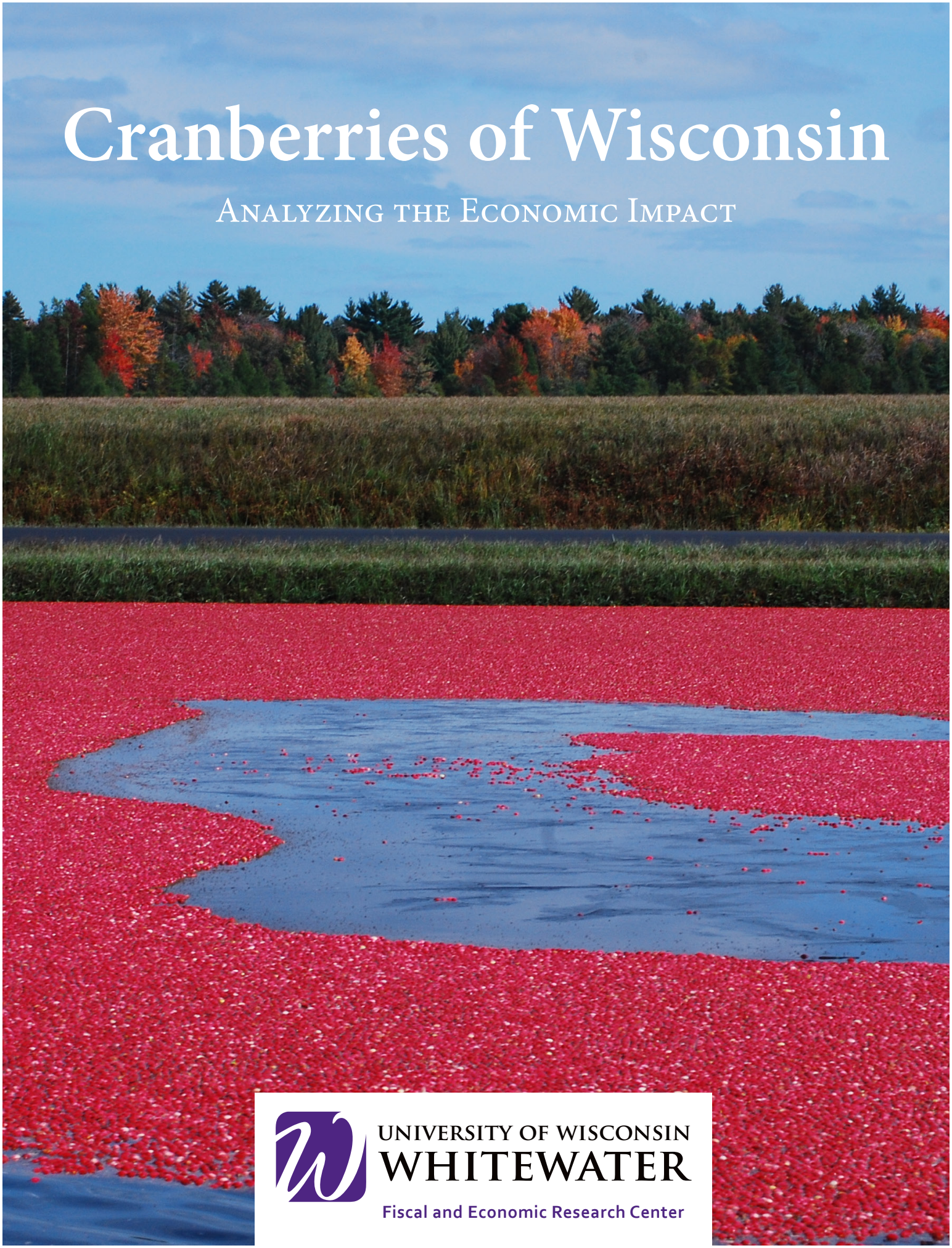
Cranberries of Wisconsin

Analyzing the Economic Impact



UNIVERSITY OF WISCONSIN
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Once mainly known as a menu item in American and Canadian Thanksgiving dinners, cranberries have branched out to become a major commercial crop in the United States and Wisconsin. Cranberries, along with blueberries and concord grapes, are the only native fruits grown commercially in the United States.

