913 |
| Miscellaneous Manufacturing | 1,785 | 9.5 | 339 | 36,432 |
| Nonmetallic Mineral Product | 1,260 | 6.7 | 327 | 68,057 |
| Transportation Equipment | 814 | 4.3 | 336 | 87,773 |
| Wood Product | 642 | 3.4 | 321 | 24,261 |
| Furniture and Related Product | 520 | 2.8 | 337 | 53,879 |
| Other Durable Goods | 993 | 5.3 | 331-335 | 64,890 |
| Nondurable Goods Manufacturing | 12,753 | 68.0 | | 47,112 |
| Food and Beverage and Tobacco | 8,666 | 46.2 | 311-312 | 43,151 |
| Apparel and Leather and Allied Product | 1,236 | 6.6 | 315-316 | 26,515 |
| Printing and Related Support Activities | 1,158 | 6.2 | 323 | 36,638 |
| Petroleum and Coal Products | 523 | 2.8 | 324 | 167,531 |
| Chemical Manufacturing | 429 | 2.3 | 325 | 58,852 |
| Other Nondurable Goods | 741 | 3.9 | 313-314, 322, 326 | 52,318 |
| Source: EMSI and DBEDT, READ. | | | | |

Hawaii's manufacturing sector differs from the U.S. in the following ways: (1) Hawaii's manufacturing is concentrated more on nondurable goods, while U.S. manufacturing is concentrated

more on durable goods. 68.0 percent of Hawaii manufacturing workers produce nondurable goods and 32.0 percent of the workers produce durable goods. In contrast, a majority of U.S. manufacturing is in durable goods, with 62.6 percent of U.S. manufacturing workers producing durable goods and 37.4 percent producing non-durable goods. (2) Manufacturing composes a greater share of the U.S. economy than that of Hawaii's economy. In 2015, U.S. manufacturing contributed 12.2 percent of the U.S. GDP, while Hawaii's manufacturing contributed 1.8 percent of the state's GDP. (3) The U.S. manufacturing industry is more diversified than Hawaii's manufacturing industry. The main categories for U.S. manufacturing are metal products, machinery, equipment, computers and electronic products, with these categories accounting for 65.1 percent of U.S. manufacturing real GDP. Petroleum products and processed food are the major categories for Hawaii's manufacturing industry, accounting for 53.3 percent of Hawaii's manufacturing real GDP. (4) U.S. manufacturers are larger companies, with an average of 38 employees per establishment versus 20 employees per establishment for Hawaii. (5) Hawaii manufactures pay more for materials than their U.S. counterparts. For Hawaii, 83.2 percent of manufacturing costs were for materials, while 71.4 percent of U.S. manufacturing costs were for materials. (6) On average, Hawaii's manufacturing workers were paid less than the national average. In 2015, the average earnings for Hawaii's manufacturing workers was $49,607 versus $76,657 for U.S. manufacturing workers.

Between 2005 and 2015, Hawaii's manufacturing industries added only about 200 jobs, while Hawaii's total economy added about 67,000 jobs. As a result, the manufacturing sector's contribution to Hawaii's employment dropped from 2.2 percent in 2005 to 2.1 percent in 2015. However, five of the industry groups showed job growth during the past decade: transportation equipment, petroleum and coal products, food and beverage and tobacco, other durable goods, and nonmetallic mineral product.

From 1998 to 2015, the share of manufacturing jobs in total jobs decreased by 0.5 percentage point in Hawaii. The decrease in the share of manufacturing jobs was partially due to increased labor productivity. In other words, the decrease in the manufacturing sector's share of real GDP was less than the share of the total job decrease. This was true for both Hawaii and the nation, especially for the nation.

Labor productivity in Hawaii's manufacturing sector, especially durable goods, was lower than the overall productivity of all industries combined. However, the growth rate of the manufacturing sector's labor productivity was higher than the overall productivity growth rate. From 1998 to 2015, all industries combined in Hawaii increased real GDP per job by 12.0 percent, from $70,266 to $78,716. However, for Hawaii's manufacturing sector, real GDP per job increased 24.2 percent, from $51,935 to $64,513 during the same period. For Hawaii's durable goods manufacturing, real GDP per job increased 44.7 percent, from $37,451 to $54,194 during the same period.

The next table shows how each of the respective NAICS-based manufacturing groups was classified on a performance matrix. Based on job growth alone, no manufacturing industry groups were qualified as high performing base-growth industries or transitioning industries for the 2005 to 2015 period. The industry groups in the emerging category were composed of transportation equipment, petroleum and coal products (mostly petroleum), food and beverage and tobacco, other durable goods, and nonmetallic mineral product. These groups accounted for about 65.3 percent of the total manufacturing sector jobs in 2015. The seven manufacturing industry groups that lost jobs in the 2005 to 2015 period fell into the declining quadrant of the performance map. These groups accounted for about 34.7 percent of total manufacturing sector jobs in 2015. The earnings average of the manufacturing industry was $49,607 in 2015, which was lower than the statewide average of $52,156.

**TABLE S-2. MANUFACTURING INDUSTRY GROUPS MAPPED BY PERFORMANCE, 2005-2015**

| Total Jobs, 2015: 18,767 | | | | | |
|---|---|---|---|---|---|
| Average Annual Earnings, 2015: $49,607 | | | | | |
| Net Change in Jobs, 2005-2015: 1.3% | | | | | |
| **Transitioning Group: 0.0% of Jobs** | | | **Base-Growth Group: 0.0% of Jobs** | | |
| Group | Change in Jobs | Average Earnings | Group | Change in Jobs | Average Earnings |
| NA | NA | NA | NA | NA | NA |
| **Declining Group: 34.7% of Jobs** | | | **Emerging Group: 65.3% of Jobs** | | |
| Group | Change in Jobs | Average Earnings | Group | Change in Jobs | Average Earnings |
| Miscellaneous Manufacturing | -8.5% | $36,432 | Transportation Equipment | 41.9% | $87,773 |
| Apparel and Leather and Allied Product | -14.0% | $26,515 | Petroleum and Coal Products | 20.0% | $167,531 |
| Chemical Manufacturing | -15.8% | $58,852 | Food and Beverage and Tobacco | 17.1% | $43,151 |
| Printing and Related Support Activities | -20.8% | $36,638 | Other Durable Goods | 9.7% | $64,890 |
| Other Nondurable Goods | -23.4% | $52,318 | Nonmetallic Mineral Product | 3.3% | $68,057 |
| Wood Product | -29.5% | $24,261 | | | |
| Furniture and Related Product | -30.2% | $53,879 | | | |

*NA denotes no industry groups in the category

# I. INTRODUCTION

The manufacturing sector is a driver for export activities, the creator of brand names, the source for innovation, the test bed for technology improvement, and the contributor for productivity growth. However, manufacturing has been a declining industry and this has led to efforts aimed at revitalizing the manufacturing industry, both at the national and local levels. In the past few years, Hawaii Legislature introduced many bills with the goal of increasing manufacturing competitiveness and creating more high paying jobs.

In looking at the global economy, a large share of manufacturing has shifted from the developed countries to the newly industrialized countries such as China. As a result, the manufacturing sector's share of the total economy has decreased over time in both the U.S. and Hawaii. Compared with the overall U.S. economy, Hawaii's manufacturing industry faces additional challenges including high energy, land, and material costs. Another challenge for Hawaii's economy is high shipping costs coupled with a limited local supply chain. A majority of raw materials and parts used for manufacturing are imported, adding substantial cost to the end product.

In spite of these challenges, there are advantages to developing Hawaii's manufacturing industry in certain areas. First, many of the manufacturing industry groups have above average wages and salaries. This is especially true for the petroleum refining, transportation equipment manufacturing, chemical manufacturing, and nonmetallic manufacturing.

Second, Hawaii has a very large defense sector. The Department of Defense spends about $2 billion each year on prime contracts and equipment in Hawaii. The proximity to military bases and personnel is an inherent advantage that local manufacturers can leverage through collaborations, just in time inventory, and joint research and development.

Finally, perhaps Hawaii's biggest advantage for manufacturing is that it has a global market of 8.5 million people that visit the state each year. In 2015, Hawaii visitors spent $15.2 billion dollars and there is tremendous potential for Hawaii to manufacture more products to serve the tourism market.

### Research Objectives

This report analyzes the recent trend of Hawaii's manufacturing sector, benchmarks the performance of the industries within the sector, and identifies potential challenges and opportunities for the manufacturing sector growth in Hawaii. Specifically, this study has four research objectives:

1) To benchmark the state's manufacturing industry as a whole.

2) To compare Hawaii's manufacturing industry against the U.S. total manufacturing industry performance. The report will compare the manufacturing's relative productivity and cost structure between the U.S. and Hawaii.

3) To examine the manufacturing industry performance in each of the manufacturing industry groups.

4) To examine the manufacturing industry performance in each of Hawaii's four counties.

## Data Sources

There are three main data sources used in this study. The first is the U.S. Bureau of Economic Analysis (BEA). The BEA provides employment, GDP, and real GDP data by three-digit North American Industry Classification System (NAICS) code for all U.S. states. It is important to note that the period available for analysis depends on the type of data. For six of the three-digit level NAICS industries, the BEA data are only available at the combined level of three industries. The employment data from the BEA are currently available from 1998 to 2015. The GDP by NAICS industry data are available at the two-digit level from 1997 to 2015 and available from 1997 to 2014 at the three-digit level.

The second source of data is the Economic Modeling Specialists, Inc. (EMSI). EMSI data consist primarily of jobs and labor earnings that are available annually at the six-digit NAICS level.[1] The EMSI data are available at both the state and the county level, but only available since 2001.

The third source of data is the U.S. Census Bureau. The 2012 Economic Census (EC) data includes detailed statistics for the manufacture industry costs.

[1] The basic data are compiled by Economic Modeling Specialists, Inc. (EMSI) and processed by DBEDT. EMSI supplements data from the Federal Departments of Labor and Commerce by including estimates of proprietors and self-employed jobs, and by estimating data for very small industries that are not reported by the Federal agencies due to disclosure issues.

## Major Industry Groups of the Manufacturing Sector

The Manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The North American Industry Classification System (NAICS) defines 472 detailed manufacturing industries at the 6-digit level and 21 available at the 3-digit level:

311 Food manufacturing

312 Beverage and tobacco product manufacturing

313 Textile mills

314 Textile product mills

315 Apparel manufacturing

316 Leather and allied product manufacturing

321 Wood product manufacturing

322 Paper manufacturing

323 Printing and related support activities

324 Petroleum and coal product manufacturing

325 Chemical manufacturing

326 Plastics and rubber product manufacturing

327 Nonmetallic mineral product manufacturing

331 Primary metal manufacturing

332 Fabricated metal product manufacturing

333 Machinery manufacturing

334 Computer and electronic product manufacturing

335 Electrical equipment, appliance, and component manufacturing

336 Transportation equipment manufacturing

337 Furniture and related product manufacturing

339 Miscellaneous manufacturing

The above industries are further classified as durable goods manufacturing or nondurable goods manufacturing. A durable good is a good that does not quickly wear out, or more specifically, one that can be used repeatedly over time rather than being completely consumed in one use. Nondurable goods may be defined either as goods that are immediately consumed in one use or ones that have a lifespan of less than 3 years.

As shown in Table 1, the durable goods manufacturing includes 10 industry groups, and the nondurable goods manufacturing includes 8 industry groups. In 2015, the manufacturing sector employed 18,767 people in Hawaii, accounting for about 2.1 percent of total jobs. Durable goods manufacturing had about 6,000 jobs, accounting for about 0.7 percent of total jobs in Hawaii. Nondurable goods manufacturing had about 12,800 jobs, accounting for about 1.4 percent of total jobs in Hawaii. Using EMSI data, durable and nondurable goods manufacturing can be broken down into 18 industry groups listed in Table 1.

**TABLE 1. DETAILED MANUFACTURING INDUSTRY GROUPS**

| Industry Group | 2015 Jobs | % in Total Jobs | NAICS | 2015 Earnings |
|---|---|---|---|---|
| All Industry Total Jobs | 896,608 | 100.00 | | 52,156 |
| Manufacturing | 18,767 | 2.09 | 31 | 49,607 |
| Durable Goods Manufacturing | 6,014 | 0.67 | | 54,913 |
| Wood Product | 642 | 0.07 | 321 | 24,261 |
| Nonmetallic Mineral Product | 1,260 | 0.14 | 327 | 68,057 |
| Primary Metal | 8 | 0.00 | 331 | 57,887 |
| Fabricated Metal Product | 511 | 0.06 | 332 | 66,631 |
| Machinery | 133 | 0.01 | 333 | 46,159 |
| Computer and Electronic Product | 286 | 0.03 | 334 | 75,739 |
| Electrical Equipment and Appliance | 54 | 0.01 | 335 | 41,318 |
| Transportation Equipment | 814 | 0.09 | 336 | 87,773 |
| Furniture and Related Product | 520 | 0.06 | 337 | 53,879 |
| Miscellaneous Manufacturing | 1,785 | 0.20 | 339 | 36,432 |
| Nondurable Goods Manufacturing | 12,753 | 1.42 | | 47,112 |
| Food and Beverage and Tobacco Product | 8,666 | 0.97 | 311-312 | 43,151 |
| Textile Mills and Textile Product Mills | 314 | 0.04 | 313-314 | 41,692 |
| Apparel and Leather and Allied Product | 1,236 | 0.14 | 315-316 | 26,515 |
| Paper | 84 | 0.01 | 322 | 68,170 |
| Printing and Related Support Activities | 1,158 | 0.13 | 323 | 36,638 |
| Petroleum and Coal Products | 523 | 0.06 | 324 | 167,531 |
| Chemical | 429 | 0.05 | 325 | 58,852 |
| Plastics and Rubber Products | 343 | 0.04 | 326 | 58,162 |
| Source: EMSI and DBEDT, READ. | | | | |

Since some industry groups listed in Table 1 were very small, they were combined with the "other" group category. The five durable goods industry groups, with NAICS code 331 to 335 were combined to the other durable goods group. The three nondurable goods industry groups, with NAICS code 313-314, 322, and 326 were combined to the other nondurable goods group. As shown in Table 2, the other durable goods category accounted for only 5.3 percent of total manufacturing jobs in Hawaii in 2015, while other nondurable goods accounted for only 3.9 percent of total manufacturing jobs in Hawaii in 2015.

**TABLE 2. CONDENSED MANUFACTURING INDUSTRY GROUPS**

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| Other Durable Goods | 993 | 5.3 | 331-335 | 64,890 |
| Nondurable Goods Manufacturing | 12,753 | 68.0 | | 47,112 |
| Food and Beverage and Tobacco | 8,666 | 46.2 | 311-312 | 43,151 |
| Apparel and Leather and Allied Product | 1,236 | 6.6 | 315-316 | 26,515 |
| Printing and Related Support Activities | 1,158 | 6.2 | 323 | 36,638 |
| Petroleum and Coal Products | 523 | 2.8 | 324 | 167,531 |
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| Other Nondurable Goods | 741 | 3.9 | 313-314, 322, 326 | 52,318 |
| Source: EMSI and DBEDT, READ. | | | | |

# II. COST STRUCTURE OF MANUFACTURING SECTOR

This section describes the cost structure of the manufacturing sector. Revenue and cost data are only available every five years from the U.S. Census Bureau's Economic Census. 2012 is the latest year when data are available. Due to the data disclosure rules, the Census Bureau did not release the data for Petroleum industry for Hawaii since there are only two refineries in the state.

According to estimate by DBEDT, about 57 percent of the sales in Hawaii's manufacturing sector in 2012 were generated in the Petroleum industry. The petroleum industry imported $4.8 billion worth of crude oil into the state in that year. This big amount of imports alone made Hawaii's manufacturing sector heavy reliance on materials, compared with the U.S. average. The Census data reveal that total manufacturing cost was composed of 83.2 percent material costs in Hawaii; while U.S. average material cost was 71.4 percent of total manufacturing cost.

Labor cost in Hawaii's manufacturing sector was lower than that of the U.S. manufacturing sector. 7.4 percent of the manufacturing sector's total cost was for labor in Hawaii in 2012, while 16.2 percent of the manufacturing sector cost went to labor for the U.S. as a whole. This was also an indication that Hawaii manufacturing workers were generally paid less than their mainland counterparts. Investment in the manufacturing sector was also low in Hawaii with only about 1.3 percent of the total manufacturing cost for capital expenditures in Hawaii versus 3.5 percent for the U.S..

Despite of Hawaii's notoriously high rental prices, percentage of total rental payments in Hawaii's manufacturing sector was only slightly higher than of the U.S. manufacturing average (0.8 percent for Hawaii, 0.7 percent for U.S. average).

