CCOVI Economic Impact Assessment (2014/15)

Cool Climate Oenology and Viticulture Institute (CCOVI), Brock University

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1 Executive Summary

Since its establishment in 1996, in partnership with the Grape Growers of Ontario, the Wine Council of Ontario, and the Winery and Grower Alliance of Ontario, the Cool Climate Oenology and Viticulture Institute (CCOVI) at Brock University has gained recognition as a successful and internationally acclaimed institute focused on the research priorities of Canada's grape and wine industry and its education and outreach needs.

A core element of CCOVI's Vision is to be the Canadian centre of excellence for cool climate viticulture, oenology, wine business, policy and culture with a mandate to advance the Canadian grape and wine industry.[1]

This pursuit is made possible through the institute's dedication to research and development. Not only is this research focused on addressing sector based issues and advancing innovation in the field, it is also focused on providing industry driven solutions to specific problems in an applied capacity.

In delivering support to industry in Research Services, Business Services, and Knowledge Transfer, it has positioned itself and Brock University as a leader in industry based research and solution provision in the Canadian grape and wine research network.

It has reached a state of maturity both as a valuable organization in the science and business of wine, and through ever increasing domestic and international brand recognition, a driver for industry innovation and collaboration.

The purpose of this report has been to provide a baseline of quantitative information that can be leveraged by CCOVI to forge its path forward, and enter into the next stage of institutional growth.

Although the institute's importance and value may be well recognized in local vineyards, across research networks, and within industry circles, it is critical that CCOVI establish a manner in which to measure its positive impact on the sector it serves.

In order to accomplish this, the following report outlines the approach, methodology, and outcomes of an economic impact assessment undertaken to examine the annual contribution of CCOVI to the industry and the regional economy based on research and outreach programs developed over the past decade. The investments made into CCOVI through Brock University's annual investment and industry/government funded research programs totals approximately $15 million over the past 10 years. This investment into CCOVI has now translated into a measurable economic impact to the industry and regional economy.

Key highlights from the report are provided below.

[1] Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". P.18

Total Economic Impact of CCOVI Research, Programs, and Services

The $15 million investment into CCOVI over the past decade is now resulting in a measurable annual economic impact for the region based on the evidence provided through industry stakeholder interviews, secondary research, and the input/output models employed in this study.

In the 2014 – 2015 fiscal year, CCOVI had an overall total annual economic impact of **$91,123,926** to the Ontario economy. This total economic impact was based on (1) the impact of research programs and outreach services directly on the industry, as well as from (2) Brock University's annual investment in CCOVI and the annual investment of government/industry investments into research programming.

(1) CCOVI Research Programs and Outreach Services Impacts to Industry

Based on the evidence provided through industry interviews conducted by The Goodman School of Business, the cumulative direct economic benefit of CCOVI research programs and services to the industry for the 2014 – 2015 fiscal year was identified as $58,152,371. This economic benefit was based on seven programs developed over the past decade including grapevine cold hardiness, ladybugs, new wine styles, Icewine, CCOVI Services, Workshops/Seminars, and Conferences.

In turn, the total economic impact generated by CCOVI research and outreach services for industry in 2014-15 (based on the total benefit identified above) was **$86,338,750.**

Impacts through individual programs were as follows:

- Total Economic Impact through Crop Loss Prevention of $7,008,530
- Total Economic Impact through Crop Loss Conversion to Wine Sales of $73,724,003
- Total Economic Impact through Other Wine Sales of $5,606,217

(2) Brock University and Government Investment Impacts

CCOVI provides benefits to industry through educational programming delivered through Brock University, applied learning workshops, conferences, and seminars. It also attracts significant industry, government, and partnered funding for research and development, which in turn generates economic impact.

As a result, in the 2014 – 2015 fiscal year, government and industry supported CCOVI research, along with student enrolment and spending for related educational programming in CCOVI, resulted in a total economic impact of **$4,785,176.**

Individual impacts include:

- Total annual impact from Brock's yearly investment in CCOVI of $1,085,644
- Total impact from government and industry funding in 2014-15 of $2,482,885
- Total impact from student services in 2014-15 of $908,844
- Total impact from revenue generated from CCOVI services in 2014-15 of $307,803

In summary, as a result of the past investments into research and services at CCOVI over the past decade, CCOVI now has the following annual estimated economic effect as measured in 2014-15:

- **Direct Economic Benefit[2] to industry of $58,152,371**

This in turn generated the following regional impact in Ontario:

- **Total Economic Impact generated by CCOVI of $91,123,926**
- **Estimated Total Employment Impact of 307 jobs created**
- **Total estimated Labour Income of $16,800,269**
- **Total Crop Loss Avoidance of 3,362 Tonnes of grapes**

[2] Across all CCOVI programs and services based on data as reported in the stakeholder interviews and for the current year. It is assumed this benefit may include cumulative impact of efforts/results witnessed or achieved over the preceding 1-2 years.