However, cranberries have a deep and rich history that many have not yet discovered. Native Americans used the fruit for a wide variety of purposes. Dating back to 1550's where they applied cranberries to heal arrow wounds from battle, created dyes, and cured meats. In the following years, early American settlers learned of the many benefits of cranberries from the natives and used them as bartering items. In 1683, settlers made cranberry juice for the first time. However, it wasn't until 1816 when Henry Hall, a revolutionary veteran, cultivated cranberries in Dennis, Massachusetts—some of the first ground work laid that has led to one of Wisconsin's largest commercial crops. With such a large production value in Wisconsin, it comes as no surprise that the cranberry takes the title of "official state fruit."

Apart from their rich history, cranberries pack a tart, tangy taste and many health benefits. Health professionals consider raw cranberries a "super fruit".

Health benefits related to eating raw cranberries or drinking cranberry juice include: prevents and treats urinary tract infections; potentially lowers LDL, bad cholesterol; potentially increases HDL, good cholesterol; fights and prevents tumor growth; potentially kills the H. pylori bacteria, which causes cancer and stomach ulcers; and has many dental benefits.

While cranberries have a rich history and numerous health benefits related to consuming them, the economic benefits of commercially growing cranberries in Wisconsin prove to have merit. In 2012, FERC (Fiscal Economic Research Center) at the University of Wisconsin-Whitewater--gathered data from government agencies and growers associations including the United States Department of Agriculture (USDA), the National Agricultural Statistics Service (NASS), the Wisconsin State Cranberry Growers Association (WSTCGA), and the Cape Cod Cranberry Growers Associations (CCCGA) on this industry. Information included production totals, yield per acre, acres harvested, utilization (fresh or processed), pricing, value of production and local economy spending. This also included research on how much of the money farmers used to harvest a cranberry crop went to locally produced products such as insurance, fertilizer, pesticides, local labor, equipment and equipment repair.

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Profile of the Cranberry Industry

Currently, five states produce cranberries in the United States.

- Massachusetts
- New Jersey
- Oregon
- Washington and
- Wisconsin

As of March 15, 2012, the USDA and New England Agricultural Statistics reported a combined total of 38,500 acres allotted for cranberry production within these five states. Wisconsin controls more than 46 percent of the production and is the primary cranberry producer in the United States.

Currently, Wisconsin uses 18,000 acres strictly for cranberry production. New Jersey, Oregon and Washington have a combined total of 7,500 acres. This means Wisconsin has 2.4 times the amount of land designated for cranberry production. While the previous statistics seem impressive, Wisconsin also has the most efficient yield per acre of any state. In 2011, yield per acre in Wisconsin was 219.4 barrels. The runner-up, New Jersey, produced 179.0 barrels, making Wisconsin nearly 19 percent more efficient in production. While many factors contribute to Wisconsin having success with yields, the following factors show predominance: management, pest and disease control, landscape and weather patterns. This year, farmers indicated that they experienced a frigid spring, which did not damage the crop, but reportedly lengthened the growing season. As a result of these factors, Wisconsin contributed to more than 57 percent of the total cranberry production in the United States.

Over the last decade, the number of acres designated for cranberry production has fluctuated substantially. Since 2000, acreage used for producing cranberries in the United States has only grown by 1,400 acres, from 36,600 acres in 2000, to 38,000 acres in 2011. In that same time, acreage designated for cropping cranberries in Wisconsin has grown by 2,900 acres (with 15,100 acres in 2000 to 18,000 acres in 2011). While Wisconsin has added 2,900 acres for yielding crops in this 11-year span, New Jersey and Massachusetts have respectively downsized 700 and 900 acres. Wisconsin has an ideal landscape and weather conditions for cranberry production and the counties in Wisconsin where cranberries are grown have no outside pressures for commercial or residential development. This explains Wisconsin's production increased while other states experience decreased production.