**TABLE 3. COMPARISON OF MANUFACTURING SECTOR'S COSTS**

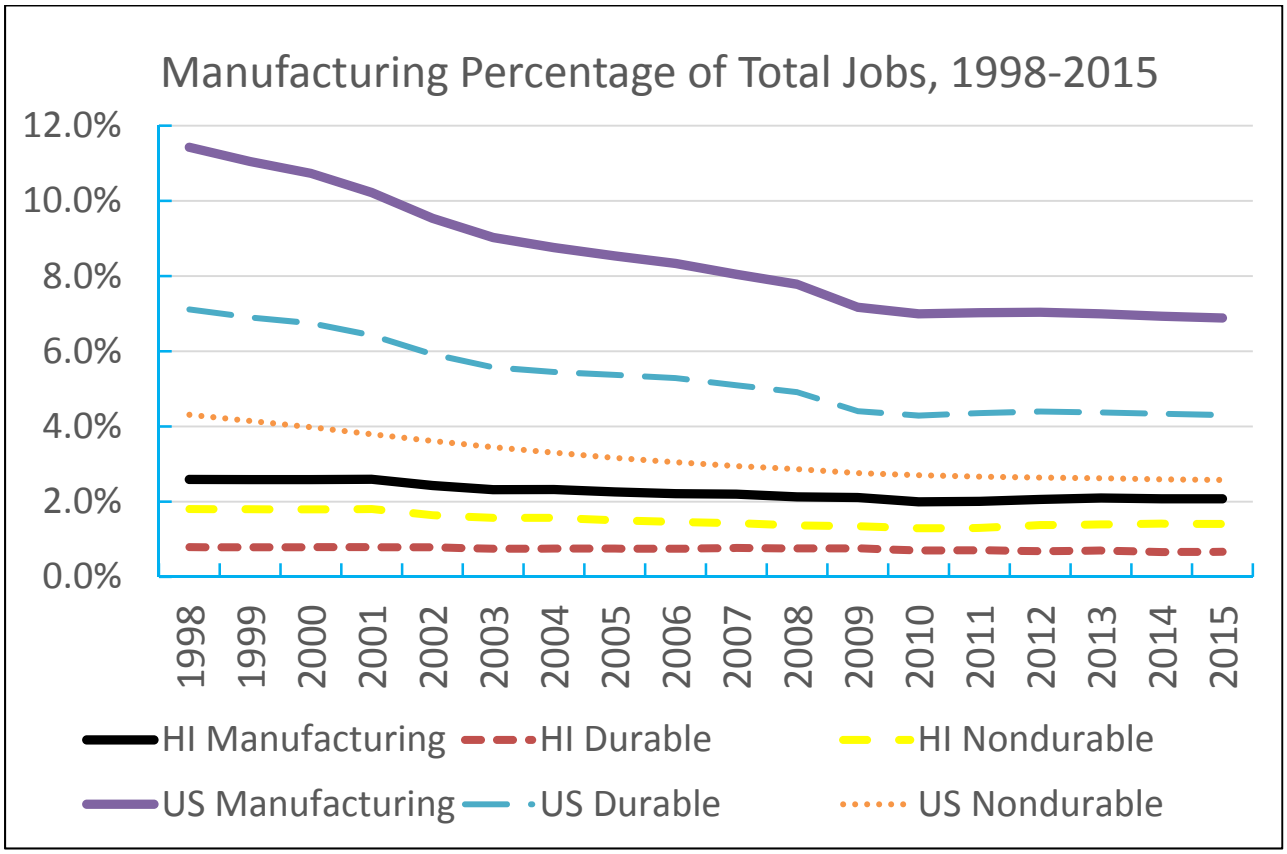
| | 2012 | | % of Cost | | HI above U.S. |
|---|---|---|---|---|---|
| | HI | U.S. | HI | U.S. | Percentage Point |
| Total selected cost ($M) | 8,102 | 4,740,301 | 100.0 | 100.0 | 0.0 |
| Labor cost | 603 | 769,610 | 7.4 | 16.2 | -8.8 |
| Total annual payroll | 465 | 590,084 | 5.7 | 12.4 | -6.7 |
| Total fringe benefits | 138 | 179,526 | 1.7 | 3.8 | -2.1 |
| Employer's cost for health insurance | 52 | 71,262 | 0.6 | 1.5 | -0.9 |
| Employer's cost for defined benefit pension plans | 16 | 16,106 | 0.2 | 0.3 | -0.1 |
| Employer's cost for defined contribution plans | 13 | 18,825 | 0.2 | 0.4 | -0.2 |
| Employer's cost for other fringe benefits | 56 | 73,333 | 0.7 | 1.5 | -0.9 |
| Total cost of materials | 6,741 | 3,384,339 | 83.2 | 71.4 | 11.8 |
| Materials, parts, containers, packaging, etc. used | 5,975 | 3,076,382 | 73.7 | 64.9 | 8.8 |
| Cost of resales | 571 | 166,185 | 7.0 | 3.5 | 3.5 |
| Cost of purchased fuels | 121 | 34,556 | 1.5 | 0.7 | 0.8 |
| Purchased electricity | 44 | 50,587 | 0.5 | 1.1 | -0.5 |
| Contract work | 30 | 56,628 | 0.4 | 1.2 | -0.8 |
| Changes in inventories | 244 | 20,873 | 3.0 | 0.4 | 2.6 |
| Total capital expenditures (new and used) | 108 | 166,458 | 1.3 | 3.5 | -2.2 |
| Capital expenditures on buildings and other structures | 13 | 33,065 | 0.2 | 0.7 | -0.5 |
| Capital expenditures on machinery and equipment | 96 | 133,393 | 1.2 | 2.8 | -1.6 |
| On automobiles, trucks, etc. for highway use | 6 | 3,347 | 0.1 | 0.1 | 0.0 |
| On computers and peripheral data processing equ. | 6 | 5,758 | 0.1 | 0.1 | -0.1 |
| On all other machinery and equipment | 84 | 124,289 | 1.0 | 2.6 | -1.6 |
| Total rental payments | 61 | 33,530 | 0.8 | 0.7 | 0.0 |
| Buildings and other structures | 47 | 23,392 | 0.6 | 0.5 | 0.1 |
| Machinery and equipment | 14 | 10,138 | 0.2 | 0.2 | 0.0 |
| Total other expenses | 346 | 365,491 | 4.3 | 7.7 | -3.4 |
| Temporary staff and leased employee expenses | 21 | 30,931 | 0.3 | 0.7 | -0.4 |
| Expensed computer hardware and other equipment | 1 | 3,658 | 0.0 | 0.1 | -0.1 |
| Expensed purchases of software | 1 | 2,835 | 0.0 | 0.1 | 0.0 |
| Data processing and other purchased computer services | 6 | 6,288 | 0.1 | 0.1 | -0.1 |
| Communication services | 3 | 4,344 | 0.0 | 0.1 | -0.1 |
| Repair and maintenance services of buildings & machinery | 63 | 44,244 | 0.8 | 0.9 | -0.2 |
| Refuse removal (including hazardous waste) services | 13 | 13,438 | 0.2 | 0.3 | -0.1 |
| Advertising and promotional services | 13 | 13,265 | 0.2 | 0.3 | -0.1 |
| Purchased professional and technical services | 15 | 29,713 | 0.2 | 0.6 | -0.4 |
| Taxes and license fees | 28 | 17,129 | 0.3 | 0.4 | 0.0 |
| All other expenses | 182 | 199,645 | 2.2 | 4.2 | -2.0 |
| Source: U.S. Census Bureau and DBEDT, READ. | | | | | |

## III. HISTORICAL TRENDS OF THE MANUFACTURING SECTOR

Due to changes in the economic structure and labor productivity, the manufacturing sector's share of jobs to total jobs decreased over time in both the U.S. and in Hawaii. As shown in Figure 1, from 1998 to 2015, the manufacturing sector's share of total jobs decreased about 4.5 percentage points, from 11.4 percent to 6.9 percent for the nation. Nationally, the share of durable goods manufacturing decreased 2.8 percentage points and the share of nondurable goods manufacturing decreased 1.7 percentage point. In looking at Hawaii, the manufacturing sector's share of total jobs decreased about 0.5 of a percentage point. The share of durable goods manufacturing in Hawaii decreased about 0.1 of a percentage point, while the share of nondurable goods manufacturing decreased about 0.4 of a percentage point.

While the role of the manufacturing sector in Hawaii is significantly less than that of the nation, especially for durable goods, the gap has been decreasing.

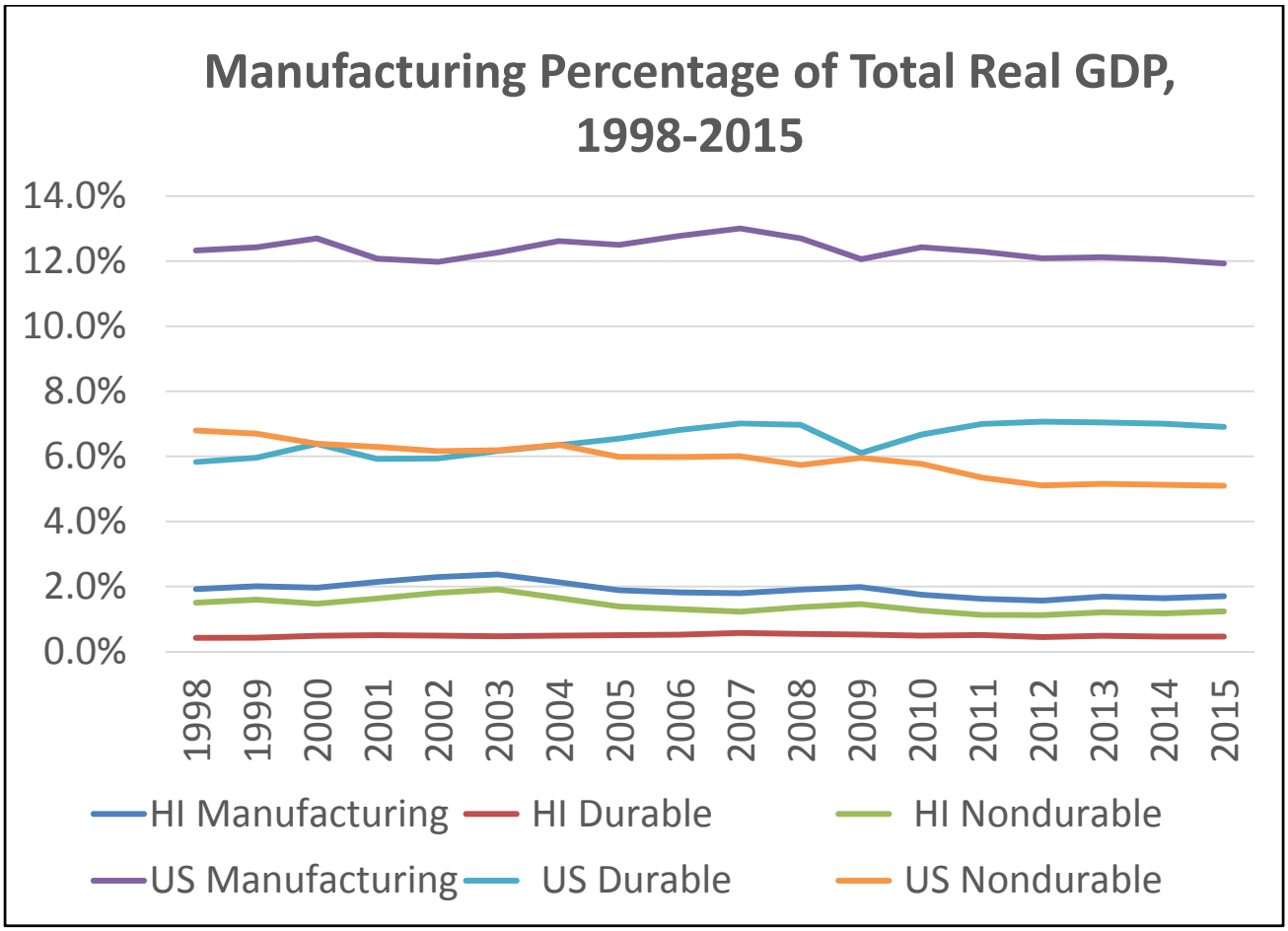
**FIGURE 1**



The decreased share of manufacturing jobs was partially due to increased labor productivity. Compared with the U.S. productivity, improvements in Hawaii's manufacturing sector were smaller. As shown in Figure 2, from 1998 to 2015, the manufacturing sector's share of U.S. real GDP decreased 0.4 of a percentage point from 12.3 percent to 11.9 percent; the share of U.S. durable goods increased 1.1 percentage points from 5.8 percent to 6.9 percent, and the share of U.S. nondurable goods decreased 1.7 percentage points from 6.8 percent to 5.1 percent.

In looking at Hawaii, from 1998 to 2015, the manufacturing sector's share of total real GDP decreased 0.22 of a percentage point from 1.9 percent to 1.7 percent. Hawaii's share of durable goods increased 0.04 of a percentage point and the share of nondurable goods decreased 0.26 of a percentage point.

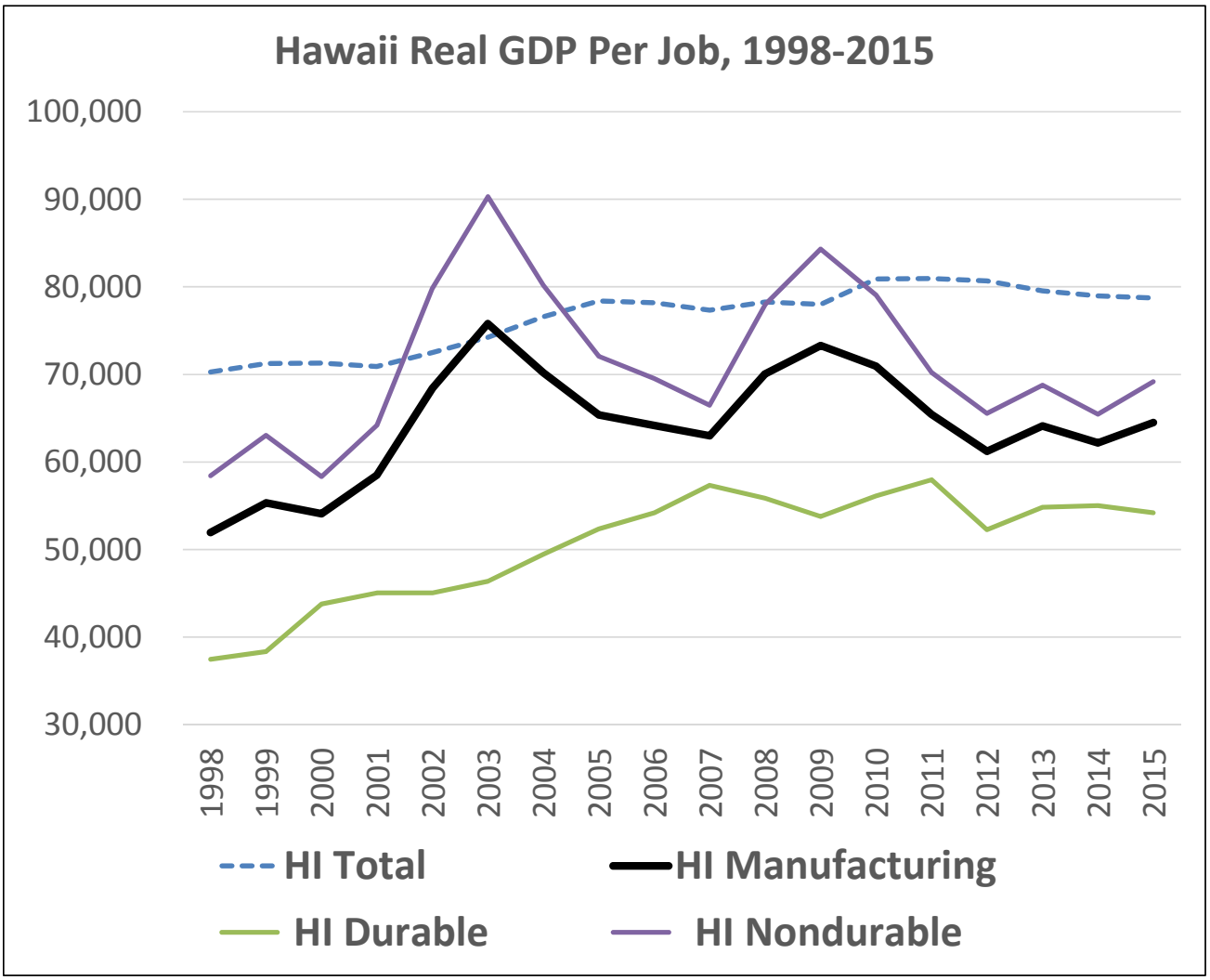
**FIGURE 2**



Labor productivity in Hawaii's manufacturing sector, especially durable goods, was lower than the productivity of all Hawaii's industries combined. However, the growth rate of the manufacturing sector's labor productivity was higher than the overall productivity growth. Figure 3 compares Hawaii's real GDP per job from 1998 to 2015. For all industries in Hawaii, real GDP per job increased 12.0 percent from $70,266 to $78,716. However, for Hawaii's manufacturing sector, real GDP per job increased 24.2 percent from $51,935 to $64,513. Real GDP per job for durable goods increased 44.7 percent from $37,451 to $54,194 and real GDP per job for nondurable goods increased 18.4 percent, from $58,425 to $69,162.