2 Economic Impact Assessment

2.1 Focus and Activities of CCOVI

The Cool Climate Oenology and Viticulture Institute (CCOVI) at Brock University is focused on three core areas:

- To strengthen the growth, profitability and sustainability of the grape and wine industry throughout Canada through research on industry needs
- Train the next generation of leaders in the industry through education, and,
- Outreach and knowledge transfer back to industry, which in turn raises the profile of the Canadian wine industry globally

Since its establishment in 1996, in partnership with the Grape Growers of Ontario, the Wine Council of Ontario, and the Winery and Grower Alliance of Ontario, CCOVI has gained recognition as a successful and internationally acclaimed institute focused on the research priorities of Canada's grape and wine industry and its education and outreach needs.

These priorities (illustrated in Figure 1) are supported through CCOVI in the form of three, key service areas for the organization:

- **Research Services** (to address industry priorities)
- **Business Services** (focused on improving industry productivity)
- **Knowledge Transfer Services** (sharing best practices and cutting-edge research outputs)

CCOVI's priorities are grounded in three pillars that guide the mission of the institute in its dedication to advancing the grape and wine industry:

- Quality
- Innovation, and,
- Sustainability

FIGURE 1: CCOVI KEY SERVICE GROUPS

Source: CCOVI adapted by MDB Insight

These pillars are core values for the organization, and are mirrored in the goals and aspirations at the heart of the people, businesses, and organizations driving the grape and wine industry forward.[3]

[3] Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". Pp 4-7.

The institute has two state of the art research facilities where the majority of the research activity takes place. Inniskillin Hall is a dedicated scientific research facility for cool climate oenology and viticulture, contains a research and teaching winery, and also includes the Canadian Wine Library. The Consumer Research Laboratory is focused on developing tools and knowledge that can be used by industry to increase market share through the analysis of consumer behaviour, market research, and wine marketing.

CCOVI is dedicated to offering innovative support services to the grape and wine community. Whether it be industry sponsored conferences, workshops, lecture series or outreach programs, CCOVI advances technology and knowledge transfer throughout the industry.

Over the years, CCOVI and Brock University's Oenology and Viticulture (OEVI) program have placed co-op interns in positions in the industry each year. CCOVI has a good track record in supporting workforce development as well. In total, 92% of OEVI graduates were also hired by the industry in Ontario, across Canada, as well as in the United States and as far away as Tasmania in Australia.

In addition, CCOVI has entered into partnerships with other academic communities, federal and provincial government research organizations, regional grape and wine industry groups across Canada, as well as in the cool climate wine regions of the world.

In summary, CCOVI and its programs have made a major contribution to the grape and wine industry across Canada. The development of this sector within individual local geographies in turn results in growth within their regional economies. The same is also true across the broader provincial economy in Ontario.

One of the objectives of this project is to estimate the annual economic impact of CCOVI and its programs locally, and in Ontario, as well as the value of CCOVI's research to the industry. The project uses a combined approach of a bottom up, standard regional impact model and the concept of economic growth.

2.2 Economic Impact Methodology

Economic impact analysis provides a quantitative method to estimate the economic benefits that a particular activity, institution or industry brings to its surrounding communities, region, or country.

These economic activities help generate additional economic activities to one or more related industry sectors. Economic impact analysis estimates the economic value of these additional economic activities.

This project takes a regional approach to analyzing the portion of the economic benefits that a region can retain before the impact leaks out into surrounding geographies.

Regional input-output tables are used to analyze the interdependence of industries within a regional framework. Derived from the Province of Ontario's Input-Output Tables, industry specific multipliers are used to assess the effects on the economy of an exogenous change in the final demand for the output of a given industry.

These multipliers provide a measure of the interdependence between an industry and the rest of the economy. Provincial Input-Output Multipliers (2010) from Statistics Canada[4] are used to calculate the economic impacts for the various CCOVI activities under examination below.