Literature Review

As a whole, the cranberry industry is healthy and growing. In 2011, U.S. production of cranberries was 7.74 million barrels, a 14 percent increase from 2010. At 4.41 million barrels, Wisconsin leads the nation in production and has a farm of value $166.4 million. Despite the production increase, cranberry acreage harvested remained constant with the previous year at 38,000. Advances in technology and good weather conditions explain this increased production. Preliminary pricing for 2011 placed fresh cranberries at $68.50 on average per barrel and $43.60 on average per barrel for processed cranberries.

In order to grow cranberries in a profitable manner, certain conditions need to exist. An abundant supply of water, access to a reliable source of sand, the bogs' ability to hold floodwaters and level terrain (Jones). This makes Wisconsin an ideal candidate for producers of the cranberry fruit. Compared to the next leading state, Massachusetts, Wisconsin incurs less product cost due to the ideal conditions and appropriate management practices of cranberry farmers (Amanor-Boadu, Boland, Barton).

The outlook for cranberries proves extremely optimistic. Both the United States and foreign markets see increasing demand and prices. Ocean Spray, the leading producer of cranberry products in the nation, saw an 18 percent increase in international sales in 2006 alone. As demand grows, growth in supply is necessary. Wisconsin commits 1,000 acres per year to expanding cranberry production. The increased consumption of dried cranberries and cranberry juice attributes to the increase in demand. While the demand for most juice products remains flat, the demand for cranberry juice increased 9.9 percent between 2005 and 2006. The sales of dried cranberries for Ocean Spray nearly tripled from 2002 to 2006. As a result, cranberry production needs to expand somewhere. The primary candidates for this expansion include Wisconsin, Michigan and the Maritime Provinces in eastern Canada (Knudson).

Wisconsin has an advantage over other areas for multiple reasons. First, in 2008, on average, Wisconsin produced more than 70 barrels per acre more than any other cranberry-producing region in the United States (Colquhoun and Johnson). Also, compared to Michigan, which has strict regulations, Wisconsin cranberry farmers have more freedom to take advantage of the growing cranberry market (Knudson). Higher yielding varieties of cranberry vines on new land in addition to superior pest and disease control, contribute to the high production potential of Wisconsin. Due to the high cost of growing the cranberry crop, it wasn't until recently that Wisconsin benefited economically from this crop (Jesse and Deller).

Literature Review

The impact of the cranberry industry in Wisconsin encompasses four categories: employment, personal income, total value added and total industry output. Employment includes all employees, including part-time workers; total value added represents personal income, interest, profits and indirect business taxes (Jesse). The cranberry doesn't only benefit some large manufacturer that doesn't care about the local economy. Most cranberry growing operations, with few exceptions, remain local in nature. By utilizing local labor and buying insurance, equipment, chemicals and fertilizers locally the cranberry industry generates revenue for related industries within the local community. The additional revenue seen in additional industries and the further implications of that revenue leave a huge impact in the local community. This works as a multiplier affect (Jesse and Deller).

For many years, investing in cranberries was not seen as an attractive market. In 2003, however, Northland Cranberries Inc. offered $800 million to acquire the assets of the current market leader, Ocean Spray Cranberries. Ocean Spray accepted the offer. Since the buyout, output and sales continue to rise (Boland). Due to this increase in output and sales, the need for land to develop into cranberry bogs has increased. However, due to the marshland conservation, acquiring land to build new cranberry bogs necessitates dealing with legal issues. Farms that use best management practices (BMPs) on their farms improve their chances to gain approval to build new cranberry bogs. Considering most of Wisconsin's cranberry bogs implement BMPs, this puts most of the cranberry growers in Wisconsin ahead of growers in other states (DeMoranville).

