The International Bottled Water Association Economic Impact Study

Methodology and Documentation

Prepared for

The International Bottled Water Association

BOTTLED**WATER**MATTERS

By

John Dunham & Associates

October 2019

The International Bottled Water Association Economic Impact Study

Executive Summary:

The International Bottled Water Association Economic Impact Study estimates the economic contributions made by the bottled water industry to the U.S. economy in 2019. John Dunham & Associates conducted this research, which was funded by the International Bottled Water Association (IBWA). This work used standard econometric models first developed by the U.S. Forest Service, and now maintained by IMPLAN, Inc. Data came from industry sources, government publications and Infogroup.

The study defines the bottled water industry as those firms involved in the production, wholesaling, and retailing of bottled water beverages. The study measures the number of jobs in these sectors, the wages paid to employees, total output, and taxes paid of each.

Industries are linked to each other when one industry buys from another to produce its own products. Each industry in turn makes purchases from a different mix of other industries, and so on. Employees in all industries extend the economic impact when they spend their earnings. Thus, economic activity started by the bottled water industry generates output (and jobs) in hundreds of other industries, often in states far removed from the original economic activity. The impact of supplier firms, and the "Induced Impact" of the re-spending by employees of industry and supplier firms, is calculated using an input/output model of the United States. The study calculates the impact on a national basis, by state and by congressional district, and county.

The study also estimates taxes paid by the industry and its employees, and consumer taxes generated by the sale of bottled water beverage products. Federal taxes include industry-specific excise and sales taxes, business and personal income taxes, FICA, and unemployment insurance. State and local tax systems vary widely, with manufacturers, wholesalers and retailers each making substantial payments. Direct retail taxes include state and local sales taxes, license fees, and applicable gross receipt taxes. Manufacturers, wholesalers and retailers pay real estate and personal property taxes, business income taxes, and other business levies that vary in each state and municipality. All entities engaged in business activity generated by the industry pay similar taxes.

The bottled water industry is a dynamic part of the U.S. economy, accounting for about $169.53 billion in output or 0.79 percent of GDP.[1] Bottled water manufacturers, along with their wholesale and retail partners, directly or indirectly employed approximately 714,356 Americans in 2019. These workers earned $39.67 billion in wages and benefits. Members of the industry and their employees paid $17.02 billion in direct federal, state and local taxes. In addition, the consumption of bottled water beverages throughout the country generated $3.01 billion in state sales and excise taxes.

---

[1] Based on GDP of $21,339.10 billion. See: Table 3, *Gross Domestic Product, Second Quarter 2019 (Second Estimate); Corporate Profits, Second Quarter 2019 (Preliminary Estimate),* News Release, US Department of Commerce, Bureau of Economic Analysis, August 29, 2019, online at: https://www.bea.gov/news/2019/gross-domestic-product-2nd-quarter-2019-second-estimate-corporate-profits-2nd-quarter

Summary Results:

The International Bottled Water Association Economic Impact Study measures the impact of the bottled water industry, defined as manufacturing/bottling, wholesaling, and retailing, on the entire economy of the United States. The industry contributes about $169.53 billion in output or 0.79 percent of GDP and, through its production and distribution linkages, impacts firms in 513 out of the 536 sectors in the US economy. The manufacturing process as defined in this study begins when water is pumped from wells or springs, or purchased from water supply companies or systems throughout the country. The 3,561 facilities that bottle water or directly import the product into the United States are denoted as manufacturers.[2] There are three types of manufacturers in the country. First, are the major soft drink and water companies, which include the traditional names such as Poland Springs, Coca-Cola, Pepsico, and Culligan. There are also dozens of regional and local manufacturers in the country including firms like Ozarka, Snowbird Water and Royal Hawaiian Water. Finally, there are literally hundreds of bottling facilities owned either directly by the manufacturers or related companies located throughout America. All told, these firms employ 46,684 people in production, sales, packaging, and direct distribution.

Once bottled water beverages have been produced or in some cases imported, they enter the distribution channel. We estimate that 12.5 percent of direct jobs are involved in the wholesale supply of bottled water throughout the country including wholesaling operations directly owned and operated by the major manufacturers. Wholesalers are involved in the transportation of bottled water from the manufacturers or a bonded warehouse operated by importers, and the storage of products for a limited period of time. The wholesaling segment of the industry directly employs around 28,503 individuals in every state in the country.

Finally, the third segment of the industry directly sells products to the consumer. This can either be through on-premise sales or for off-premise consumption. For this analysis, the retail sector is assumed to consist of firms in the following industries: Eating and drinking places, supermarkets and other food stores, liquor stores, drug stores, convenience stores, book stores, newsstands and tobacco stores, warehouse clubs, retail water stores, vending machines and office delivery.[3] While there are obviously other venues that may sell bottled water to the public – street vendors, cruise lines, non-profit groups, etc. they are not included in the analysis due to limited data availability and the small amount of product that they handle. We estimate that the jobs of over 152,290 employees in these companies are directly tied to the sale of bottled water.