In 2015, Hawaii's manufacturing sector real GDP per job was about 18.0 percent below that of the total industry average. Durable goods was about 31.2 percent and the nondurable goods was about 12.1 percent below the total industry average. Additionally, the labor productivity for the manufacturing sector, especially nondurable goods manufacturing, was more volatile than that of the total industry average over time.

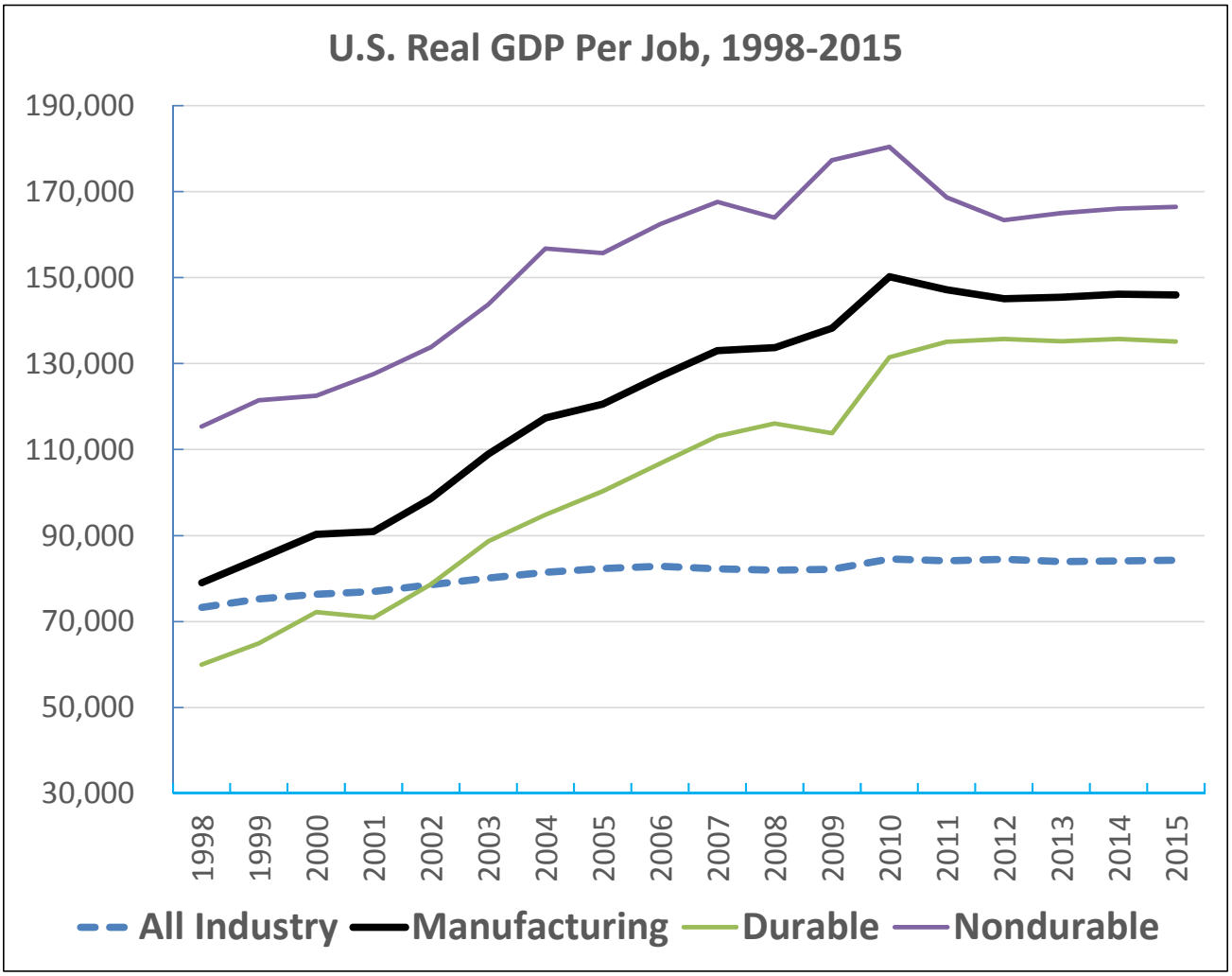
**FIGURE 3**



For the U.S., however, labor productivity for the manufacturing sector was significantly higher than the productivity for the average of all industries. Furthermore, the growth rate of the manufacturing sector's labor productivity, especially durable goods, was higher than the overall productivity growth. Figure 4 compares the U.S. real GDP per job from 1998 to 2015. For all industries, real GDP per job increased 15.0 percent from $73,243 to $84,246. For the manufacturing sector, real GDP per job increased 84.7 percent from $79,029 to $145,984. Real GDP per job for durable goods increased 125.3 percent from $59,982 to $135,121 and real GDP per job for nondurable goods increased 44.3 percent from $115,369 to $166,458. The gap between durable goods and nondurable goods decreased significantly.

In 2015, the U.S. manufacturing sector's real GDP per job was about 73.3 percent above that of the total industry average. The durable goods category was about 60.4 percent and the nondurable goods category was about 97.6 percent above the total industry average. For the total industry average, the U.S. real GDP per job was only about 7.0 percent higher than that of Hawaii in 2015. However, for the manufacturing sector, the U.S. real GDP per job was about 126.3 percent higher than that of Hawaii.

**FIGURE 4**



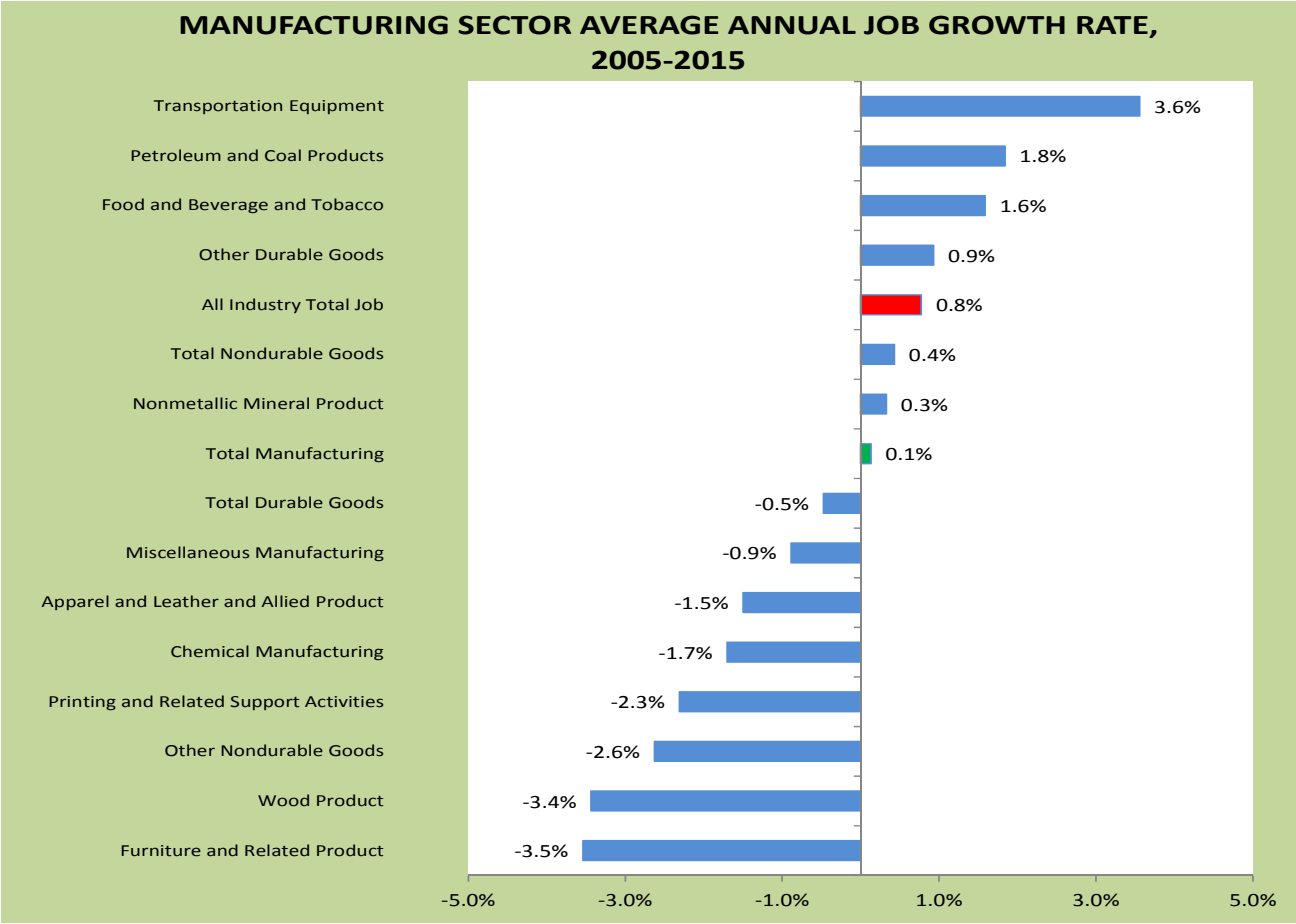
# IV. HAWAII'S MANUFACTURING SECTOR PORTFOLIO

As noted in the previous sections, the manufacturing sector data is categorized into durable goods manufacturing and nondurable goods manufacturing. The durable goods and nondurable goods both include 6 industry groups. This section will examine the performance of the 12 industry groups in the manufacturing sector in Hawaii.

## Manufacturing Sector Job Growth

From 2005 to 2015, the manufacturing sector's job growth was lower than that of the average job growth for all Hawaii's industries combined (Figure 5). Of the 12 manufacturing industry groups, six showed net job growth over the period and four had an average annual job growth rate above the overall state average of 0.8 percent. For the purpose of this analysis, the groups that exceeded the state average annual job growth rate were called *high growth* industry groups. Transportation equipment had the highest job growth; followed by petroleum and coal products, food and beverage and tobacco, and other durable goods. The manufacturing sector added only 0.1 percent jobs per year on average from 2005 to 2015, durable goods lost 0.5 percent per year, but nondurable goods added 0.4 percent per year.

**FIGURE 5**

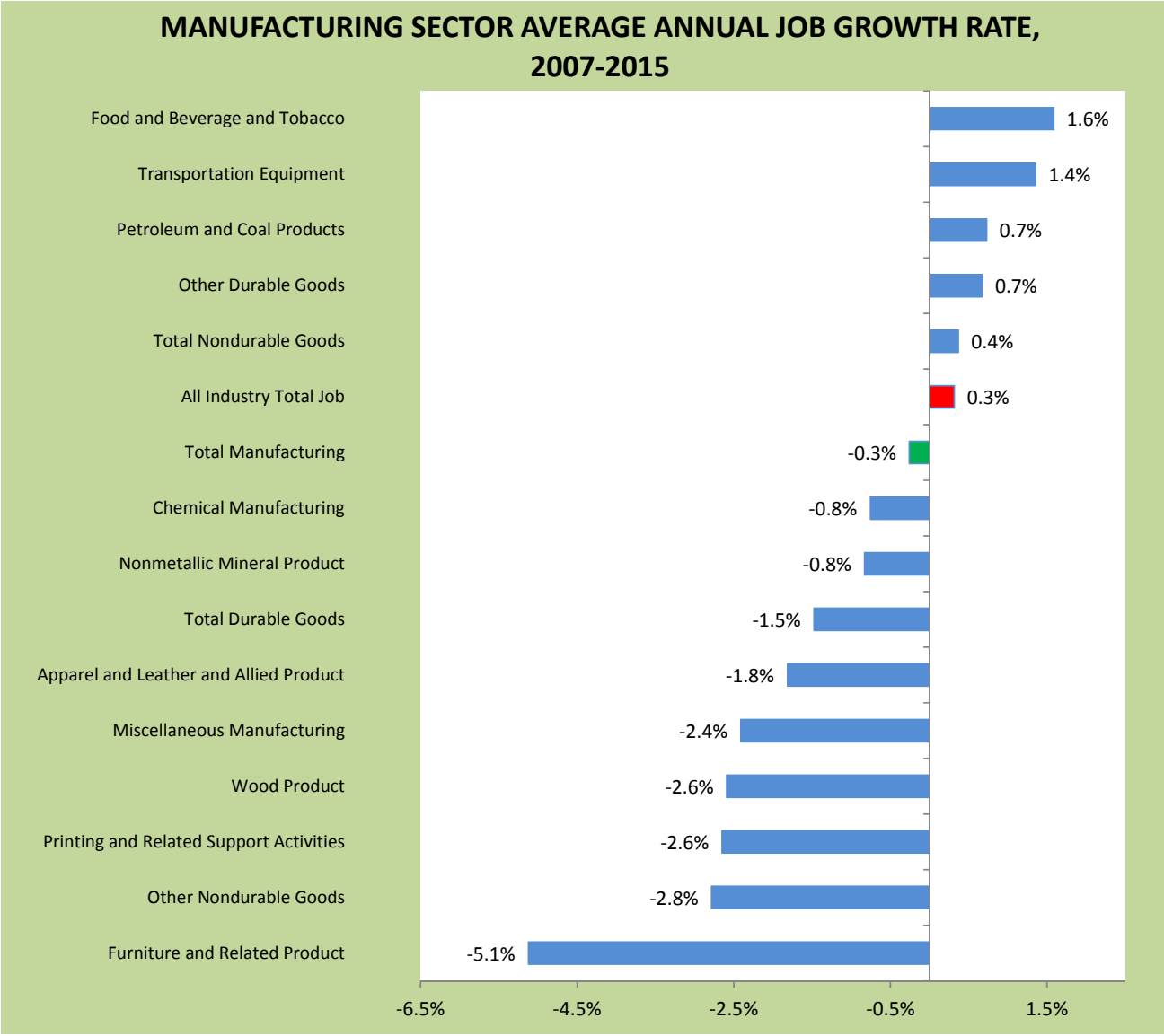



Source: DBEDT compilation based on EMSI data.

While this study focuses more on long-term trends, it is important to examine how jobs in the manufacturing sector have been impacted by the recession. The manufacturing sector experienced severe job losses from the recession that began in late 2007. Only five manufacturing industry groups had positive job growth during the 2007-2015 period. The strongest performers during this period were the food and beverage and tobacco group and the transportation equipment group.

The category of furniture and related product experienced the most significant jobs loss during this period, followed by other nondurable goods, printing and related supporting activity, wood product, miscellaneous manufacturing, apparel and leather and allied product, nonmetallic mineral product, and chemical manufacturing.

**FIGURE 6**




Source: DBEDT compilation based on EMSI data.