Cranberry Data

Table 1.1 | Cranberry Crop Statistics for Wisconsin

Year	Harvested	Yield Per Acre	Production		Utilization		Value	
			Total	Utilized	Fresh	Processed	Per Barrel 1/	Total
	Acres		Barrels				Dollars	1,000 Dollars
1990	9,400	147.3	1,385,000	1,371,000	117,000	1,254,000	45.3	62,741
1991	9,700	160.3	1,555,000	1,525,000	147,000	1,378,000	48.6	75,573
1992	9,800	137.8	1,350,000	1,330,000	100,000	1,230,000	50.9	68,715
1993	10,000	136	1,360,000	1,298,000	86,000	1,212,000	49.7	67,592
1994	11,100	147.7	1,640,000	1,615,000	88,000	1,527,000	49.5	81,124
1995	12,000	150	1,800,000	1,734,000	122,000	1,612,000	54.2	97,581
1996	12,900	154.3	1,990,000	1,915,000	146,000	1,769,000	60.4	120,107
1997	13,700	153.3	2,100,000	2,164,000	110,000	2,054,000	65	136,500
1998	14,500	175.2	2,540,000	2,517,000	129,000	2,388,000	43.3	109,982
1999	14,600	226.5	3,307,000	3,301,000	206,000	3,095,000	20	66,140
2000	15,100	178.3	2,692,000	2,598,000	187,000	2,411,000	17.4	46,841
2001	15,100	188.1	2,840,000	2,466,000	209,000	2,257,000	23.7	67,308
2002	15,900	200.6	3,190,000	3,208,000	177,000	3,031,000	29.7	94,743
2003	17,400	207.3	3,607,000	3,570,000	195,000	3,375,000	31.7	114,342
2004	17,400	189.7	3,300,000	3,300,000	205,000	3,095,000	32.5	107,250
2005	17,400	210.3	3,660,000	3,660,000	200,000	3,460,000	34	124,440
2006	17,500	225.1	3,940,000	3,840,000	170,000	3,670,000	40.2	154,550
2007	17,600	217.6	3,830,000	3,830,000	230,000	3,600,000	50.5	193,518
2008	17,700	252.5	4,470,000	4,470,000	220,000	4,250,000	55.4	247,670
2009	18,000	219.4	3,950,000	3,950,000	220,000	3,730,000	48.5	191,395
2010	18,000	220	3,960,000	3,960,000	80,000	3,880,000	47.1	186,628

Cranberry Data

Table 1.2 | Cranberry Crop Statistics for the United States

Year	Harvested	Yield Per Acre	Production		Utilization		Value	
			Total	Utilized	Fresh	Processed	Per Barrel 1/	Total
	Acres	Barrels					Dollars	1,000 Dollars
1990	27,800	122.1	3,393,000	3,370,000	215,700	3,154,300	46.1	156,417
1991	28,400	148.6	4,219,000	4,148,500	236,500	3,912,000	49	206,731
1992	29,200	142.5	4,160,000	4,104,500	223,500	3,881,000	51.6	214,656
1993	29,400	133.3	3,919,000	3,818,000	199,000	3,619,000	50.2	196,734
1994	31,100	150.5	4,682,000	4,631,000	216,000	4,415,000	49.3	230,823
1995	32,800	127.8	4,193,000	4,100,000	242,000	3,858,000	53.4	223,906
1996	34,000	137.4	4,671,000	4,566,000	236,000	4,330,000	65.9	307,819
1997	35,700	154	5,497,000	5,297,000	225,000	5,072,000	63.7	350,159
1998	36,600	148.7	5,444,000	5,401,000	244,000	5,157,000	38.8	211,227
1999	37,500	168.9	6,334,000	6,334,000	357,000	5,977,000	17.2	108,945
2000	36,600	156.1	5,712,000	5,579,000	442,000	5,137,000	18.1	103,387
2001	34,200	155.8	5,329,000	4,883,000	426,000	4,457,000	23.8	126,830
2002	37,900	150	5,684,000	5,677,000	370,000	5,307,000	30.2	171,657
2003	39,400	155.1	6,110,000	6,100,000	334,000	5,766,000	31.8	194,298
2004	39,200	157.5	6,175,000	6,167,000	397,000	5,770,000	32.3	199,453
2005	39,100	159.2	6,225,000	6,243,000	347,000	5,896,000	34	211,650
2006	39,000	176.9	6,900,000	6,785,000	355,500	6,429,500	38.5	265,650
2007	38,800	164.8	6,395,000	6,554,000	360,000	6,194,000	43.8	280,101
2008	38,200	205.9	7,865,000	7,606,000	348,500	7,257,500	58.1	456,957
2009	38,500	179.6	6,913,000	6,913,000	333,000	6,580,000	48.2	333,207
2010	38,500	176.9	6,811,000	6,808,200	219,200	6,589,000	46.5	316,712