Other firms are related to the three segments of the bottled water industry as suppliers. These firms produce and sell a broad range of items including machinery for the production process, fuel, packaging materials, sales displays or machinery. In addition, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services or even transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the bottled water industry. All told, we estimate that the bottled water industry is directly responsible for 241,591 supplier jobs. These firms generate about $71.44 billion in economic activity.

An economic analysis of the bottled water industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the supplier firms are part of the industry being analyzed[4] the spending by employees of the industry, and those of supplier firms whose jobs are directly dependent on

---

[2]   Throughout this study the term "firms" means facilities. One firm, such as Coca-Cola or Poland Springs, might operate hundreds of facilities. This study is based on physical locations.

[3]   Based on data from the US Department of Commerce, Bureau of the Census, Census of Retail Trade, 2012.

[4]   These firms would more appropriately be considered as part of the supplier firms' industries.

bottled water sales and production, should surely be included. This spending on everything from housing, to food, to educational services and medical care makes up what is traditionally called the "induced impact" or multiplier effect of the bottled water industry. In other words, this spending, and the jobs it creates is induced by the production, distribution and sale of bottled water. We estimate that the induced impact of the industry is nearly $40.47 billion, and generates 245,288 jobs, for a multiplier of 0.70.[5]

An important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the community. In the case of the bottled water industry, this contribution comes in two forms. First, the traditional direct taxes paid by the firms and their employees provide $17.02 billion in revenues to the federal, state and local governments. In addition, the consumption of bottled water generates about $3.01 billion in state consumption taxes. These figures do not include local sales taxes.

Table 1 below presents a summary of the total economic impact of the industry in the United States.

Table 1: Economic Contribution of the Bottled Water Industry

	Direct	Supplier	Induced
Output	$57,620,137,200	$71,437,312,400	$40,470,270,100
Jobs	227,477	241,591	245,288
Wages	$9,917,870,100	$17,014,852,100	$12,739,424,400
Taxes			$17,016,010,100
Consumption Taxes			$3,007,127,700

Output Model:

John Dunham & Associates produced the Economic Impact study for IBWA. The analysis consists of a number of parts, each of which will be described in the following sections of this document. These include data, models, calculations and outputs. These components were linked together into an interactive system that allows the IBWA to examine the links between the various parts of the industry and to produce detailed output documents on an as-needed basis. As such, there is no book – no thick report – outlining the impact of the industry, but rather a system of models and equations that can be continuously queried and updated.

Economic Impact Modeling – Summary:

The Economic Impact Study begins with an accounting of the direct employment in the various sectors. Manufacturing encompasses company owned bottled water production and other supply operations, and bottling either by company owned facilities or distributors. Wholesaling includes the nationwide network of bottled water distributors and related warehouse and transportation operations. Retailing includes locations where bottled water is consumed on-premise, off-premise, and office delivery.[6] The data comes from a variety of government and private sources.

It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer expenditures for a product are the sum total of the impact on the local economy. However, one economic activity always leads to a

---

[5]   Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the supplier industries as part of the induced impact. John Dunham & Associates believes that this is not an appropriate definition of the induced impact and as such limits this calculation to only the effect of spending by direct and supplier employees.

[6]   Examples of on-premise include businesses where customers consume their purchases before leaving like restaurants and bars, while off-premise includes facilities that sell bottled and canned water for consumption elsewhere like supermarkets, convenience stores, warehouse stores, and similar locations.

ripple effect whereby other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.
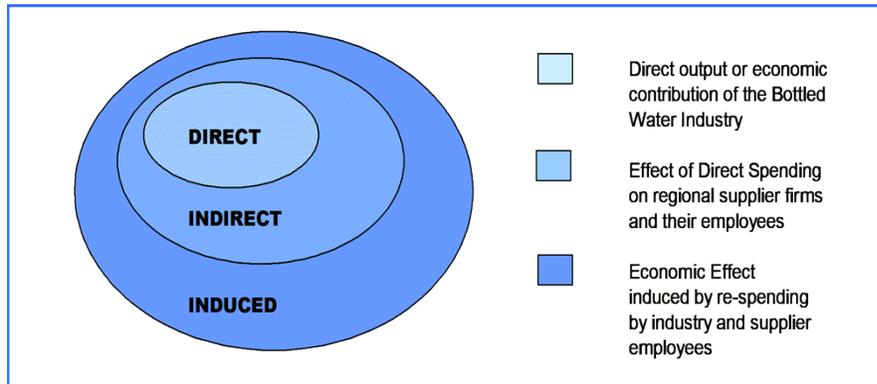
The economic activities of events are linked to other industries in the state and national economies. The activities required to produce a bottle of water, from pumping water from a spring, to filtering, to bottling and packaging, to shipping and retailing generate the direct effects on the economy. Regional (or indirect) impacts occur when these activities require purchases of goods and services such as bottles, or gasoline from local or regional suppliers. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages. The ratio between induced economic and direct impact is termed the "multiplier". The framework in the chart above illustrates these linkages.