**TABLE 4. STATE OF HAWAII MANUFACTURING INDUSTRY JOBS**

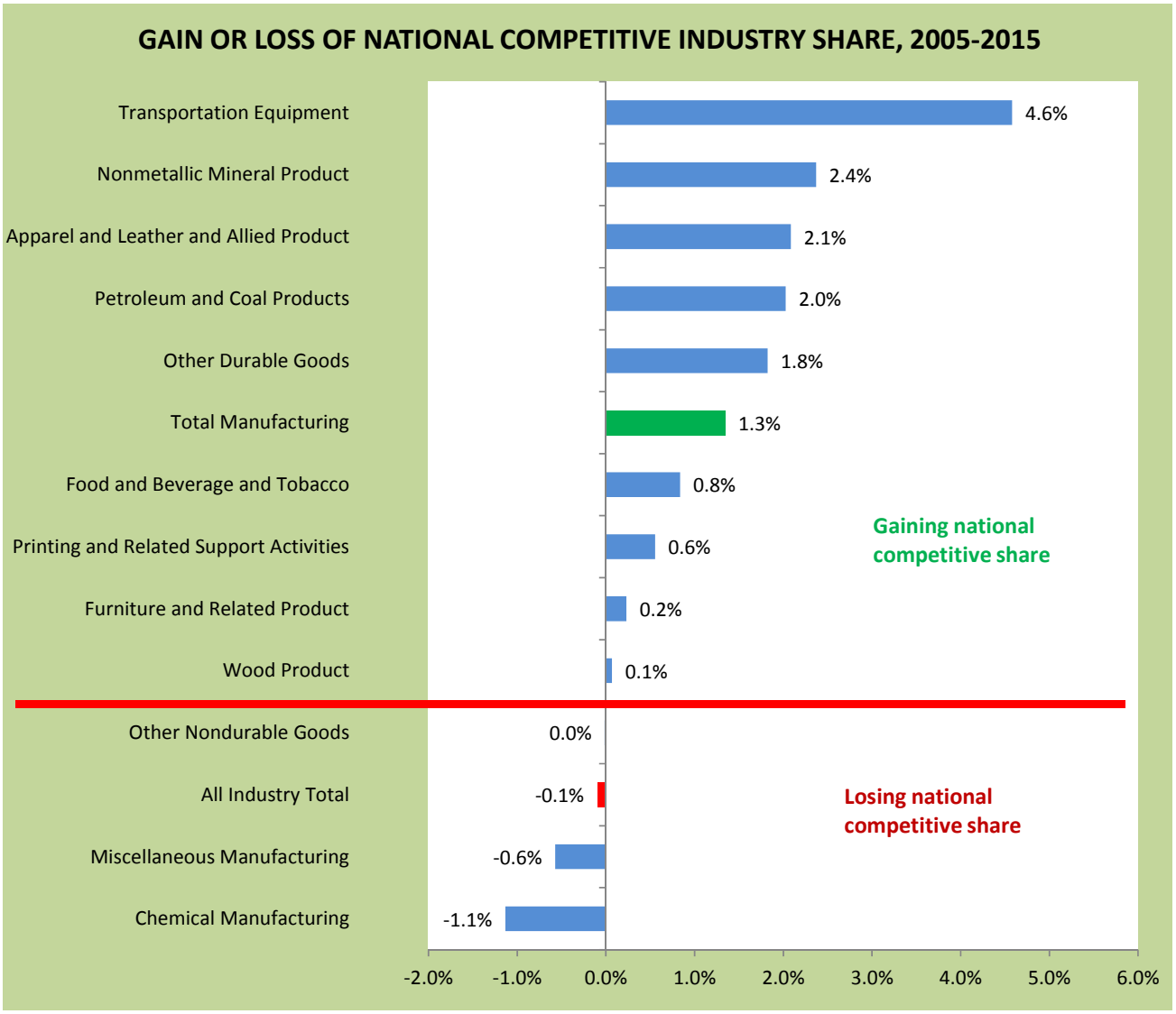
| Industry Group | Performance Class | Jobs | | | | Average Annual Job Growth (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2005 | 2007 | 2014 | 2015 | 2005-2007 | 2007-2015 | 2014-2015 | 2005-2015 |
| Transportation Equipment | Emerging | 574 | 731 | 760 | 814 | 12.9% | 1.4% | 7.1% | 3.6% |
| Nonmetallic Mineral Product | Emerging | 1,219 | 1,347 | 1,212 | 1,260 | 5.1% | -0.8% | 4.0% | 0.3% |
| Petroleum and Coal Products | Emerging | 436 | 494 | 493 | 523 | 6.4% | 0.7% | 6.1% | 1.8% |
| Other Durable Goods | Emerging | 905 | 941 | 963 | 993 | 2.0% | 0.7% | 3.1% | 0.9% |
| Food and Beverage and Tobacco | Emerging | 7,403 | 7,641 | 8,488 | 8,666 | 1.6% | 1.6% | 2.1% | 1.6% |
| Miscellaneous Manufacturing | Declining | 1,951 | 2,170 | 1,830 | 1,785 | 5.5% | -2.4% | -2.4% | -0.9% |
| Apparel and Leather and Allied Product | Declining | 1,437 | 1,431 | 1,209 | 1,236 | -0.2% | -1.8% | 2.2% | -1.5% |
| Chemical Manufacturing | Declining | 509 | 456 | 482 | 429 | -5.4% | -0.8% | -11.1% | -1.7% |
| Printing and Related Support Activities | Declining | 1,463 | 1,435 | 1,182 | 1,158 | -0.9% | -2.6% | -2.1% | -2.3% |
| Other Nondurable Goods | Declining | 967 | 929 | 697 | 741 | -2.0% | -2.8% | 6.4% | -2.6% |
| Wood Product | Declining | 911 | 792 | 622 | 642 | -6.7% | -2.6% | 3.2% | -3.4% |
| Furniture and Related Product | Declining | 745 | 791 | 519 | 520 | 3.1% | -5.1% | 0.1% | -3.5% |
| Total Manufacturing | Emerging | 18,519 | 19,158 | 18,457 | 18,767 | 1.7% | -0.3% | 1.7% | 0.1% |

Source: DBEDT compilation based on EMSI data.

## National Competitiveness of the Manufacturing Sector

Another measure that can help shed light on the manufacturing sector is the performance compared with the national industry average for each group. If a Hawaii manufacturing industry group has an average annual growth rate that is higher than the national average for the same group, then the Hawaii group is effectively increasing its competitive share of the total national industry. Conversely, if Hawaii's growth rate for a respective industry group is less than the national average, then the Hawaii group is effectively decreasing its competitive share of the total national industry. Figure 7 shows how much more or less Hawaii's manufacturing industries grew per year on average compared with the same industries nationally. For instance, over the 2005 to 2015 period, jobs in the transportation equipment industry group grew at an average annual rate that was 4.6 percent higher in Hawaii than the same industry nationwide. Thus, Hawaii's transportation equipment industry group increased its competitive national industry share. On the other hand, chemical manufacturing lost national industry share due to an average annual growth rate that was 1.1 percent below the national industry growth rate.

**FIGURE 7**



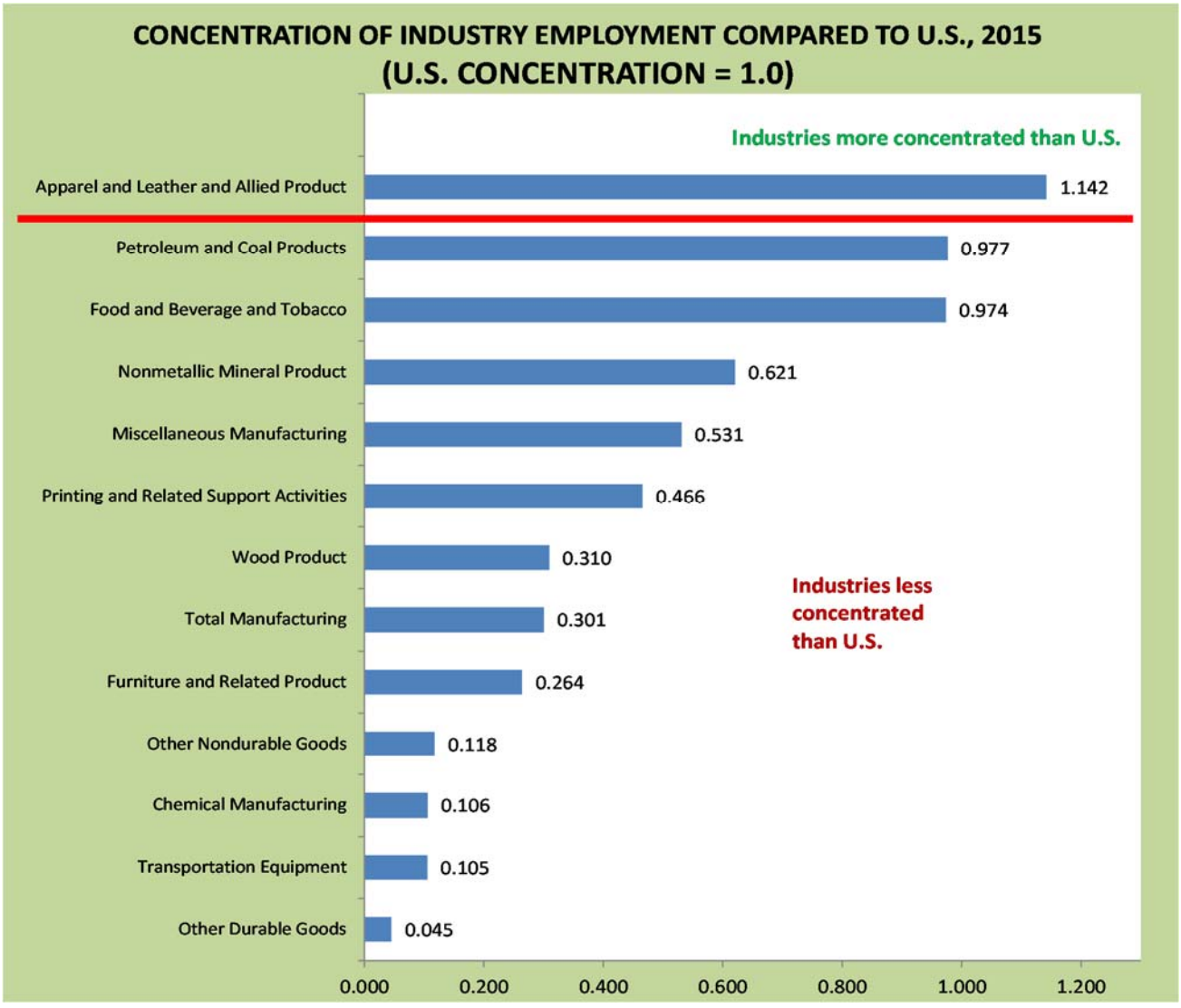

Source: DBEDT compilation based on EMSI data.

Of the 12 industry groups in the manufacturing sector, only three groups lost national competitive share over the 2005-2015 period. Industries that have both positive job growth and an increase in competitive national industry share, represent the best performing industry groups over a given period of time. Industry groups with the higher competitive share metric are probably showing a higher comparative advantage compared with the national industry. In Hawaii, these groups include transportation equipment, nonmetallic mineral product, petroleum manufacturing, other durable goods, and food and beverage and tobacco.

## Industry Concentration – Hawaii's Manufacturing Specialties

A third performance metric that helps in the evaluation of the manufacturing industry portfolio is industry job concentration (Figure 8). This is a measure of the state's level of specialization in each respective industry and helps shed light on the industries' export potential.

**FIGURE 8**




Source: DBEDT compilation based on EMSI data.

Export activity brings new money into the state and is a basis for long-term industry growth. Unfortunately, estimates of industry exports are not part of standard industry data programs. Thus, it is not clear how much output in a given manufacturing industry is exported.

However, it is possible to identify industries that are likely export by measuring the concentration of their employment in the state's economy. As explained above, an industry that employs a higher proportion of jobs in Hawaii than the same industry nationally, is relatively more concentrated and is more likely to be exporting some of its output.

Industry concentration is measured by a metric called the Location Quotient or LQ for short. The LQ for an industry at the state level that is equal to the U.S. level is 1.0. Hawaii industries with an LQ measure of more than 1.0 are more concentrated in the state economy than the same industry for the U.S. as a whole. Conversely, those industries that are below 1.0 are less concentrated in state economy than the U.S. as whole.

Of the 12 industry groups in the manufacturing sector, only the apparel and leather and allied product industry group had a concentration level in Hawaii's economy that was higher than the same industry nationally. Industries that are less concentrated in Hawaii may also be exporting some of their output. However, a majority of the output is probably serving local demand.

## Performance Map Framework: Identifying Emerging Manufacturing Industries

A framework to better understand the overall implications of these key performance metrics is the performance map adapted from the industry life cycle model. The performance map breaks industries in the economy into four generalized stages of life, starting with an *emerging* phase, moving to a *base-growth* industry phase, followed by a mature or *transitioning* phase and finally a *declining* phase. Of course, not all industries fit nicely into this notion, especially over short periods of time. However, with some qualifications, this notion of development stages can help us evaluate the status of the manufacturing industry portfolio.

Using the three performance metrics from Figures 5, 7 and 8, the manufacturing industry groups can be placed into one of four life-cycle quadrants according to the criteria shown in Table 5 and described below.

**TABLE 5. PERFORMANCE MAP CRITERIA**

| TRANSITIONING | BASE-GROWTH |
|---|---|
| • Positive job growth<br>• Losing competitive national industry share | • Positive job growth<br>• Highly concentrated in the economy<br>• Increasing competitive national industry share |
| **DECLINING** | **EMERGING** |
| • Losing jobs over period | • Positive job growth<br>• Current low concentration in the economy<br>• Increasing competitive national industry share |

**Emerging Quadrant**: These are industries that are potentially in the early, take-off stage. They have been performing well by showing both job growth and an increase in their competitive share of the national industry. However, these industries have yet to achieve a concentration in the state's economy equal to the same industry for the U.S. as a whole. An *emerging* manufacturing industry is one that has found a competitive niche in the economy and is gaining in competitive national industry share. At some point, if the process continues, the industry's concentration will exceed the national level and the emerging industry will graduate to a base-growth industry in the state's economy.

**Base-Growth Quadrant:** These are industries that have become potential economic drivers. They are growing their job counts and are increasing their competitive national industry share. Moreover, they have exceeded the national level of industry concentration in the economy and are probably exporting at least a proportion of their output.

**Transitioning Quadrant:** Transitioning manufacturing industries are still maintaining or growing their workforce, however they are losing competitive national industry share (growing more slowly than the same industry nationally). This is typical of mature industries that are still important to the economy but are having difficulty maintaining national market share. They are considered transitioning because they could either continue to lose industry share and eventually fall into decline, or reinvigorate themselves and begin to regain industry share and continue growing. Also in this quadrant may be former emerging industries that never reached base-growth status before losing competitive national industry share and some previously declining industries that are fighting back into competitiveness.

**Declining Quadrant:** The declining quadrant contains industry groups showing job losses over the period. All of these manufacturing industry groups have lost jobs to some extent between 2005 and 2015. Most industries that are losing jobs are also losing competitive national industry share. However, while they are declining in jobs for the period, these industries are not necessarily dying industries. A number of temporary circumstances may have put some of Hawaii's manufacturing industries into the declining quadrant for the period studied. Their appearance in the declining quadrant is a red flag that warrants more careful analysis to understand the problem.

It should be emphasized that the performance map framework is more of a guide to understand an industry's situation rather than a conclusion about the value of the industry to the state. It provides a starting point for assessing the strengths and weaknesses of the industries in the portfolio. Also, it is important to note that, within industries that are experiencing mixed or poor performance, there may be pockets of very successful firms.

Table 6 shows how each of the respective NAICS-based manufacturing industry groups fell on the performance map based on the 2005 to 2015 performance measures. Combined, the manufacturing industry groups accounted for about 18,767 jobs in Hawaii's economy in 2015.

**TABLE 6. MANUFACTURING INDUSTRY GROUPS MAPPED BY PERFORMANCE, 2005-2015**

| Total Jobs, 2015: 18,767 | | | | | |
|---|---|---|---|---|---|
| Average Annual Earnings, 2015: $49,607 | | | | | |
| Net Change in Jobs, 2005-2015: 1.3% | | | | | |
| **Transitioning Group: 0.0% of Jobs** | | | **Base-Growth Group: 0.0% of Jobs** | | |
| Group | Change in Jobs | Average Earnings | Group | Change in Jobs | Average Earnings |
| NA | NA | NA | NA | NA | NA |
| **Declining Group: 34.7% of Jobs** | | | **Emerging Group: 65.3% of Jobs** | | |
| Group | Change in Jobs | Average Earnings | Group | Change in Jobs | Average Earnings |
| Miscellaneous Manufacturing | -8.5% | $36,432 | Transportation Equipment | 41.9% | $87,773 |
| Apparel and Leather and Allied Product | -14.0% | $26,515 | Petroleum and Coal Products | 20.0% | $167,531 |
| Chemical Manufacturing | -15.8% | $58,852 | Food and Beverage and Tobacco | 17.1% | $43,151 |
| Printing and Related Support Activities | -20.8% | $36,638 | Other Durable Goods | 9.7% | $64,890 |
| Other Nondurable Goods | -23.4% | $52,318 | Nonmetallic Mineral Product | 3.3% | $68,057 |
| Wood Product | -29.5% | $24,261 | | | |
| Furniture and Related Product | -30.2% | $53,879 | | | |

Source: DBEDT compilation based on EMSI data.
*NA denotes no industry groups in the category

Overall, the manufacturing industry groups added 247 jobs between 2005 and 2015 in Hawaii. This amounted to a 1.3 percent increase in jobs. In contrast, total jobs in Hawaii increased 8.0 percent during the same period. Based on job growth alone, the leading performers of the manufacturing groups were transportation equipment, petroleum and coal products, food and beverage and tobacco, other durable goods, and nonmetallic mineral product groups. The earnings average of the manufacturing industry portfolio was $49,607 in 2015, which was lower than the statewide average of $52,156.