2.2.1 Measures of Economic Impact Analysis

Each of the economic impact analyses calculated for the various CCOVI initiatives and activities examined in this report contain four distinct measures.

These measures are:

- **Output:**
  - Output is the broadest measure of economic activity. Output is the total gross value of goods and services produced by a given company or industry as measured by the price paid to the producer
  - In this case, it is reflected in the total value of goods and services produced by CCOVI, or through the respective industry group as a direct result of access or uptake of CCOVI services
- **Labour Income:**
  - Labour Income as a measure of the salary earnings of the employees
- **Employment:**
  - Employment refers to the number of additional full-time or equivalent jobs created as a result of the expenditures made by the operations
- **Value-added:**
  - Value-added refers to the additional value of a good or service over the cost of inputs used to produce it from the previous stage of production

2.2.2 Components of Economic Impact

For each of the economic impact calculations that are presented in the tables below, there are a number of different impact types. These represent the economic effects that are a result of the economic activity.

[4] The latest multipliers available through Statistics Canada for Ontario industries were published in 2010. Therefore, these multipliers have been applied in the economic impact analyses in this report.

They are:

- Direct Effect
- Indirect Effect
- Induced Effect
- Total Effect

As will be seen below, and throughout this section of the report, not all economic impact assessments will contain all possible effects. For the purposes of this report, this is due to the availability (or lack thereof) of the necessary multipliers (as referenced above) needed to calculate the potential effect, and that measure the possible impact.

The various effects used in this report are defined as follows:

- **Direct Effect:**

Measures the jobs, GDP and fiscal contributions generated by the organisation or industry itself. The direct economic effect of CCOVI and its programs are the direct economic impacts associated with its economic activities.

- **Indirect Effect:**

Attempts to capture jobs and GDP supported or created by the organisation through the purchases it makes from its suppliers. Therefore, local or regional businesses and jobs will be needed to support the operations of CCOVI and its programs, which make up the indirect economic impact of the initial dollar circulation in the sector.

In the case of analysing the various program impacts on the local industry, this indirect effect is a product of the industry activity as a result of CCOVI services.

- **Induced Effect:**
    - Jobs and GDP supported by the spending patterns of those employed directly or indirectly by the organisation.

In this respect, induced effects measure the changes in the production of goods and services in response to consumer expenditures induced by those employed directly or indirectly by CCOVI and related programs.

In the case of analysing the various program impacts on local industry, the induced effects relate to those employed in the various businesses and industries supported directly through CCOVI programming.

The final values presented are nominal values and are not adjusted for the time effect.

- **Total Effect:**
    - Total effects are the sum of direct effects and the secondary, indirect and induced effects

For this report and the analyses below, these figures represent the total economic impact that can be assumed to occur from CCOVI itself and its effect on local industry through the various programs and services it delivers.

2.3 Brock University, Industry and Government Support of CCOVI and its Programs

The following section is structured to provide estimates on the economic impact directly associated with CCOVI and its programs. It is understood that CCOVI and its programming play a critical role in Brock University's ability to secure program associated funding and spending that otherwise would not be available to support the local and provincial grape and wine industry in Ontario.

Later sections in this report will focus on the economic impact associated with CCOVI's positive impact on and through industry through research programming and outreach services (section 2.4.2).

2.3.1 Brock University Investment in CCOVI Operations

The CCOVI budget includes staff salaries and operational expenses. The staff compliment of 14 includes full and part time staff along with all organizational functions (executive, administration, research, and community facing positions). Operational expenditures include supplies, travel, postage, printing, repairs and maintenance, among other things.

As of the 2014/15 fiscal year, the CCOVI budget represents a new structure where revenue as well as expenses required to generate revenue, are now included. This departure reflects a more business minded approach to the organization, and one that allows for the monitoring and observation of the impact of CCOVI services in offsetting operational costs.

To support the operation of CCOVI, additional jobs and services were created within the community. The economic impact table below provides estimates of the cumulative impact of the program spending circulated within the community. The output figure reflects the actual CCOVI operational expenses for the 2014/15 fiscal year.