Cranberry Data

Table 1.3 | Cranberry Barrel Price Comparisons

Year	WI	US	MA	NJ	OR	WA
1990	45.3	46.1	47.6	45	44.8	44.8
1991	48.6	49	49.8	47.7	47.2	47.2
1992	50.9	51.6	53.6	48.8	48.5	48.5
1993	49.7	50.2	51.8	47.2	46.5	46.5
1994	49.5	49.3	50.6	46.6	46.8	46.8
1995	54.2	53.4	54.3	50	49.6	49.6
1996	60.4	65.9	70.9	61.8	60.5	61
1997	65	63.7	66.2	56.6	50.7	55.7
1998	43.3	38.8	37.3	26.3	39.8	25
1999	20	17.2	16.2	10.1	11.5	11.8
2000	17.4	18.1	19	17.9	16.7	22.3
2001	23.7	23.8	24	23.1	22.5	28.2
2002	29.7	30.2	31	29	30.4	33.8
2003	31.7	31.8	32.1	29.6	32.3	33.5
2004	32.5	32.3	32.1	30.4	32.5	34.7
2005	34	34	33.7	33.7	34.3	36.3
2006	40.2	38.5	38.8	35.6	48.3	41.3
2007	50.5	43.8	43.4	38.9	59.6	41.2
2008	55.4	58.1	58.6	53.6	91.5	57.4
2009	48.5	48.2	47.1	56.1	36.3	60.6
2010	47.1	46.5	43.3	55.6	34.5	62.3
Average	42.743	42.405	42.924	40.171	42.133	42.310

Analysis

For the past 20 years, Wisconsin's cranberry industry produced a median annual yield per acre of 188.1 barrels. Compared to the rest of the United States, which produced a median annual yield of 155.1 barrels. In its best year, 2008, Wisconsin averaged 252.5 barrels per acre. Furthermore, Wisconsin, as a median, produces 2,840,000 barrels per year. No other fruit crop in Wisconsin produces this large of an amount. In the past 20 years, this crop was worth total 2.5 billion. By looking at Table 1.1 one can see the trend of increased land use and increased efficiency in cranberry farming which has allowed Wisconsin to remain the primary cranberry producer in the United States.

The Economic Multiplier-The Economic Impact of the Cranberry Industry on Wisconsin's Economy

To determine the economic impact of the cranberry industry on Wisconsin, the 2011 IMPLAN economic modeling system was used. This produces an economic multiplier, which is a quantitative measure of economic impact that recognizes that all levels of economies are interconnected networks of interdependent activity. When one part of the economy changes the rest of economy will be influenced by that change. This will typically result in a greater total impact than was caused by the original injection of capital into the economy.

A portion of that money will "leak" out of the local economy through taxes or be spent outside of the local economy. Only a fraction of the money spent by cranberry producers will probably stay in the local economy. People who work within the industry could be from outside the State. Insurance paid by the employers and employees might be paid to a company in a different state. The harvesting equipment could have been not only assembled by people from outside the community, but also designed and fabricated in a state other than Wisconsin. Each of these and many more possibilities allow for money to leak out of the economy and to have effects on other areas. The multiplier effect compensates for this "leak".