There were no manufacturing industry groups that qualified as base-growth industries or transitioning industries for the 2005 to 2015 period. The industry groups in the emerging category were composed of transportation equipment, petroleum and coal products (mostly petroleum), food and beverage and tobacco, other durable goods, and nonmetallic mineral product. These groups accounted for about 65.3 percent of the total manufacturing sector jobs in 2015. The seven manufacturing industry groups that lost jobs in the 2005 to 2015 period fell into the declining quadrant of the performance map. These groups accounted for about 34.7 percent of total manufacturing sector jobs in 2015.

# V. MANUFACTURING INDUSTRY PERFORMANCE BY COUNTY

The following tables summarize the 2005 to 2015 county performance of the statewide manufacturing industries (paid employment and self-employed/sole proprietors). Performance has been organized by *Best Performing Targets* (registering as base-growth & emerging industry groups) and *Other Targeted Industry Performance* (those that fell into the transitioning and declining categories).

## City & County of Honolulu

Honolulu accounted for 13,870 of the state's manufacturing industry jobs in 2015, a 0.1 percent average annual growth from 2005 to 2015. The average annual job growth rate was 1.4 percent from 2005 to 2007, and was negative 0.2 percent from 2007 to 2015. As shown in Table 7, five manufacturing industry groups were in the high performing quadrant in the 2005 to 2015 period. These high performing groups not only grew jobs during the period, but also increased their competitive share of the activity by exceeding the national growth rate for the industry. These included petroleum and coal products, food and beverage and tobacco, nonmetallic mineral product, transportation equipment, and other durable goods. Seven manufacturing industry groups lost jobs in Honolulu County over the 2005 to 2015 period. Apparel and leather and allied product lost the most jobs, followed by miscellaneous manufacturing, printing and related support activities, furniture and related products, other nondurable goods, wood product, and chemical manufacturing.

**TABLE 7. MANUFACTURING INDUSTRY JOBS, HONOLULU**

| Industry Group | Performance Class | Jobs | | | | Average Annual Job Growth (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2005 | 2007 | 2014 | 2015 | 2005-2007 | 2007-2015 | 2014-2015 | 2005-2015 |
| Petroleum and Coal Products | Base-Growth | 434 | 494 | 491 | 517 | 6.7% | 0.6% | 5.2% | 1.8% |
| Food and Beverage and Tobacco | Emerging | 5,194 | 5,315 | 6,198 | 6,296 | 1.2% | 2.1% | 1.6% | 1.9% |
| Nonmetallic Mineral Product | Emerging | 718 | 789 | 719 | 745 | 4.8% | -0.7% | 3.7% | 0.4% |
| Transportation Equipment | Emerging | 537 | 697 | 746 | 796 | 13.9% | 1.7% | 6.8% | 4.0% |
| Other Durable Goods | Emerging | 698 | 728 | 757 | 775 | 2.1% | 0.8% | 2.4% | 1.0% |
| Chemical Manufacturing | Declining | 291 | 273 | 246 | 276 | -3.2% | 0.1% | 12.4% | -0.5% |
| Miscellaneous Manufacturing | Declining | 1,544 | 1,625 | 1,308 | 1,267 | 2.6% | -3.1% | -3.1% | -2.0% |
| Apparel and Leather and Allied Product | Declining | 1,314 | 1,277 | 1,012 | 1,036 | -1.4% | -2.6% | 2.4% | -2.3% |
| Printing and Related Support Activities | Declining | 1,157 | 1,146 | 907 | 884 | -0.5% | -3.2% | -2.6% | -2.7% |
| Other Nondurable Goods | Declining | 874 | 842 | 625 | 663 | -1.8% | -2.9% | 6.2% | -2.7% |
| Wood Product | Declining | 446 | 425 | 286 | 294 | -2.4% | -4.5% | 3.0% | -4.1% |
| Furniture and Related Product | Declining | 542 | 533 | 320 | 319 | -0.8% | -6.2% | -0.5% | -5.2% |
| Total Manufacturing | Emerging | 13,749 | 14,144 | 13,614 | 13,870 | 1.4% | -0.2% | 1.9% | 0.1% |

Source: DBEDT compilation based on EMSI data.

The comparisons of Honolulu County's manufacturing industry jobs and earnings growth with the state and nation are listed in Table 8. For job growth, Honolulu County's 0.1 percent annual growth rate was the same as the state's growth rate but was better than the national average of negative 1.2 percent. For average earnings, Honolulu County was higher than the state, but lower than the national average.

**TABLE 8. HONOLULU COUNTY MANUFACTURING INDUSTRY PERFORMANCE COMPARED WITH STATE AND NATION, 2005-2015**

| Industry Group | Performance Class | Job Change 2005-2015 | Average Annual Job Growth (%) | | | Avg. Annual Earnings (2015) | | |
|---|---|---|---|---|---|---|---|---|
| | | | County | State | U.S. | County | State | U.S. |
| Petroleum and Coal Products | Base-Growth | 83 | 1.8% | 1.8% | -0.2% | 168,564 | 167,531 | 165,867 |
| Food and Beverage and Tobacco | Emerging | 1,102 | 1.9% | 1.6% | 0.8% | 114,937 | 43,151 | 56,365 |
| Nonmetallic Mineral Product | Emerging | 27 | 0.4% | 0.3% | -2.0% | 72,999 | 68,057 | 63,814 |
| Transportation Equipment | Emerging | 259 | 4.0% | 3.6% | -1.0% | 88,598 | 87,773 | 88,081 |
| Other Durable Goods | Emerging | 76 | 1.0% | 0.9% | -0.9% | 69,686 | 64,890 | 85,680 |
| Chemical Manufacturing | Declining | -15 | -0.5% | -1.7% | -0.6% | 61,576 | 58,852 | 118,964 |
| Miscellaneous Manufacturing | Declining | -277 | -2.0% | -0.9% | -0.3% | 40,217 | 36,432 | 75,037 |
| Apparel and Leather and Allied Product | Declining | -278 | -2.3% | -1.5% | -3.6% | 54,686 | 26,515 | 41,710 |
| Printing and Related Support Activities | Declining | -273 | -2.7% | -2.3% | -2.9% | 39,296 | 36,638 | 51,809 |
| Other Nondurable Goods | Declining | -211 | -2.7% | -2.6% | -2.6% | 52,945 | 52,318 | 64,075 |
| Wood Product | Declining | -152 | -4.1% | -3.4% | -3.5% | 25,085 | 24,261 | 48,255 |
| Furniture and Related Product | Declining | -223 | -5.2% | -3.5% | -3.8% | 55,361 | 53,879 | 48,572 |
| Total Manufacturing | Emerging | 121 | 0.1% | 0.1% | -1.2% | 52,730 | 49,607 | 76,657 |

Source: DBEDT compilation based on EMSI data.

## Hawaii County

Hawaii County accounted for 2,143 of the state's manufacturing jobs in 2015, a 0.1 percent average annual increase from 2005 to 2015. The average annual job growth rate was 7.0 percent from 2005 to 2007. However, since the recession began at the end of 2007, manufacturing job growth declined. Of the 12 manufacturing industry groups defined, only 11 groups had jobs in Hawaii County in 2015. As shown in Table 9, five manufacturing industry groups were high performing in Hawaii County during the 2005 to 2015 period. These included food and beverage and tobacco, apparel and leather and allied product, printing and related support activities, miscellaneous manufacturing, and other nondurable goods. Six manufacturing industry groups lost jobs in Hawaii County during the 2005 to 2015 period. Wood products lost the most jobs, followed by nonmetallic mineral product, chemical manufacturing, furniture and related product, transportation equipment, and other durable goods.

**TABLE 9. MANUFACTURING INDUSTRY JOBS, HAWAII COUNTY**

| Industry Group | Performance Class | Jobs | | | | Average Annual Job Growth (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2005 | 2007 | 2014 | 2015 | 2005-2007 | 2007-2015 | 2014-2015 | 2005-2015 |
| Food and Beverage and Tobacco | Base-Growth | 952 | 1,134 | 1,044 | 1,105 | 9.2% | -0.3% | 5.8% | 1.5% |
| Apparel and Leather and Allied Product | Emerging | 57 | 71 | 76 | 73 | 11.7% | 0.4% | -3.8% | 2.6% |
| Printing and Related Support Activities | Emerging | 125 | 133 | 133 | 136 | 3.1% | 0.2% | 1.7% | 0.8% |
| Miscellaneous Manufacturing | Emerging | 141 | 229 | 183 | 178 | 27.4% | -3.1% | -2.4% | 2.4% |
| Other Nondurable Goods | Emerging | 39 | 34 | 44 | 44 | -5.9% | 3.2% | 0.3% | 1.3% |
| Other Durable Goods | Declining | 102 | 126 | 87 | 98 | 10.9% | -3.1% | 12.1% | -0.4% |
| Nonmetallic Mineral Product | Declining | 235 | 259 | 195 | 198 | 4.8% | -3.3% | 1.8% | -1.7% |
| Furniture and Related Product | Declining | 115 | 144 | 94 | 87 | 11.9% | -6.1% | -7.3% | -2.7% |
| Chemical Manufacturing | Declining | 94 | 88 | 141 | 63 | -3.4% | -4.2% | -55.4% | -4.0% |
| Wood Product | Declining | 238 | 199 | 150 | 151 | -8.5% | -3.4% | 0.2% | -4.5% |
| Transportation Equipment | Declining | 27 | 18 | 5 | 10 | -18.9% | -6.5% | 104.9% | -9.2% |
| Total Manufacturing | Emerging | 2,125 | 2,434 | 2,153 | 2,143 | 7.0% | -1.6% | -0.5% | 0.1% |

Source: DBEDT compilation based on EMSI data.

The comparison of Hawaii County's manufacturing industry jobs and earnings growth with the state and nation are listed in Table 10. For job growth, Hawaii County's 0.1 percent annual growth rate was the same as the state's growth rate and above the national average of negative 1.2 percent. For average earnings, Hawaii County was lower than the state and much lower than the national average.

**TABLE 10. HAWAII COUNTY MANUFACTURING INDUSTRY PERFORMANCE COMPARED WITH STATE AND NATION, 2005-2015**

| Industry Group | Performance Class | Job Change 2005-2015 | Average Annual Job Growth (%) | | | Avg. Annual Earnings (2015) | | |
|---|---|---|---|---|---|---|---|---|
| | | | County | State | U.S. | County | State | U.S. |
| Food and Beverage and Tobacco | Base-Growth | 152 | 1.5% | 1.6% | 0.8% | 42,296 | 43,151 | 56,365 |
| Apparel and Leather and Allied Product | Emerging | 17 | 2.6% | -1.5% | -3.6% | 20,292 | 26,515 | 41,710 |
| Printing and Related Support Activities | Emerging | 10 | 0.8% | -2.3% | -2.9% | 21,339 | 36,638 | 51,809 |
| Miscellaneous Manufacturing | Emerging | 37 | 2.4% | -0.9% | -0.3% | 23,882 | 36,432 | 75,037 |
| Other Nondurable Goods | Emerging | 6 | 1.3% | -2.6% | -2.6% | 28,542 | 52,318 | 64,075 |
| Other Durable Goods | Declining | -4 | -0.4% | 0.9% | -0.9% | 41,649 | 64,890 | 85,680 |
| Nonmetallic Mineral Product | Declining | -37 | -1.7% | 0.3% | -2.0% | 57,952 | 68,057 | 63,814 |
| Furniture and Related Product | Declining | -28 | -2.7% | -3.5% | -3.8% | 54,333 | 53,879 | 48,572 |
| Chemical Manufacturing | Declining | -32 | -4.0% | -1.7% | -0.6% | 58,324 | 58,852 | 118,964 |
| Wood Product | Declining | -87 | -4.5% | -3.4% | -3.5% | 20,209 | 24,261 | 48,255 |
| Transportation Equipment | Declining | -17 | -9.2% | 3.6% | -1.0% | 70,508 | 87,773 | 88,081 |
| Total Manufacturing | Emerging | 18 | 0.1% | 0.1% | -1.2% | 39,334 | 49,607 | 76,657 |

Source: DBEDT compilation based on EMSI data.

## Maui County

Of the 12 condensed manufacturing industry groups defined in this study, only 11 groups had jobs in 2015 for Maui County. These groups accounted for 2,010 of the state's manufacturing industry jobs in 2015, a negative 0.1 percent average annual decrease from 2005 to 2015. The average annual job growth was a negative 2.2 percent from 2005 to 2007 and a positive 0.4 percent from 2007 to 2015. As shown in Table 11, six manufacturing industry groups were high performing in Maui County in the 2005 to 2015 period. These included nonmetallic mineral product, apparel and leather and allied product, miscellaneous manufacturing, furniture and related product, and other durable goods. Five manufacturing industry groups lost jobs in Maui County over the 2005 to 2015 period. Food and beverage and tobacco lost the most jobs, followed by printing and related support activities, other nondurable goods, wood product, and chemical manufacturing.

**TABLE 11. MANUFACTURING INDUSTRY JOBS, MAUI COUNTY**

| Industry Group | Performance Class | Jobs | | | | Average Annual Job Growth (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2005 | 2007 | 2014 | 2015 | 2005-2007 | 2007-2015 | 2014-2015 | 2005-2015 |
| Nonmetallic Mineral Product | Base-Growth | 188 | 233 | 226 | 244 | 11.2% | 0.6% | 7.7% | 2.6% |
| Apparel and Leather and Allied Product | Emerging | 48 | 53 | 78 | 86 | 5.7% | 6.2% | 10.3% | 6.1% |
| Miscellaneous Manufacturing | Emerging | 196 | 233 | 264 | 265 | 9.1% | 1.6% | 0.2% | 3.0% |
| Furniture and Related Product | Emerging | 57 | 74 | 76 | 94 | 13.5% | 3.2% | 24.6% | 5.2% |
| Other Durable Goods | Emerging | 86 | 71 | 89 | 87 | -8.8% | 2.5% | -3.1% | 0.1% |
| Transportation Equipment | Emerging | 5 | 12 | 5 | 5 | 55.8% | -10.5% | 0.0% | 0.0% |
| Food and Beverage and Tobacco | Declining | 1,033 | 932 | 931 | 927 | -5.0% | -0.1% | -0.3% | -1.1% |
| Wood Product | Declining | 135 | 107 | 109 | 112 | -10.8% | 0.5% | 2.9% | -1.9% |
| Chemical Manufacturing | Declining | 105 | 74 | 85 | 81 | -15.7% | 1.1% | -4.5% | -2.5% |
| Printing and Related Support Activities | Declining | 131 | 110 | 95 | 94 | -8.3% | -2.0% | -1.1% | -3.3% |
| Other Nondurable Goods | Declining | 48 | 45 | 14 | 15 | -3.5% | -12.7% | 7.8% | -11.0% |
| Total Manufacturing | Declining | 2,031 | 1,944 | 1,972 | 2,010 | -2.2% | 0.4% | 1.9% | -0.1% |

Source: DBEDT compilation based on EMSI data.

The comparisons of Maui County's manufacturing industry jobs and earnings growth with the state and nation are listed in Table 12. For job growth, Maui County's negative 0.1 percent average annual growth decline was below the state's positive 0.1 percent, but above the national average of negative 1.2 percent. For average earnings, Maui County was lower than the state and much lower than the national average.