FIGURE 2: CCOVI OPERATION IMPACTS

Impact Type	Output	Labour Income	Employment	Value Added
Direct Effect	$682,719	$361,541	4.4	$542,987
Indirect Effect	$136,507	$47,628	0.9	$71,667
Induced Effect	$266,419	$47,628	1.2	$158,284
Total Effect	$1,085,644	$456,797	7	$772,938

Source: MDB Insight

Figure 2 above illustrates that the total effect of CCOVI operations in the 2014/15 fiscal year was $1.08 Million.

This in turn generated $456,797 in labour income, along with the generation of 7 jobs in the economy as a result of expenditures made by the organization.

Further, CCOVI operations stimulated an estimated $772,938 in additional value-added impact on the broader economy.

2.3.2 Government and Industry funding of CCOVI Research

A core element of the CCOVI Vision is to be the Canadian centre of excellence for cool climate viticulture, oenology, and wine business, with a mandate to advance the Canadian grape and wine industry.[5]

This pursuit is made possible through the institute's dedication to research and development. Not only is this research focused on addressing sector based issues and advancing innovation in the field, it is also focused on providing industry driven solutions to specific problems in an applied capacity.

There are various streams of research funding that make up the core research services provided by CCOVI. These come from three principles sources:

- Government funding with industry partners
- Government funding without industry partners
- Funding from industry directly

In the 2014/15 fiscal year, staff and researchers successfully attracted $1,302,375 Million in total research funding. This includes the three sources mentioned above.

As of April 2015 in the current 2015/16 fiscal year, CCOVI has already attracted over $370,000 in funding across all research categories.

[5] Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". P.18

FIGURE 3: GOVERNMENT AND INDUSTRY FUNDED RESEARCH PROGRAMS 2012/13 TO 2015/16

Contributor	Contribution Type	Fiscal Year			
		2015/16	2014/15	2013/14	2012/13
Government Grants in Partnership with Industry	Provincial and Federal Funding Sources	$220,000	$985,500	786,163	1,219,000
Industry Partners	Cash Contributions from Partners to CCOVI Programs	$70,000	$56,735	77,865	65,000
Industry Partners	In-kind Contributions from Partners to Programs	$179,697	$185,526	$69,402	$165,902
Industry Partners	Industry Partners in Research	26	71	57	53
CCOVI – Industry Partners	Funded Research Programs	7	9	3	4

Source: CCOVI

When examining the level of secured funding over time (Figure 3, above), it is worth noting that CCOVI has consistently been successful in attaining approximately $1 million in funding from government-industry programs. CCOVI has already reached well over the 2014/15 fiscal totals for industry funding as of April in the current 2015/16 fiscal year to date.

Further, in-kind contributions have nearly totaled the previous year's contribution already, indicating even deeper levels of industry participation and cooperation with CCOVI research and programming.

In addition, the number of funded research programs in partnership with industry continue to increase each year, indicating steady support for CCOVI – Industry partnered research.

Figure 4 below highlights the levels of non-industry partnered funding (government) for CCOVI between the 2012/13 fiscal years to date (2015/16).
With the exception of the international government collaboration between the 2013/14 and 2014/15 years, current levels of CCOVI attracted funding are closely reaching year end totals from previous years.

It also highlights the revenue potential contained in international activities (although the project expenses and profit margins are not taken into consideration in this table).

FIGURE 4: CCOVI GOVERNMENT FUNDING WITHOUT INDUSTRY PARTNERS 2012/13 TO 2015/16

Funding Agency	2015/16	2014/15	2013/14	2012/13	2011/12
NSERC (5)	83,000	50,000	46,000	73,000	63,475
Gov't of Australia		183,732	183,732		
SSHRC (2)		26,408	26,408	26,408	28,341
Totals	**83,000**	**260,140**	**256,140**	**99,408**	**91,816**

Source: CCOVI

Based on the total research funding dollars attracted (both with, and without industry funding) during the previous fiscal year (2014/15), the following table (Figure 5) summarizes the estimated economic impact related to those CCOVI research activities. The economic value of CCOVI research adopted by industry will be analyzed separately in section 2.4.2. It should be noted that the research impact figures below relate only to the research dollars identified above and are in addition to the applied research figures and impacts identified through the industry engagement discussed further on in this report.