This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole.

Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the supplier sector and of the re-spending in the economy by employees in the industry and its suppliers. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the IBWA model, only the most conservative estimate of the induced impact has been used.

Model Description and Data:

This analysis is based on data provided by Infogroup, IBWA, and the federal government. The analysis utilizes the IMPLAN Model in order to quantify the economic impact of the bottled water industry on the economy of the United States.[7] The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a sports facility – on a pre-defined geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).[8]

Every economic impact analysis begins with a description of the industry being examined. In the case of the International Bottled Water Association Economic Impact Study model, the bottled water industry is defined as the production, bottling, distribution and retailing of bottled water. This will incorporate firms in the following economic sectors:

---

[7]   The model uses 2016 input/output accounts.
[8]   RIMS II is a product developed by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993.

- ❖ Manufacturing: Including firms that produce, filter and distill water for retail sale, and firms that bottle water for consumption in the United States. Manufacturers include major multi-state multi-operational companies, regional producers and bottlers.

- ❖ Wholesaling: Including firms involved in the distribution and storage of bottled water after they leave control of the manufacturer. Exporters and importers are included in the wholesaling sector. The direct effects of manufacturer-owned wholesaling operations have been shifted to the wholesaling sector for this analysis.

- ❖ Retailing: This includes firms involved in both the on-premises and off-premises sale of bottled water beverages. This sector includes restaurants, bars, retail establishments (e.g. grocery stores, beverage stores and convenience stores), office delivery services, and vending machine operators. Model limitations preclude the inclusion of actual vending machine locations, military stores, colleges, or other government owned outlets as part of the retailing sector.

The IMPLAN model is designed to run based on the input of specific direct economic factors. It uses a detailed methodology (see Methodology section) to generate estimates of the other direct impacts, tax impacts, and supplier and induced impacts based on these entries. In the case of the International Bottled Water Association Economic Impact Model, direct employment in the bottled water industry, as described above, is a base starting point for the analysis. Direct employment in each of the three components of the industry is – due to data limitations – estimated in three distinct ways. In the case of the manufacturing sector, establishment employment is based directly on data provided to John Dunham & Associates by Infogroup as of May 2019. Infogroup data are recognized nationally as a premier source of micro industry data. Infogroup is the leading provider of business and consumer data for the top search engines and leading in-car navigation systems in North America. Infogroup gathers data from a variety of sources, by sourcing, refining, matching, appending, filtering, and delivering the best quality data. Infogroup verifies its data at the rate of almost 100,000 phone calls per day to ensure absolute accuracy. Since the Infogroup data are adjusted on a continual basis, staff from John Dunham & Associates scanned the data for discrepancies. In addition, for cases where employment data for International Bottled Water Association member firms were available, Infogroup employment figures were replaced with those from IBWA.

Employment for large manufacturing operations (those companies that produce a wide range of products such as soft drinks, bottled waters, juices and sports drinks) was divided by the employment share for each product based on known data. Employment in other facilities is based on employment at specific locations reported to Infogroup by the companies as of May 2019; with employment at locations where no data are available is estimated to be equal to the median for known facilities with similar modes of business and products at the state level.

Wholesale employment is based on two sources. First, like manufacturing, it is based on total employment at specific locations reported to Infogroup by the companies as of May 2019, with employment at locations where no data are available is estimated to be equal to the median for known facilities with similar modes of business and products at the state level. Second, a percent of sales of bottled water derived from the Economic Census of Wholesale Trade was applied to job data provided by Infogroup.[9] For example, if a wholesaler sells $1,000 worth of products in total, and $100 of that is from bottled water, then 10 percent of warehouse employment should be allocated to bottled water. This process determines how many jobs are supported by the sales of bottled water.

---

[9]   2012 Economic Census, Wholesale Trade: Industry Series: Preliminary Product Lines Statistics by Kind of Business for the U.S.: 2012, September 30, 2019, US Department of Commerce, Bureau of the Census, at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

Retail employment data was calculated much like that of the wholesale sector. In order to estimate total employment in the supported by the sales of bottled water at on- and off-premise establishments, Infogroup retail employment data is multiplied by the percent of total sales comprised first of bottled beverages in total, and then by the percent of bottled water. The percent of beverages sold at on- and off-premise retail locations across the US is calculated using the Economic Census of Retail Trade.[10] The percent of beverage sales attributed to water specifically is calculated using "Bottled Water in the U.S. through 2022"[11] and then adjusted for lower price ratio gathered from the Beverage Digest 2018 Fact Book.[12]

Once the initial direct employment figures have been established, they are entered into a model linked to the IMPLAN database. The IMPLAN data are used to generate estimates of direct wages and output in each of the three sectors: manufacturing, wholesaling and retailing. Wages are derived from data from the U.S. Department of Labor's ES-202 reports that are used by IMPLAN to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction employees, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employers.

Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics Growth model to estimate the missing output.

The model also includes information on income received by the Federal, State, and Local Governments, and produces estimates for the following taxes at the Federal Level: Corporate Income, Payroll, Personal Income, Estate, Gift, and Excise taxes; Customs Duties; and Fines, Fees, etc. State and local tax revenues include estimates of: Corporate Profits, Property, Sales, Severance, Estate and Gift and Personal Income Taxes; Licenses and Fees and certain Payroll Taxes.

Indirect Taxes paid due to the consumption of bottled water in each state are also included in the analysis. This is based on estimates of output by state provided by the IMPLAN analysis. These figures – while mostly separate from the reported taxes paid – contain very small double counts. This is because individuals employed by the industry or its suppliers purchase bottled water, and the sales taxes paid by these people are already included in the direct taxes section.

Consumption taxes are calculated by multiplying estimated on- and off-premise sales in each state by the respective state sales tax rates. Since there are over 50,000 local sales tax jurisdictions calculating local sales taxes in a model of this type is not possible. In addition to sales taxes, certain excise taxes and container taxes levied by states and major localities (in this case Baltimore, Chicago and Cook County) are included in the analysis. Taxes are either based on a rate per unit or dollar of sales, or in cases where

---

[10] 2012 Economic Census, *Retail Trade: Geographic Area Series: Summary Statistics for the U.S., States, Metro Areas, Counties, and Places: 2012,* September 30, 2019, US Department of Commerce, Bureau of the Census, at: https://www.census.gov/data/tables/2012/econ/census/retail-trade.html

[11] Table 5.1: U.S. Bottled Water Market: Volume, Share and Growth by Type of Distribution 2016-2022 (P), *Bottled Water in the U.S. through 2022*, Beverage Marketing Corporation, August 2018.

[12] According to the BD Fact Book, the price of a case of bottle water is roughly one third of that charged for carbonated beverages, which are the bulk of the industry. Therefore, our study adjusts to account for the lower price by reducing off-premise retail jobs by the same percent. See Table 4: Retail Price Per Case 2018: Selected Categories, *Fact-Book Twenty Fourth Edition: Statistical Yearbook of Nonalcoholic Beverages for 2018,* Beverage Digest, May 2019.

specific sales cannot be calculated based on the national share of bottled water sales applied to the overall taxes collected.

While IMPLAN is used to calculate the state level impacts, Infogroup data provide the basis for congressional district and county level estimates. Publicly available data at the congressional district and county level is limited by disclosure restrictions, especially for smaller sectors of the economy, like bottled water manufacturing. Our model, therefore, uses actual physical location data provided by Infogroup in order to allocate jobs – and the resulting economic activity – by zip code. For zip codes entirely contained in a single congressional district or county, jobs are allocated based on the percentage of total sector jobs in each zip code. For zip codes that are broken by congressional districts or counties, allocations are based on the percentage of total jobs physically located in each segment of the zip code. Physical locations are based on either actual address of the facility, or the zip code of the facility, with facilities placed randomly throughout the zip code area. All supplier and indirect jobs are allocated based on the percentage of a state's employment in that sector in each of the districts. Again, these percentages are based on Infogroup data.

IMPLAN Methodology:[13]

Francoise Quesnay, one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

Input-Output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources – as published government data series, unpublished data, sets of relationships, ratios, or as estimates. The IMPLAN Group gathers this data, converts it into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: Federal, state, and county. Most of the detailed data is available at the county level, and as such there are many issues with disclosure, especially in the case of smaller industries, such as brewing. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found from any of them. The data is then converted into national input-output matrices (Use, Make, By-products, Absorption and Market Shares), as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the basis of the IMPLAN model. The Benchmark Make Table is updated to current year prices, and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector, and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all

---

[13]   This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.

data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one. If, for example, 10 percent of the consumer price of water is from the purchase of bottled, then the bottle margin would be 0.1.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 536 sectors of the IMPLAN model. Where data are missing, deflators from BEA's Survey of Current Businesses are used.

Finally, one of the most important parts of the IMPLAN model, the Regional Purchase Coefficients (RPCs) must be derived. IMPLAN is derived from a national model, which represents the "average" condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows developed in 1977. These data are updated and bridged to the 536 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models, evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released before extensive testing takes place.