**TABLE 12. MAUI COUNTY MANUFACTURING INDUSTRY PERFORMANCE COMPARED WITH STATE AND NATION, 2005-2015**

| Industry Group | Performance Class | Job Change 2005-2015 | Average Annual Job Growth (%) | | | Avg. Annual Earnings (2015) | | |
|---|---|---|---|---|---|---|---|---|
| | | | County | State | U.S. | County | State | U.S. |
| Nonmetallic Mineral Product | Base-Growth | 55 | 2.6% | 0.3% | -2.0% | 68,871 | 68,057 | 63,814 |
| Apparel and Leather and Allied Product | Emerging | 39 | 6.1% | -1.5% | -3.6% | 10,924 | 26,515 | 41,710 |
| Miscellaneous Manufacturing | Emerging | 69 | 3.0% | -0.9% | -0.3% | 26,627 | 36,432 | 75,037 |
| Furniture and Related Product | Emerging | 37 | 5.2% | -3.5% | -3.8% | 48,186 | 53,879 | 48,572 |
| Other Durable Goods | Emerging | 1 | 0.1% | 0.9% | -0.9% | 61,678 | 64,890 | 85,680 |
| Transportation Equipment | Emerging | 0 | 0.0% | 3.6% | -1.0% | 71,000 | 87,773 | 88,081 |
| Food and Beverage and Tobacco | Declining | -105 | -1.1% | 1.6% | 0.8% | 43,933 | 43,151 | 56,365 |
| Wood Product | Declining | -23 | -1.9% | -3.4% | -3.5% | 25,216 | 24,261 | 48,255 |
| Chemical Manufacturing | Declining | -23 | -2.5% | -1.7% | -0.6% | 54,245 | 58,852 | 118,964 |
| Printing and Related Support Activities | Declining | -37 | -3.3% | -2.3% | -2.9% | 40,801 | 36,638 | 51,809 |
| Other Nondurable Goods | Declining | -33 | -11.0% | -2.6% | -2.6% | 47,490 | 52,318 | 64,075 |
| Total Manufacturing | Declining | -21 | -0.1% | 0.1% | -1.2% | 43,478 | 49,607 | 76,657 |

Source: DBEDT compilation based on EMSI data.

## Kauai County

Of the 12 condensed manufacturing industry groups defined in this study, only 11 groups had jobs in 2015 for Kauai County. These groups accounted for 730 of the state's manufacturing industry jobs in 2015, a 1.8 percent average annual increase from 2005 to 2015. The average annual job growth was 1.1 percent from 2005 to 2007 and 1.9 percent from 2007 to 2015. As shown in Table 13, six manufacturing industry groups qualified as high performing in Kauai County during the 2005 to 2015 period. These included other durable goods, apparel and leather and allied product, other nondurable goods, food and beverage and tobacco, and miscellaneous manufacturing. Five manufacturing industry groups lost jobs in Kauai County over the 2005 to 2015 period.

**TABLE 13. MANUFACTURING INDUSTRY JOBS, KAUAI COUNTY**

| Industry Group | Performance Class | Jobs | | | | Average Annual Job Growth (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2005 | 2007 | 2014 | 2015 | 2005-2007 | 2007-2015 | 2014-2015 | 2005-2015 |
| Other Durable Goods | Emerging | 15 | 14 | 32 | 38 | -3.4% | 13.2% | 17.1% | 9.7% |
| Apparel and Leather and Allied Product | Emerging | 22 | 29 | 40 | 42 | 13.8% | 5.0% | 5.2% | 6.7% |
| Other Nondurable Goods | Emerging | 9 | 3 | 8 | 15 | -42.3% | 22.3% | 87.5% | 5.2% |
| Food and Beverage and Tobacco | Emerging | 224 | 259 | 306 | 328 | 7.5% | 3.0% | 7.5% | 3.9% |
| Miscellaneous Manufacturing | Emerging | 70 | 83 | 74 | 74 | 8.9% | -1.5% | -0.7% | 0.5% |
| Transportation Equipment | Emerging | 5 | 5 | 5 | 5 | 0.0% | 0.0% | 0.0% | 0.0% |
| Nonmetallic Mineral Product | Declining | 77 | 66 | 72 | 72 | -7.3% | 1.1% | 0.7% | -0.6% |
| Wood Product | Declining | 91 | 60 | 78 | 86 | -18.9% | 4.5% | 10.0% | -0.7% |
| Printing and Related Support Activities | Declining | 50 | 46 | 47 | 45 | -3.6% | -0.5% | -5.1% | -1.2% |
| Furniture and Related Product | Declining | 32 | 41 | 29 | 19 | 14.2% | -8.9% | -33.2% | -4.7% |
| Chemical Manufacturing | Declining | 18 | 20 | 10 | 6 | 3.7% | -13.9% | -41.5% | -10.6% |
| Total Manufacturing | Emerging | 614 | 627 | 702 | 730 | 1.1% | 1.9% | 4.1% | 1.8% |

Source: DBEDT compilation based on EMSI data.

The comparisons of Kauai County's manufacturing industry jobs and earnings growth with the state and nation are listed in Table 14. For job growth, Kauai County's 1.8 percent average annual growth rate was better than the state's 0.1 percent and better than the national average of a negative 1.2 percent. For average earnings, Kauai County was lower than the state and much lower than the national average.

**TABLE 14. KAUAI COUNTY MANUFACTURING INDUSTRY PERFORMANCE COMPARED WITH STATE AND NATION, 2005-2015**

| Industry Group | Performance Class | Job Change | Average Annual Job Growth (%) | | | Avg. Annual Earnings (2015) | | |
|---|---|---|---|---|---|---|---|---|
| | | 2005-2015 | County | State | U.S. | County | State | U.S. |
| Other Durable Goods | Emerging | 23 | 9.7% | 0.9% | -0.9% | 34,734 | 64,890 | 85,680 |
| Apparel and Leather and Allied Product | Emerging | 20 | 6.7% | -1.5% | -3.6% | 19,571 | 26,515 | 41,710 |
| Other Nondurable Goods | Emerging | 6 | 5.2% | -2.6% | -2.6% | 24,000 | 52,318 | 64,075 |
| Food and Beverage and Tobacco | Emerging | 104 | 3.9% | 1.6% | 0.8% | 40,269 | 43,151 | 56,365 |
| Miscellaneous Manufacturing | Emerging | 4 | 0.5% | -0.9% | -0.3% | 36,757 | 36,432 | 75,037 |
| Transportation Equipment | Emerging | 0 | 0.0% | 3.6% | -1.0% | 70,000 | 87,773 | 88,081 |
| Nonmetallic Mineral Product | Declining | -5 | -0.6% | 0.3% | -2.0% | 42,116 | 68,057 | 63,814 |
| Wood Product | Declining | -6 | -0.7% | -3.4% | -3.5% | 27,308 | 24,261 | 48,255 |
| Printing and Related Support Activities | Declining | -5 | -1.2% | -2.3% | -2.9% | 21,681 | 36,638 | 51,809 |
| Furniture and Related Product | Declining | -12 | -4.7% | -3.5% | -3.8% | 55,195 | 53,879 | 48,572 |
| Chemical Manufacturing | Declining | -12 | -10.6% | -1.7% | -0.6% | 58,000 | 58,852 | 118,964 |
| Total Manufacturing | Emerging | 116 | 1.8% | 0.1% | -1.2% | 37,481 | 49,607 | 76,657 |

Source: DBEDT compilation based on EMSI data.

# VI. MANUFACTURING INDUSTRY PERFORMANCE BY MAJOR GROUPS

This section takes a closer look at the performance for each respective industry group in the manufacturing sector's portfolio. As discussed earlier, the manufacturing sector included about 18,767 jobs in 12 industry groups in 2015. In terms of jobs, these 12 groups were composed of the top five groups for durable goods, the top five groups for nondurable goods, one group for all other durable goods, and one group for all other nondurable goods. The average annual earnings for the manufacturing sector was $49,607 in 2015. Table 15 shows the major industry groups of the manufacturing sector and their primary performance metrics.

Among the nondurable goods manufacturing groups, the food and beverage and tobacco group had the most jobs in 2015. The 8,666 jobs in this group accounted for 46.2 percent of the total manufacturing jobs in 2015. In the nondurable goods groups, both the apparel and leather and allied product group and the printing and related support activities had more than 1,100 jobs in 2015. The top group in durable goods manufacturing was miscellaneous manufacturing, which had about 1,800 jobs in 2015. Nonmetallic mineral product in the durable goods groups also had more than 1,000 jobs in 2015.

**TABLE 15. EMPLOYMENT AND GROWTH IN HAWAII'S MANUFACTURING INDUSTRY**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Total Manufacturing** | **18,519** | **18,767** | **0.1%** | **-1.2%** | **49,607** | **76,657** | **1.3%** | **0.30** | **0.04** |
| Food and Beverage and Tobacco | 7,403 | 8,666 | 1.6% | 0.8% | 43,151 | 56,365 | 0.8% | 0.97 | 0.09 |
| Miscellaneous Manufacturing | 1,951 | 1,785 | -0.9% | -0.3% | 36,432 | 75,037 | -0.6% | 0.53 | -0.03 |
| Nonmetallic Mineral Product | 1,219 | 1,260 | 0.3% | -2.0% | 68,057 | 63,814 | 2.4% | 0.62 | 0.14 |
| Apparel and Leather and Allied Product | 1,437 | 1,236 | -1.5% | -3.6% | 26,515 | 41,710 | 2.1% | 1.14 | 0.23 |
| Printing and Related Support Activities | 1,463 | 1,158 | -2.3% | -2.9% | 36,638 | 51,809 | 0.6% | 0.47 | 0.03 |
| Other Durable Goods | 905 | 993 | 0.9% | -0.9% | 64,890 | 85,680 | 1.8% | 0.05 | 0.01 |
| Transportation Equipment | 574 | 814 | 3.6% | -1.0% | 87,773 | 88,081 | 4.6% | 0.11 | 0.04 |
| Other Nondurable Goods | 967 | 741 | -2.6% | -2.6% | 52,318 | 64,075 | 0.0% | 0.12 | 0.00 |
| Wood Product | 911 | 642 | -3.4% | -3.5% | 24,261 | 48,255 | 0.1% | 0.31 | 0.01 |
| Petroleum and Coal Products | 436 | 523 | 1.8% | -0.2% | 167,531 | 165,867 | 2.0% | 0.98 | 0.19 |
| Furniture and Related Product | 745 | 520 | -3.5% | -3.8% | 53,879 | 48,572 | 0.2% | 0.26 | 0.01 |
| Chemical Manufacturing | 509 | 429 | -1.7% | -0.6% | 58,852 | 118,964 | -1.1% | 0.11 | -0.01 |

Source: DBEDT compilation based on EMSI data.

Table 16 compares the U.S. and Hawaii's real GDP growth rates from 2005 to 2014 for the manufacturing sector groups based on BEA data. For the total, including all industries, the real GDP annual growth rate in Hawaii was below the national average by 0.2 of a percentage point. For the manufacturing sector, Hawaii's negative 0.7 percent annual growth rate was significantly below the positive 0.7 percent annual growth for the nation. The real GDP growth rates for durable goods and nondurable goods in Hawaii were both below the national average. Among the 12 manufacturing sector groups, seven groups in Hawaii performed better than the nation in terms of real GDP growth from 2005 to 2014.

Among the nondurable goods manufacturing groups, the food and beverage and tobacco group also accounted for the largest portion of the manufacturing sector's real GDP in 2014. The $355 million real GDP in this group accounted for 31.2 percent of the total manufacturing sector's real GDP in 2014. Although this share was below this group's share of total manufacturing jobs (46.0 percent), it was significantly higher than the same share for the nation (11.6 percent). The second largest group for real GDP is petroleum and coal products (mostly petroleum refinery). Although it only accounted for 2.7 percent of the manufacturing sector jobs in 2014, its share of the manufacturing sector's real GDP was 22.1 percent in 2014. This value was also significantly higher than the same share for the nation at 5.3 percent.

For durable goods, the top two groups were nonmetallic mineral product and other durable goods. They accounted for about 9.7 percent and 6.3 percent of Hawaii's manufacturing real GDP in 2014, respectively.

**TABLE 16. REAL GDP IN HAWAII AND U.S. MANUFACTURING INDUSTRY**

| Group & Industry | Hawaii Real GDP | | U.S. Real GDP | | Real GDP Annual Growth | | | % of 2014 Manufacture Real GDP | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2014 | 2005 | 2014 | Hawaii | U.S. | U.S. Above Hawaii | Hawaii | U.S. |
| All Industry Total | 64,365 | 69,662 | 14,211,385 | 15,653,000 | 0.9% | 1.1% | 0.2% | | |
| Manufacturing | 1,212 | 1,139 | 1,776,685 | 1,886,153 | -0.7% | 0.7% | 1.4% | 100.0% | 100.0% |
| Durable Goods Manufacturing | 323 | 321 | 930,148 | 1,095,908 | -0.1% | 1.8% | 1.9% | 28.2% | 58.1% |
| Miscellaneous Manufacturing | 44 | 56 | 68,049 | 77,083 | 2.7% | 1.4% | -1.3% | 4.9% | 4.1% |
| Nonmetallic Mineral Product | 119 | 111 | 55,078 | 43,007 | -0.8% | -2.7% | -1.9% | 9.7% | 2.3% |
| Transportation Equipment | 48 | 56 | 228,151 | 261,531 | 1.7% | 1.5% | -0.2% | 4.9% | 13.9% |
| Wood Product | 14 | 8 | 26,093 | 21,590 | -6.0% | -2.1% | 3.9% | 0.7% | 1.1% |
| Furniture and Related Product | 39 | 21 | 39,554 | 25,124 | -6.6% | -4.9% | 1.7% | 1.8% | 1.3% |
| Other Durable Goods | 61 | 72 | 531,784 | 672,264 | 1.9% | 2.6% | 0.8% | 6.3% | 35.6% |
| Nondurable Goods Manufacturing | 891 | 817 | 850,561 | 801,934 | -1.0% | -0.7% | 0.3% | 71.7% | 42.5% |
| Food and Beverage and Tobacco | 387 | 355 | 212,102 | 218,906 | -1.0% | 0.4% | 1.3% | 31.2% | 11.6% |
| Apparel and Leather and Allied Product | 23 | 24 | 13,281 | 10,892 | 0.5% | -2.2% | -2.7% | 2.1% | 0.6% |
| Printing and Related Support Activities | 57 | 70 | 44,588 | 40,720 | 2.3% | -1.0% | -3.3% | 6.1% | 2.2% |
| Petroleum and Coal Products | 320 | 252 | 127,465 | 99,393 | -2.6% | -2.7% | -0.1% | 22.1% | 5.3% |
| Chemical Manufacturing | 64 | 87 | 284,749 | 293,876 | 3.5% | 0.4% | -3.1% | 7.6% | 15.6% |
| Other Nondurable Goods | 57 | 40 | 163,044 | 137,613 | -3.9% | -1.9% | 2.0% | 3.5% | 7.3% |

Source: DBEDT compilation based on BEA data.

Most of the 12 industry groups are composed of smaller subgroups and job numbers and average earnings data are available for these subgroups. However, GDP data is only available at the larger industry level and not the subgroup level. Job numbers and average earnings data for the smaller industry level are shown in detail in the following sections.

## Food and Beverage and Tobacco Manufacturing

Hawaii has no tobacco manufacturing, so this group included only food and beverage manufacturing. It was the largest group for Hawaii's manufacturing sector, both in terms of jobs and real GDP. With about 8,700 employees, including self-employed workers, it accounted for about 46.2 percent of total manufacturing jobs in 2015. However, the average earnings of this group was only $43,151 in 2015, about 13.0 percent below the average earnings for the total manufacturing sector in Hawaii. The average earnings figure was about 23.4 percent below the U.S. average for the same group. From 2005 to 2015, jobs in this group increased at an average annual rate of 1.6 percent, higher than the 0.8 percent average annual growth for the nation.

This group includes twelve smaller industry subgroups. Nine of them are food manufacturing related and they accounted for about 88.7 percent of jobs in the food and beverage group. The subgroups with the most jobs also had the lowest earnings. As shown in Table 17, the largest subgroup was bakeries and tortilla, which had about 2,900 jobs and accounted for about 33.5 percent of the jobs in this group. The second largest subgroup was perishable prepared food, with about 1,200 jobs. These two subgroups also added the most jobs (877 jobs and 204 jobs, respectively) from 2005 to 2015. With about $33,400 in annual earnings, the bakeries and tortilla subgroup was the lowest in the food and beverage group. The average earnings of the perishable prepared food subgroup was $36,166, the third lowest annual earnings in this group.

These two subgroups are more concentrated in Hawaii than the nation, with LQ values in 2015 equal to 1.79 and 5.07, respectively. This is probably due to the fact that a significant quantity of their products were either consumed by visitors or exported. Other more concentrated subgroups in Hawaii include sugar and confectionery product, coffee and tea, snack food, soft drink, and bottled water. Soft drink manufacturing, which had 445 jobs in 2015, has the highest average earnings ($83,425), followed by dairy product ($59,186), bottled water ($57,843), and other beverage product ($54,676). From 2005 to 2015, fruit and vegetable preserving and specialty food lost the most jobs (lost 188 jobs), followed by animal slaughtering and processing (lost 130 jobs), and snack food (lost 45 jobs).