An example of an economic multiplier: consider that 30 employees were hired to work in the cranberry industry; employment will increase by more than 30 jobs directly tied to the industry. Employment increases by more than 30 for two reasons. First, the operation of the fair requires several expenditures including utilities, insurance and maintenance costs. This spending creates additional jobs in those industries that supply those services. These impacts are referred to as indirect effects because they are indirectly created by the establishment of jobs in the cranberry industry. Another impact occurs from the people who work in the industry spending their earned income in the local community. This spending creates jobs in the businesses that provide the services. These impacts are called induced impacts. This defines the employment multiplier as the number that is multiplied by the number of jobs directly involved in the fair to give the total number of jobs created (both directly and those created in the community by the fair). If the total number of jobs created by the industry was 40, then the employment multiplier would be 1.33 (40/30).

To calculate the impact of expenditures by the cranberry industry, an IMPLAN input – output model was used. An IMPLAN model is capable of determining the overall economic impact that initial spending has on the local economy. The IMPLAN model uses data gathered in surveys and estimates to what extent different spending categories affect the local economy in terms of initial effect, direct effect, indirect effect, and induced effect. This Input/Output (I/O) Model provides a means to capture and measure these effects. It uses the following three effects to measure economic impact:

- **Direct effect** - production change associated with a change in demand for the good itself. It is the initial impact to the economy, which is exogenous to the model. In the case of the fair, this includes the spending brought about by the cranberry industry.

- **Indirect effect** - the secondary impact caused by changing input needs of directly affected industries (e.g., additional input purchases to produce additional output). It concerns inter-industry transactions: The cranberry industry has a demand for locally produced materials needed to produce their product (perhaps office supplies). The success of the cranberry industry affects all of the industry's suppliers.

- **Induced effect** - caused by changes in household spending due to the additional employment generated by direct and indirect effects. The induced effect measures the effects of the changes in household income: those individuals working in the cranberry industry and the industry's suppliers spend money at restaurants, grocery stores and shops.

During this study, two types of data were used to assess the economic impact of the cranberry industry in Wisconsin. The first type of data, direct spending by the industry, is measured in terms of the costs of operating the industry (predominantly wages and operating expenses). This includes the employees and other expenses not directly connected to labor (utilities, maintenance, insurance, etc.).

Table 1.4 The Economic Impact of the Cranberry Industry on the State of Wisconsin

Impact Type	Employment	Labor Income	Value Added	Output
	Number of Jobs Created	In Dollars($)		
Direct Effect	2,407.80	96,933,185	96,028,287	223,168,000
Indirect Effect	589.9	22,934,296	34,193,359	62,349,774
Induced Effect	841.8	32,380,460	58,044,590	102,829,673
Total Effect	3,839.50	152,247,941	188,266,236	388,347,447

The economic impact of the cranberry industry is measured across industry sales, job creation and employment income. Using a five year yield price average, this industry contributes $388,347,447 in sales to Wisconsin's economy and creates 3,839.5 annual full-time jobs with a total labor income of $152,247,941. This gives a "Cranberry Industry sales multiplier" of 1.74 (388,347,447/223,168,000), which suggests that for every dollar of sales by the industry, an additional 74 cents of economic activity is generated in Wisconsin.

The "Cranberry Industry employment multiplier" equals 1.59 (3839.5/2407.8), which implies that for every job created by attendees of the industry, 0.59 additional jobs will be created. Finally, the income multiplier created by the industry is 1.57, implying that for every dollar of labor income earned by employees of the industry, an additional 57 cents of income is earned in Wisconsin.