FIGURE 5: GOVERNMENT AND INDUSTRY FUNDED CCOVI RESEARCH IMPACTS FROM FISCAL 2014/15

Impact Type	Output	Labour Income	Employment	Value Added
Direct Effect	$ 1,302,375	$ 888,161	9.7	$ 989,530
Indirect Effect	$ 417,306	$ 167,525	2.8	$ 232,272
Induced Effect	$ 763,204	$ 217,172	4.2	$ 453,368
Total Effect	$ 2,482,885	$ 1,272,857	17	$1,675,170

Source: MDB Insight

What is immediately apparent is that the total impact of over $2.4 million related to CCOVI research is almost double the direct effect output ($1.3 million) of the organization.

Further, nearly an equal amount of estimated labour income was generated at $1,272,857 and an estimated 17 jobs were generated as a result of the expenditures made by CCOVI research operations.

In addition, an estimated $1,675,170 Million was generated in value-added impact on the broader economy.

2.3.3 Education Programs

CCOVI plays an important role in supporting Brock University's OEVI program and the university's other educational programing specific to the grape and wine industry. The Oenology and Viticulture programs were established as a result of the expanding wine industry in Canada and are delivered through the only "degree-granting institution in the country's primary grape growing and wine-producing area".[6]

These programs have been instrumental in filling the gaps of industry based education and training needs in Ontario for the sector. Canadian oenologists and viticulturists have traditionally relied on training in other countries in order to perfect their craft.

The OEVI program has developed in close working relationships with growers, vintners and the operators of related and supporting businesses. These relationships facilitate

[6] Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". P.16.

the placement of undergraduate students through internship and co-op positions, and ensure that their education meets the requirements of the industry.

In the past, roughly 90% of graduates were hired by the industry in Ontario, as well as across Canada and into the United States. In this regard, CCOVI educational programming directly assists in strengthening workforce development in the grape and wine industry. CCOVI related education programs are identified below.

Oenology and Viticulture Program (OEVI)

OEVI**,** a four-year Honours Co-operative program leading to a Bachelor of Science in Oenology and Viticulture, is designed to meet the needs of the grape, grape juice and wine industries of cool climate regions. The aim of the program is to provide a comprehensive scientific education as well as practical skills in oenology and viticulture together with exposure to marketing, tourism and wine appreciation. Students will participate in a minimum of three 4-month work terms as indicated in the program of study. Each student is required to do at least one work term in a vineyard setting and one at a winery during the harvest and crush.

The program includes three full-time instructors, four part-time instructors, and a number of graduate students and post-doctoral fellows of CCOVI researchers or fellows. Other Brock University faculties and staffs from the Department of Biological Sciences, Faculty of Mathematics and Science are also involved.

Certificate in Grape and Wine Technology (OEVC)

The Certificate in Grape and Wine Technology (OEVC**)** was established in 1999 for those individuals who had completed an undergraduate degree in biological sciences or chemistry or some related area (e.g., biotechnology, biochemistry), or for those individuals admissible to the University with relevant work experience in the grape and wine industry.

As shown in the annual report of *Self-Study for the Academic Program Review*, Brock University adopts the full-time equivalent enrollment method to report annual program enrollment. Full Course Enrollment for a half-year course (P course) is 0.5, while it is 1.0 for a full-year course (F course). Full Time Enrollments are calculated by dividing Full Course Enrolment by 5 (as the full time load is 5 credits per student per year).