**TABLE 17. FOOD AND BEVERAGE AND TOBACCO INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Food and Beverage and Tobacco Product** | 7,403 | 8,666 | 1.6% | 0.8% | 43,151 | 56,365 | 0.8% | 0.97 | 0.09 |
| Bakeries and Tortilla | 2,025 | 2,901 | 3.7% | 1.3% | 33,378 | 43,329 | 2.4% | 1.79 | 0.38 |
| Perishable Prepared Food | 988 | 1,192 | 1.9% | 4.2% | 36,166 | 41,385 | -2.3% | 5.07 | -1.19 |
| Sugar and Confectionery Product | 875 | 893 | 0.2% | -0.1% | 49,743 | 56,996 | 0.3% | 2.37 | 0.08 |
| Fruit and Vegetable Preserving and Specialty Food | 720 | 533 | -3.0% | 0.0% | 35,278 | 56,538 | -3.0% | 0.61 | -0.21 |
| Coffee and Tea | 407 | 499 | 2.0% | 5.7% | 50,852 | 59,794 | -3.6% | 3.97 | -1.61 |
| Soft Drink Manufacturing | 442 | 445 | 0.1% | -0.5% | 83,425 | 73,766 | 0.6% | 1.27 | 0.09 |
| Animal Slaughtering and Processing | 570 | 440 | -2.6% | -0.3% | 49,843 | 45,194 | -2.2% | 0.19 | -0.05 |
| Other Food Manufacturing | 285 | 415 | 3.8% | 0.9% | 36,172 | 75,178 | 2.9% | 0.34 | 0.09 |
| Dairy Product | 356 | 414 | 1.5% | 0.4% | 59,186 | 69,695 | 1.1% | 0.62 | 0.07 |
| Snack Food | 443 | 398 | -1.1% | 2.2% | 42,124 | 58,417 | -3.2% | 1.43 | -0.53 |
| Other Beverage Product Manufacturing | 146 | 298 | 7.4% | 3.7% | 54,676 | 70,808 | 3.7% | 0.40 | 0.12 |
| Bottled Water Manufacturing | 146 | 240 | 5.1% | -0.9% | 57,843 | 69,591 | 6.0% | 3.39 | 1.52 |

Source: DBEDT compilation based on EMSI data.

## Miscellaneous Manufacturing

With about 1,800 jobs in 2015, or about 9.5 percent of total jobs in the manufacturing sector, the miscellaneous manufacturing group was the largest group for durable goods manufacturing. However, since this group's GDP per job was relatively low, it only accounted for about 4.9 percent of the total manufacturing sector's real GDP in 2014, which was slightly above the 4.1 percent figure for the nation. The average earnings of this group was only $36,432 in 2015, about 26.6 percent below the average earnings of the total manufacturing sector in Hawaii and about 51.4 percent below the U.S. average for the same group. From 2005 to 2015, jobs in this group decreased 0.9 percent per year on average for Hawaii. In contrast, jobs in this group decreased at an average annual rate of 0.3 percent nationally. This group was less concentrated in Hawaii, indicating that Hawaii is likely to be a net importer for this group.

This group includes five industry subgroups. Jewelry and silverware manufacturing had the most jobs (604 jobs), with the other four subgroups each having about 200-400 jobs in 2015. As shown in Table 18, medical equipment and supplies, which mainly included dental laboratories, had the highest average annual earnings ($53,487) in this group, followed by sporting and athletic goods ($44,157), other miscellaneous manufacturing ($36,892), sign manufacturing ($35,231), and jewelry and silverware ($27,177).

Two subgroups, jewelry and silverware and sporting and athletic goods were more concentrated in Hawaii than the nation, with 2015 LQ values of 3.07 and 1.16, respectively. This was probably due to the fact that a significant portion of their products were either consumed by visitors or exported.

From 2005 to 2015, two of the subgroups added jobs. Other miscellaneous manufacturing added the most jobs (24 jobs), followed by sporting and athletic goods (18 jobs). Medical equipment and supplies lost 127 jobs and jewelry and silverware manufacturing lost 76 jobs.

**TABLE 18. MISCELLANEOUS MANUFACTURING INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Miscellaneous Manufacturing** | 1,951 | 1,785 | -0.9% | -0.3% | 36,432 | 75,037 | -0.6% | 0.53 | -0.03 |
| Jewelry and Silverware | 680 | 604 | -1.2% | -2.5% | 27,177 | 51,429 | 1.3% | 3.07 | 0.42 |
| Other Miscellaneous Manufacturing | 334 | 358 | 0.7% | -1.2% | 36,892 | 63,450 | 1.9% | 0.42 | 0.08 |
| Sign Manufacturing | 324 | 319 | -0.2% | 0.9% | 35,231 | 51,216 | -1.0% | 0.60 | -0.06 |
| Sporting and Athletic Goods | 281 | 299 | 0.6% | -1.3% | 44,157 | 63,281 | 1.9% | 1.16 | 0.22 |
| Medical Equipment and Supplies | 332 | 205 | -4.7% | 0.3% | 53,487 | 94,764 | -5.0% | 0.13 | -0.09 |

Source: DBEDT compilation based on EMSI data.

## Nonmetallic Mineral Product Manufacturing

The nonmetallic mineral product manufacturing group was the second largest group for durable goods manufacturing in 2015, with more than 1,200 jobs or about 6.7 percent of total manufacturing jobs. Since this group's GDP per job was higher than the average of the manufacturing sector, it accounted for about 9.7 percent of the total manufacturing sector's real GDP in 2014. At the national level, this group accounted for only 3.3 percent of the manufacturing jobs and 2.3 percent of real GDP.

The average annual earnings in this group was relatively high, with average annual earnings of $68,057 in 2015. The average earnings of this group was 37.2 percent above the average earnings of the whole manufacturing sector in Hawaii and about 6.6 percent above the U.S. average for the same group. From 2005 to 2015, jobs in this group increased at an average annual rate 0.3 percent in Hawaii, which was a sharp contrast to the 2.0 percent average annual decrease for the nation. This group is less concentrated in Hawaii than the nation, indicating that Hawaii is likely to be a net importer for this group.

This group can be separated into four subgroups, but their products are mostly used in the construction sector. Cement and concrete product manufacturing had the most jobs (773 jobs) and the other three subgroups each had about 100-200 jobs in 2015. As shown in Table 19, cement and concrete product manufacturing had the highest average annual earnings ($91,006) in this group, followed by other nonmetallic mineral product ($64,552), glass and glass product ($36,041). Clay product and refractory manufacturing has the lowest average earnings ($5,704).

All subgroups are less concentrated in Hawaii with a 2015 LQ value less than 1.0. This probably was due to the fact that a significant quantity of construction materials was imported to Hawaii.

From 2005 to 2015, the cement and concrete product subgroup lost 74 jobs, and the other nonmetallic mineral product subgroup lost 54 jobs. Jobs increased the most in clay product and refractory manufacturing (135 jobs), followed by glass and glass product (54 jobs).

Three subgroups, except the other nonmetallic mineral product subgroup, outperformed the national average in terms of job growth from the 2005 to 2015 period. The U.S. lost jobs in all the four subgroups. The job loss in the cement and concrete product subgroup was more severe at the national level than in Hawaii.

**TABLE 19. NONMETALLIC MINERAL PRODUCT INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Nonmetallic Mineral Product** | 1,219 | 1,260 | 0.3% | -2.0% | 68,057 | 63,814 | 2.4% | 0.62 | 0.14 |
| Cement and Concrete Product | 847 | 773 | -0.9% | -2.5% | 91,006 | 65,831 | 1.6% | 0.86 | 0.13 |
| Clay Product and Refractory | 77 | 211 | 10.7% | -3.4% | 5,704 | 53,796 | 14.1% | 0.91 | 0.68 |
| Other Nonmetallic Mineral Product | 203 | 149 | -3.1% | -0.4% | 64,552 | 65,002 | -2.6% | 0.33 | -0.10 |
| Glass and Glass Product | 93 | 126 | 3.2% | -1.9% | 36,041 | 63,775 | 5.0% | 0.28 | 0.11 |

Source: DBEDT compilation based on EMSI data.

## Apparel and Leather and Allied Product Manufacturing

With more than 1,200 jobs in 2015 or about 6.6 percent of the total manufacturing jobs, the apparel and leather and allied product group was the second largest group for nondurable goods manufacturing in Hawaii. Since this group's GDP per job was relatively low, it only accounted for about 2.1 percent of the manufacturing sector's real GDP in 2014. For the nation, this group only accounted for 1.7 percent of total manufacturing jobs and 0.6 percent of manufacturing real GDP.

Due to increased international competition, this group declined significantly in both the U.S. and Hawaii. From 2005 to 2015, jobs in this group decreased at an average annual rate of 1.5 percent in Hawaii, and decreased 3.6 percent for the nation. Compared with the U.S., this group is slightly more concentrated in Hawaii.

The average annual earnings of this group was the second lowest among all 12 manufacturing groups in Hawaii. The average earnings of $26,515 for this group was about 46.5 percent below the average earnings of the total manufacturing sector in Hawaii and about 36.4 percent below the U.S. average for the same group.

This group includes three industry subgroups. The cut and sew apparel manufacturing dominated the group and accounted for 1,047 jobs or 84.7 percent of the jobs in the group. Leather and allied product had 116 jobs and other apparel manufacturing had 73 jobs in 2015. As shown in Table 20, cut and sew apparel manufacturing had the highest average annual earnings ($28,044), followed by leather and allied product ($22,003) and other apparel manufacturing ($11,702). The cut and sew apparel manufacturing is more concentrated in Hawaii than the nation, with a 2015 LQ value of 1.50.

From 2005 to 2015, the cut and sew apparel manufacturing subgroup lost 308 jobs, the leather and allied product added 61 jobs, and the other apparel manufacturing added 46 jobs.

**TABLE 20. APPAREL AND LEATHER AND ALLIED PRODUCT INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Apparel and Leather and Allied Product** | 1,437 | 1,236 | -1.5% | -3.6% | 26,515 | 41,710 | 2.1% | 1.14 | 0.23 |
| Cut and Sew Apparel Manufacturing | 1,355 | 1,047 | -2.5% | -3.9% | 28,044 | 42,255 | 1.3% | 1.50 | 0.20 |
| Leather and Allied Product | 55 | 116 | 7.7% | 0.0% | 22,003 | 42,688 | 7.6% | 0.54 | 0.28 |
| Other Apparel Manufacturing | 27 | 73 | 10.5% | -6.0% | 11,702 | 38,119 | 16.4% | 0.44 | 0.35 |

Source: DBEDT compilation based on EMSI data.

## Printing and Related Support Activities

With 1,158 jobs in 2015 or about 6.2 percent of total jobs in the manufacturing sector, the printing and related support activities group was the third largest group for nondurable goods manufacturing in Hawaii. It accounted for about 6.1 percent of the total manufacturing sector's real GDP in 2014. Nationally, this group accounted for 4.0 percent of the total manufacturing jobs and 2.2 percent of the manufacturing sector's real GDP.

Jobs in this group decreased in both Hawaii and the nation. This trend can partially be attributed to an increase in digital media consumption at the expense of print media consumption. From 2005 to 2015, jobs in this group decreased at an annual average rate of 2.3 percent in Hawaii and decreased 2.9 percent nationally. From 2005 to 2014, real GDP in this group increased at an average annual rate of 2.3 percent in Hawaii and decreased 1.0 percent for the nation. Compared with the U.S., this group is less concentrated in Hawaii than the nation.

The average annual earnings of $36,638 was about 26.1 percent lower than the average earnings of Hawaii's total manufacturing sector and about 29.3 percent below the U.S. average for the same group.

This group can be separated into four subgroups. Only three subgroups had jobs in 2015 and the support activities for printing subgroup only had a few jobs in 2015. As shown in Table 21, commercial printing had the highest average annual earnings ($41,212), followed by commercial screen printing ($28,111).

From 2005 to 2015, jobs decreased in all the subgroups. Commercial printing experienced the greatest job loss (172 jobs), followed by commercial screen printing (93 jobs), and support activities for printing (41 jobs).

**TABLE 21. PRINTING AND RELATED SUPPORT INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Printing and Related Support Activities** | 1,463 | 1,158 | -2.3% | -2.9% | 36,638 | 51,809 | 0.6% | 0.47 | 0.03 |
| Commercial Printing (except Screen and Books) | 932 | 759 | -2.0% | -3.3% | 41,212 | 54,377 | 1.2% | 0.42 | 0.05 |
| Commercial Screen Printing | 485 | 392 | -2.1% | 1.6% | 28,111 | 38,116 | -3.7% | 0.96 | -0.42 |
| Support Activities for Printing | 46 | 5 | -19.9% | -5.9% | 28,111 | 55,548 | -13.9% | 0.03 | -0.13 |
| Books Printing | 5 | 0 | -100.0% | -4.3% | 0 | 55,128 | -95.7% | 0.00 | -0.03 |

Source: DBEDT compilation based on EMSI data.

## Other Durable Goods Manufacturing

The other durable goods group was the third largest group for durable goods manufacturing, with about 1,000 jobs in 2015 or about 5.3 percent of the total jobs in the manufacturing sector. Since this group's GDP per job was higher than the average of the manufacturing sector, it accounted for 6.3 percent of Hawaii's total manufacturing sector's real GDP in 2014. At the national level, the role of this group was significantly higher than Hawaii, accounting for about 35.1 percent of all manufacturing jobs and 35.6 percent of the manufacturing sector's real GDP.

The average annual earnings in this group was relatively high compared with other groups in Hawaii. However, it was relatively low compared with the average annual earnings for the nation overall. With an average earnings of $64,890 in 2015, this group was 30.8 percent above the average earnings of the total manufacturing sector in Hawaii, but 24.3 percent below the U.S. average for the same group. From 2005 to 2015, jobs in this group increased at an average annual rate of 0.9 percent in Hawaii, compared with the negative 0.9 percent average annual growth for the nation. This group is less concentrated in Hawaii than the nation, indicating that Hawaii is likely to be a net importer for this group.

This group can be separated into five subgroups. As shown in Table 22, fabricated metal products, which mainly includes architectural and structural metals, had the most 2015 jobs (511 jobs). This was followed by computer and electronic product (286 jobs), which mainly includes navigational, measuring, electro-medical, and control instruments. These two subgroups also had higher average annual earnings.

All subgroups in this category were less concentrated in Hawaii than the nation, with a 2015 LQ value of less than 1.0. This was probably due to the fact that a significant amount of their products are imported to Hawaii.

From 2005 to 2015, computer and electronic product manufacturing added the most jobs (172 jobs), followed by machinery manufacturing (42 jobs). Fabricated metal product manufacturing lost 102 jobs, and primary metal lost 38 jobs in the same period.

**TABLE 22. OTHER DURABLE GOODS INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Other Durable Goods Manufacturing** | 905 | 993 | 0.9% | -0.9% | 64,890 | 85,680 | 1.8% | 0.05 | 0.01 |
| Fabricated Metal Product Manufacturing | 613 | 511 | -1.8% | -0.3% | 66,631 | 64,030 | -1.5% | 0.07 | -0.01 |
| Computer and Electronic Product Manufacturing | 115 | 286 | 9.6% | -2.1% | 75,739 | 125,989 | 11.7% | 0.06 | 0.04 |
| Machinery Manufacturing | 91 | 133 | 3.8% | -0.2% | 46,159 | 80,157 | 4.1% | 0.02 | 0.01 |
| Electrical Equipment and Appliance Manufacturing | 40 | 54 | 3.1% | -1.0% | 41,318 | 83,361 | 4.1% | 0.03 | 0.01 |
| Primary Metal Manufacturing | 46 | 8 | -16.0% | -1.5% | 57,887 | 78,677 | -14.5% | 0.00 | -0.02 |

Source: DBEDT compilation based on EMSI data.

## Transportation Equipment Manufacturing

The transportation equipment manufacturing group in Hawaii was dominated by ship and boat building. This group had 814 jobs in 2015, accounting for 4.3 percent of total jobs in the manufacturing sector. Since this group's GDP per job was higher than the average of the overall manufacturing sector, its share of the manufacturing sector's real GDP in 2014 was about 4.9 percent. The role of this group at the national level was significantly higher than that of Hawaii due to a greater comparative advantage. Nationally, this group accounted for about 12.4 percent of manufacturing jobs and 13.9 percent of the manufacturing sector's real GDP.

The average annual earnings in this group was relatively high compared with other groups in Hawaii, but close to the national level. With average earnings of $87,773 in 2015, this group was 76.9 percent above the average earnings of the total manufacturing sector in Hawaii. However, the earnings were only 0.3 percent below the national average for the same group. From 2005 to 2015, jobs in this group increased at an average annual rate of 3.6 percent in Hawaii, which was significantly higher than the 1.0 percent annual decrease for the nation.