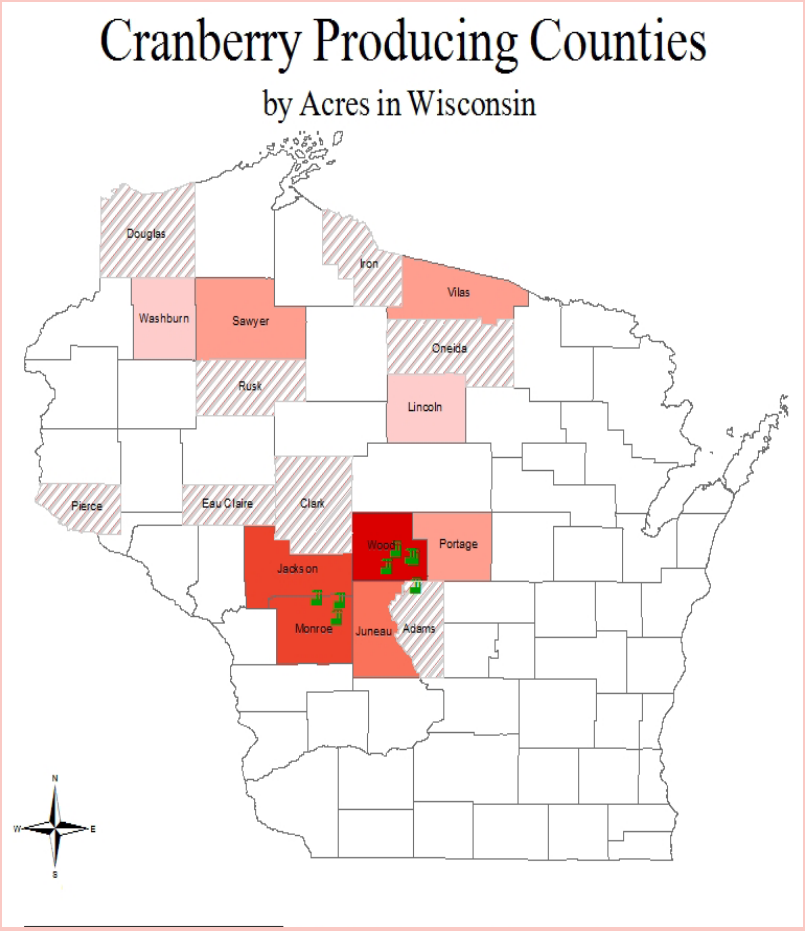
Table 1.5 The Economic Impact of Adding an Additional 1,000 Acres of Cranberry Producing Farmland

Impact Type	Employment	Labor Income	Value Added	Output
	Number of Jobs Created	In Dollars($)		
Direct Effect	135.6	5,457,950	5,406,998	12,565,766
Indirect Effect	33.2	1,291,346	1,925,302	3,510,695
Induced Effect	47.4	1,823,224	3,268,276	5,789,959
Total Effect	216.2	8,572,519	10,600,576	21,866,410

An alternative view of this analysis can be a marginal analysis, in which an estimate is made regarding the economic impact of adding an additional 1,000 acres of cranberry-producing farmland to the market.This analysis is predicated on the expectation that this additional output will not materially impact either the output price or the input costs. In this case, 1,000 additional acres would create 135.6 jobs in the industry and an additional 80.6 jobs throughout Wisconsin.

The Economic Impact of Taxes from the Cranberry Industry on the State of Wisconsin

The impact of taxes derived from the cranberry industry proves to be a substantial sum. In 2012, Wisconsin will collect $18,287,504 in tax revenue. Taxes collected from the cranberry industry come from direct and indirect sources. The cranberry industry gets taxed directly, but indirect taxes such as taxes placed on employees and taxes placed on businesses that deal with the cranberry industry or their employees also contribute heavily to this impact. In fact most of the taxes collected due to the cranberry industry are collected from indirect business taxes at a total of $12,270,919; $4,738,795 comes from indirect sales taxes of businesses; and $6,179,652 comes from indirect property taxes of businesses.



Conclusion

The cranberry industry has a combined impact (including direct, indirect, and induced) of $388,347,447 on the economy of Wisconsin. This money led directly to the creation of 3,839 jobs in the state. Due to the interaction between Wisconsin and the rest of the World, a large portion of the money could "leak" out of Wisconsin. Due to size and the economic complexity, however, the industries of Wisconsin provide many of the inputs and services required by the cranberry industry. Some money does ultimately flow outside the state to purchase items that do not originate in Wisconsin. Even considering these leakages, the impact of the cranberry industry is significant. The multiplier effect makes up for the leakages that exist.