Impacts of Students

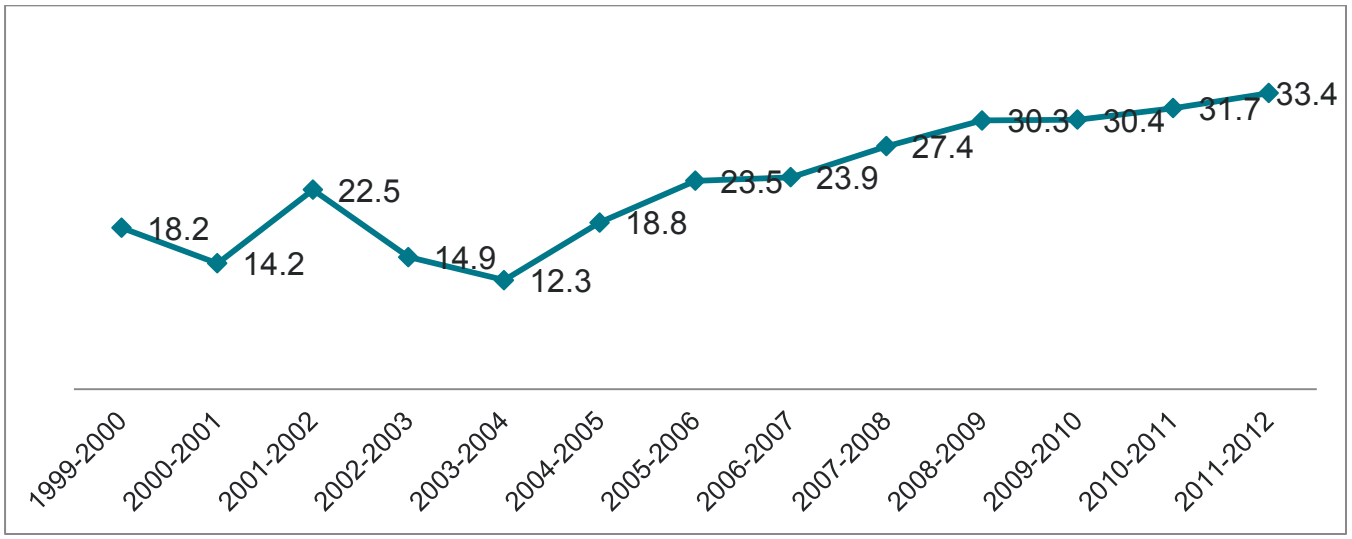
As reported in the *2013-2014 Undergraduate Tuition and Related Fees*, all undergraduate students with a credit load of 4.0 to 5.0 credits (equivalent of full time study) pay a flat rate around $ 6,300 per semester for the arts or sciences programs, and $ 88.00 total ancillary fees for each credit taken.

Based on the cost estimation from the University website, each full time student needs to spend at least $18,000 each year to go to Brock University.

Students generate additional economic activities through expenditures on food, accommodation, transportation, and entertainment. The rationale is that without the OEVI educational programs, these students would not be studying at Brock University.

Therefore, the local area would not be able to capture the economic impact associated with these student activities.

FIGURE 6: TOTAL FULL TIME EQUIVALENT ENROLLMENT



Source: Brock University adapted by MDB Insight

Based on this method, there are roughly 30 annual Full Time Equivalent Enrollments with the educational programs each year[7].

The enrollment has been steadily increasing over the years. The calculations below are based on the following assumptions:

- Students live on campus and use most of the services provided by the university each year, and,
- 30 students spend approximately $540,000 in total to go to Brock University

A university provides various services to the students, and each service is associated with a different multiplier effect. The following calculations are estimated based on the weighted average effect of services provided by a university in Ontario.

[7]The 30 full time equivalent student enrollments are based on the average of the past five years, which provides more recent reference to the study.

FIGURE 7: STUDENT SERVICES IMPACT

Impact Type	Output	Labor Income	Employment	Value Added
Direct Effect	$ 540,000	$ 260,072	6	$ 382,000
Indirect Effect	$ 160,205	$ 55,103	1	$ 87,719
Induced Effect	$ 208,638	$ 59,370	1	$ 123,915
Total Effect	$ 908,844	$ 374,545	8	$ 593,634

Source: MDB Insight

Based on Figure 7 (above), the total economic impact of CCOVI related educational programming for a given year is estimated at $908,884. This includes an estimated $374,545 in labour income and an estimated $593,634 in value added impact on the broader economy.

Graduate Placement

Figure 8 (below) summarizes the placement of graduates from OEVI related educational programs to grape and wine business areas. Out of a total of 130 graduates from programs related to the Classes of 2000 to 2014, 119 are known to have been placed into industry related employment. This represents a 91.5% placement rate. Assessing the placement data by employment type in Figure 8 (below), roughly 67% of the graduates are working in winemaking related fields. A further 34% are working in consultancy or management positions related to the business of wine, research, and business development.

Placing graduates in the wine industry is one of the major contributions that CCOVI provides to the industry. After receiving training through the required co-op internships, these graduates are job ready with both knowledge and experience. The direct pipeline of highly qualified personnel into the local industry and broader sector is invaluable from a workforce development perspective.

As mentioned earlier, CCOVI is helping to fill an important gap previously contended with by industry forced to look outside of Ontario, and Canada, for training and educational and applied foundations in the craft.

The broader spectrum of programming to include business management is encouraging, as it further supports the broader cycle of industry activities and assists in increasing profitability and growth.