This group can be separated into two subgroups. As shown in Table 23, ship and boat building accounted for about 96 percent of the jobs in this group. This subgroup was also more concentrated in Hawaii, indicating that ship and boat building may be a net exporter for Hawaii.

Although it has high earnings, the other transportation equipment manufacturing subgroup was small in Hawaii. From 2005 to 2015, ship and boat building added 265 jobs, while other transportation equipment manufacturing lost 24 jobs.

**TABLE 23. TRANSPORTATION EQUIPMENT INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Transportation Equipment Manufacturing** | 574 | 814 | 3.6% | -1.0% | 87,773 | 88,081 | 4.6% | 0.11 | 0.04 |
| Ship and Boat Building | 516 | 780 | 4.2% | -1.1% | 87,962 | 76,223 | 5.3% | 1.15 | 0.47 |
| Other Transportation Equipment Manufacturing | 58 | 34 | -5.3% | -1.0% | 83,449 | 89,219 | -4.2% | 0.00 | 0.00 |

Source: DBEDT compilation based on EMSI data.

## Other Nondurable Goods Manufacturing

Other nondurable goods manufacturing includes: plastics and rubber products, textile mills and textile product mills, and paper manufacturing. With about 741 jobs in 2015, it accounted for 3.9 percent of total jobs in the manufacturing sector. Its share of the manufacturing sector's real GDP in 2014 was 3.5 percent. The role of this group at the national level was higher than Hawaii, accounting for about 10.1 percent of manufacturing jobs and 7.3 percent of manufacturing real GDP.

Due to increased global competition, jobs in this group decreased in Hawaii and the nation. From 2005 to 2015, jobs in this group decreased at an average annual rate of 2.6 percent for both Hawaii and the nation. From 2005 to 2014, real GDP in this group decreased an average annual rate of 3.9 percent in Hawaii and decreased 1.9 percent for the nation. Compared with the U.S., this group was less concentrated in Hawaii.

The average earnings of $52,318 for this group was 5.5 percent above the average earnings of the total manufacturing sector in Hawaii but about 18.3 percent below the U.S. average for the same group.

As shown in Table 24, both the plastics and rubber products subgroup and the textile mills and textile product mills subgroup employed about 300 jobs in 2015. Paper manufacturing only had 84 jobs but had the highest annual earnings ($68,170). Plastics and rubber products had the second highest annual earnings ($58,162), followed by the textile mills and textile product mills subgroup ($41,692).

From 2005 to 2015, the paper manufacturing subgroup lost 120 jobs, the textile mills and textile product mills subgroup lost 99 jobs, and the plastics and rubber products subgroup lost 6 jobs.

**TABLE 24. OTHER NONDURABLE GOODS MANUFACTURING INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Other Nondurable Goods Manufacturing** | 967 | 741 | -2.6% | -2.6% | 52,318 | 64,075 | 0.0% | 0.12 | 0.00 |
| Plastics and Rubber Products Manufacturing | 350 | 343 | -0.2% | -1.6% | 58,162 | 61,120 | 1.5% | 0.10 | 0.02 |
| Textile Mills and Textile Product Mills | 413 | 314 | -2.7% | -4.9% | 41,692 | 49,370 | 2.2% | 0.27 | 0.06 |
| Paper Manufacturing | 204 | 84 | -8.5% | -2.6% | 68,170 | 79,321 | -5.9% | 0.05 | -0.04 |

Source: DBEDT compilation based on EMSI data.

## Wood Product Manufacturing

Wood product manufacturing in Hawaii accounted for about 640 jobs or 3.4 percent of total manufacturing jobs in 2015. Since this group's GDP per job was lower than the average of the manufacturing sector, its share of the manufacturing sector's real GDP in 2014 was only 0.7 percent. At the national level, this group's share of total manufacturing sector jobs and real GDP were 3.3 percent and 1.1 percent, respectively.

As shown in Table 25, from 2005 to 2015, jobs in this group decreased in both Hawaii and the nation. The Hawaii job decrease of 3.4 percent per year was slightly better than the 3.5 percent decrease for the nation. However, due to differences in the changes of GDP per job, Hawaii's real GDP annual growth rate from 2005 to 2014 was a negative 6.0 percent, compared to a negative 2.1 percent growth for the nation. This group was less concentrated in Hawaii than the U.S. overall.

The average annual earnings of this group was the lowest among all groups in the manufacturing sector. The average earnings of $24,261 for this group was about 51.1 percent below the average earnings of the whole manufacturing sector in Hawaii and about 49.7 percent below the U.S. average for the same group.

This group can be separated into four subgroups. Millwork had the most jobs (290 jobs). This was followed by other wood product (148 jobs), veneer, plywood, and engineered wood product manufacturing (145 jobs), and sawmills and wood preservation (59 jobs). Average annual earnings ranged from about $13,689 to $54,009. From 2005 to 2015, other wood product lost 129 jobs, sawmills and wood preservation lost 89 jobs, veneer, plywood, and engineered wood product lost 87 jobs, only millwork added 37 jobs.

**TABLE 25. WOOD PRODUCT MANUFACTURING INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Wood Product Manufacturing** | 911 | 642 | -3.4% | -3.5% | 24,261 | 48,255 | 0.1% | 0.31 | 0.01 |
| Millwork | 253 | 290 | 1.4% | -4.4% | 22,178 | 48,644 | 5.8% | 0.54 | 0.24 |
| Other Wood Product Manufacturing | 277 | 148 | -6.1% | -2.7% | 13,689 | 42,373 | -3.4% | 0.22 | -0.09 |
| Veneer, Plywood, and Engineered Wood Product Manufacturing | 232 | 145 | -4.6% | -4.8% | 34,352 | 54,009 | 0.2% | 0.39 | 0.01 |
| Sawmills and Wood Preservation | 148 | 59 | -8.8% | -2.4% | 36,434 | 51,472 | -6.4% | 0.12 | -0.11 |

Source: DBEDT compilation based on EMSI data.

## Petroleum and Coal Products Manufacturing

Petroleum and coal products manufacturing was the most capital intensive group in the manufacturing sector. For Hawaii, this group was mainly petroleum related and it accounted for 2.8 percent of Hawaii's manufacturing sector jobs in 2015. However, while the job number is relatively small, this group accounted for 22.1 percent the manufacturing sector's real GDP in 2014. At the national level, this group accounted for only 0.9 percent of manufacturing jobs and 5.3 percent of the manufacturing sector's real GDP.

As shown in Table 26, from 2005 to 2015, jobs in this group increased in Hawaii but decreased in the nation. However, the growth rate of real GDP was negative for both Hawaii and the nation from 2005 to 2014. The national real GDP annual growth rate of negative 2.7 percent was slightly lower than the negative 2.6 percent for Hawaii.

The average annual earnings in this group was the highest among all manufacturing groups. The average earnings of $167,531 for this group was 237.7 percent above the average earnings of the whole manufacturing sector in Hawaii and about 1.0 percent above the U.S. average for the same group.

This group can be separated into three subgroups. Petroleum refineries dominated the group and accounted for about 95 percent of the jobs in this group. This subgroup was more concentrated in Hawaii than the nation. From 2005 to 2015, petroleum refineries added 66 jobs.

**TABLE 26. PETROLEUM AND COAL PRODUCTS INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Petroleum and Coal Products Manufacturing** | 436 | 523 | 1.8% | -0.2% | 167,531 | 165,867 | 2.0% | 0.98 | 0.19 |
| Petroleum Refineries | 429 | 495 | 1.4% | 0.0% | 174,295 | 202,987 | 1.4% | 1.51 | 0.21 |
| Asphalt Paving, Roofing, and Saturated Materials Manufacturing | 5 | 26 | 17.7% | -1.6% | 52,271 | 102,639 | 19.3% | 0.21 | 0.17 |
| Other Petroleum and Coal Products Manufacturing | 0 | 5 | NA | 1.4% | 53,561 | 112,973 | | | |

Source: DBEDT compilation based on EMSI data.

## Furniture and Related Product Manufacturing

Furniture and related product manufacturing in Hawaii accounted for 520 jobs or 2.8 percent of total manufacturing jobs in 2015. Since this group's GDP per job was lower than the average of the manufacturing sector's GDP per job, its share of the manufacturing sector's real GDP in 2014 was 1.8 percent. At the national level, this group's share of manufacturing sector jobs and real GDP were 3.2 percent and 1.3 percent, respectively.

As shown in Table 27, from 2005 to 2015, jobs decreased in both Hawaii and the U.S. The national job decrease of 3.8 percent per year was higher than the 3.5 percent decrease in Hawaii. From 2005 to 2014, real GDP also decreased in both Hawaii and the nation. The 4.9 percent decrease in national real GDP was better than the 6.6 percent decrease in Hawaii's real GDP. This group was less concentrated in Hawaii than the nation.

The average annual earnings for this group was higher than the average earnings of Hawaii's total manufacturing sector and the U.S. average annual earnings for the same group. The average earnings of $53,879 for this group was 8.6 percent above the average earnings of the whole manufacturing sector in Hawaii and about 10.9 percent above the U.S. average for the same group.

This group can be separated into four subgroups. Household and institutional furniture and kitchen cabinet accounted for 409 jobs or 78.7 percent of the jobs in this group. Although it had the highest average annual earnings of $66,610, mattress manufacturing had only 64 jobs in 2015.

From 2005 to 2015, all the subgroups lost jobs. Household and institutional furniture and kitchen cabinet lost the most jobs (160 job), followed by office furniture (36 job), blind and share manufacturing (18 job), and mattress manufacturing (11 jobs).

**TABLE 27. FURNITURE AND RELATED PRODUCT INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Furniture and Related Product Manufacturing** | 745 | 520 | -3.5% | -3.8% | 53,879 | 48,572 | 0.2% | 0.26 | 0.01 |
| Household and Institutional Furniture and Kitchen Cabinet Manufacturing | 569 | 409 | -3.3% | -4.3% | 52,421 | 44,286 | 1.1% | 0.32 | 0.04 |
| Mattress Manufacturing | 75 | 64 | -1.6% | -2.9% | 66,610 | 53,001 | 1.3% | 0.57 | 0.08 |
| Office Furniture (including Fixtures) Manufacturing | 66 | 30 | -7.6% | -2.3% | 49,893 | 57,878 | -5.3% | 0.06 | -0.04 |
| Blind and Shade Manufacturing | 34 | 17 | -7.0% | -5.3% | 47,889 | 48,918 | -1.7% | 0.27 | -0.05 |

Source: DBEDT compilation based on EMSI data.

## Chemical Manufacturing

Chemical manufacturing in Hawaii accounted for 429 jobs or 2.3 percent of total manufacturing jobs in 2015. Since this group's GDP per job was higher than the average of the manufacturing sector, its share of the manufacturing sector's real GDP was 7.6 percent in 2014. The role of this group at the national level was much more important than its role in Hawaii. Nationally, this group accounted for about 6.5 percent of the manufacturing sector's jobs and 15.6 percent of the sector's real GDP.

As shown in Table 28, from 2005 to 2015, jobs in this group decreased in both Hawaii and the nation. The national job decrease was less severe than that of Hawaii. Due to slower productivity growth in the U.S., the real GDP growth rate was lower for the nation than for Hawaii. From 2005 to 2014, real GDP increased 0.4 percent per year for the nation, compared with a 3.5 percent growth for Hawaii.

The average annual earnings in this group was above the average earnings of Hawaii's manufacturing sector, but below the U.S. average annual earnings for this group. The average earnings of $58,852 for this group was 18.6 percent above the average earnings of the total manufacturing sector in Hawaii, but about 50.5 percent below the U.S. average for the same group.

This group can be separated into five subgroups. Basic chemical manufacturing had the most jobs (134 job), followed by soap, cleaning compound, and toilet preparation (131 jobs), and pharmaceutical and medicine (64 jobs). The other two subgroups had about 50 jobs. All the subgroups were less concentrated in Hawaii than for the nation.

From 2005 to 2015, pharmaceutical and medicine manufacturing lost the most jobs (lost 49 jobs), followed by basic chemical manufacturing (lost 25 jobs), and other chemical manufacturing (lost 20 jobs). Only the soap, cleaning compound, and toilet preparation subgroup added 23 jobs.

**TABLE 28. CHEMICAL MANUFACTURING INDUSTRY GROUP EMPLOYMENT**

| Group & Industry | Hawaii Jobs | | Avg. Job Growth Rate, 2005-2015 | | Annual Earnings, 2015 | | Performance Metrics | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2015 | Hawaii | U.S. | Hawaii | U.S. | Competitive Share 2005-2015 | Location Quotient (LQ), 2015 | Change in LQ, 2005-2015 |
| **Chemical Manufacturing** | 509 | 429 | -1.7% | -0.6% | 58,852 | 118,964 | -1.1% | 0.11 | -0.01 |
| Basic Chemical Manufacturing | 159 | 134 | -1.7% | -0.2% | 75,226 | 122,812 | -1.5% | 0.19 | -0.03 |
| Soap, Cleaning Compound, and Toilet Preparation Manufacturing | 107 | 131 | 2.0% | 0.2% | 33,523 | 79,979 | 1.7% | 0.23 | 0.04 |
| Pharmaceutical and Medicine Manufacturing | 112 | 64 | -5.5% | -0.2% | 74,986 | 156,982 | -5.3% | 0.05 | -0.03 |
| Other Chemical manufacturing | 73 | 52 | -3.3% | -1.5% | 33,993 | 94,388 | -1.8% | 0.04 | -0.01 |
| Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing | 57 | 48 | -1.7% | -0.8% | 87,592 | 103,879 | -0.9% | 0.26 | -0.02 |

Source: DBEDT compilation based on EMSI data.

# VII. Conclusions

Manufacturing is an important sector of Hawaii's economy. The local manufacturing sector provides quality products for the local population, mitigates the risk of transportation disruptions, as well as reduces high shipping costs from the mainland and foreign countries.

In both Hawaii and the U.S. overall, the manufacturing sector's share of total jobs has been decreasing. From 1998 to 2015, the manufacturing sector's share of total jobs for the nation decreased about 4.5 percentage points, from 11.4 percent to 6.9 percent and for Hawaii the share decreased about 0.5 of a percentage point from 2.6 percent to 2.1 percent. This decrease was due to a shift of manufacturing to lower wage countries and also a labor productivity increase in the U.S.

Nationally, labor productivity increased substantially in the manufacturing sector, which partially contributed to a decrease in the share of manufacturing jobs. From 1998 to 2015, the manufacturing sector's share of real GDP in the U.S. decreased 0.4 of a percentage point from 12.3 percent to 11.9 percent. In Hawaii, the manufacturing sector's share of real GDP decreased 0.2 of a percentage point, from 1.9 percent to 1.7 percent during this same period. Hawaii's manufacturing sector labor productivity was also lower when compared with Hawaii's total industries combined. However, the growth rate of the Hawaii's manufacturing sector's labor productivity was higher than that of all industries combined.

The analysis showed that a 68 percent of Hawaii's manufacturing jobs were in nondurable goods versus 32 percent for durable goods. The largest group for nondurable goods was food and beverage manufacturing, which accounted for about 8,700 jobs or almost half of the total manufacturing jobs in Hawaii in 2015. This was followed by the apparel, leather and allied product group and the printing and related support activities group, each of which had more than 1,100 workers.

The four-quadrant performance map categorized each industry group by their growth, competitiveness and concentration in the economy. The industry groups in the emerging category were composed of transportation equipment, petroleum and coal products (mostly petroleum refinery for Hawaii), food and beverage and tobacco, other durable goods, and nonmetallic mineral product. These groups accounted for about 65.3 percent of the total manufacturing sector jobs in 2015. The seven manufacturing industry groups that lost jobs in the 2005 to 2015 period fell into the declining quadrant of the performance map. These groups accounted for about 34.7 percent of the total manufacturing sector jobs in 2015. There were no manufacturing industry group that fell into the base-growth industry and transitioning industry for the 2005 to 2015 period.

In spite of the comparative disadvantages, there are several areas where Hawaii has comparative advantages that can be leveraged for manufacturing. The first is proximity to a large defense market. In the 2015 fiscal year, the Department of Defense had $1.8 billion prime contract in Hawaii. Industry groups such as ship and boat building, food and beverage, and petroleum supplied the military with locally manufactured products. The second advantage is the tourist market of approximately 8.5 million visitors annually. This market spent $15.2 billion dollars in 2015 and there is tremendous potential for apparel and textiles, food related, and other groups that target this market. The third advantage is a strong research and development base that includes universities, technology commercialization programs, and private industry. The University of Hawaii has programs in engineering, computer science, and biotechnology and this provides the research as well as the workforce required for technology related manufacturing. In looking towards the future, Hawaii has the resources to expand its manufacturing base.