FIGURE 8: GRADUATE PLACEMENT OF CCOVI PROGRAMS CLASS OF 2000 – 2014

Class of	Education Programs	Research	Winemaking	Grower	Professional/ Management	Viticulture	Total Placement
2000 – 2014	Certificate	1	23	3	16	3	46
	BSc OEVI	6	45	4	17	1	73
Total	Combined	7	68	7	33	4	119

2.3.4 Outreach Services

Knowledge transfer and advancing industry stability, development, and growth is at the intersection of Research and Outreach Services. It is here that CCOVI is able to illustrate some of its greatest value to the local, national, and international industry audiences.

As an institute, CCOVI is dedicated to offering innovative outreach services to the grape and wine community, and every year, organizes various workshops and conferences.

These programs are well attended, and bring together a variety of scientists, researchers, industry professionals, growers, vintners, and various other sector stakeholders, locally, nationally, and internationally.

The industry support services and outreach programs identified below are purposed on facilitating technology transfer and assisting industry in solving problems in a timely fashion.

Outreach Services

- **Analytical lab testing services**
  CCOVI established its Analytical Services in 2010 in response to a distinct need identified by industry to fill the gap in lab testing services in Ontario, and assist in improving the quality of wine. Prior to filling this need provincially, Ontario wineries were forced to ship samples to California, and growers did not have access to testing facilities. In recognition of its value, in 2011 the Grape Growers of Ontario designated the CCOVI Analytical Services as the official testing lab for Third Party Dispute Resolution for grape loads that are rejected by the winery at the harvest.

- **Wine grape pre-harvest monitoring**
  Wine grape pre-harvest monitoring services provide up-to-date information to growers on grape development across various grape growing regions prior to the harvest season. Pre-harvest monitoring provides valuable information that assists growers in making harvesting decisions that affect grape and wine quality. Provided in an easily accessible web-based format, the Preharvest monitoring data can be searched and sorted quickly and effectively, and compared against other harvest information across the Niagara Peninsula.

- **VineAlert**
  Launched in 2010 through a partnership with CCOVI and industry partners, the VineAlert program is a unique and innovative risk management tool that can be used by grape growers to reduce crop loss due to cold weather events. Through an online database and web-enable format, data is available that compares levels of grapevine bud hardiness for different varieties and locations throughout the dormant season. This supports growers in critical decisions on when protective actions such as the use of wind machines or other methods are warranted to protect grapevines.

  The system is designed to provide early warnings of when damaging temperatures are likely to be reached, affording growers the time needed to take preventative actions. Currently, 354 growers subscribe to the service. Based on its success and value, service was expanded beyond the Niagara Peninsula to include Lake Erie North Shore and Prince Edward County as of 2011/2012.

  Further, beyond serving the local industry base, the database has been accessed by 67 countries globally. Coupled with significant page views during the recent cold weather season (15,533 views) this illustrates the high level of international interest in this analytical tool and the significant potential contained in the service as a revenue stream.

Conferences

Dating back as early as 2002, CCOVI has hosted a series of "industry-inspired forums".[8] These have generally been targeted toward priority areas for the industry, such as the International Cool Climate Chardonnay Celebration (i4C) Educational Day, The Riesling Experience, the International Sparkling Wine Symposium, and the Academy of Wine Business Research Conference.

Conferences are an integral component to heightening CCOVI exposure and recognition for the local and national industry as it competes on a global stage. Conferences bring together producers, trade, media and wine enthusiasts from Canada, the U.S. and around the world to share and learn. In the 2013/2014 fiscal year, CCOVI attracted 360 attendees to conferences it hosted.

Workshops

Annually, CCOVI has a substantial impact on knowledge transfer to industry through the delivery of workshops for industry specific training and professional development.

Between 2011 and 2014 CCOVI workshops have been attended by over 2,900 individuals across approximately 28 professional development and training activities. On average, roughly 725 people are trained each year, with numbers of attendance ranging from 600 to 840 in any given year.

[8] Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". P.18

The following is a brief overview of CCOVI's various workshops:

- **Calibrate with CCOVI**
  Since 2012, the 'Calibrate with CCOVI' series of workshops aims to help industry improve various aspects of their operations from vineyard management, sales and marketing, and laboratory analysis. This represents another means of knowledge and technology transfer between CCOVI and industry in the form of six annual workshops.

- **VQA Wine Makers Forum**

  Since 2008, the VQA Winemakers series has been provided to foster informal discussions among VQA winemakers and CCOVI scientists about best practices in winemaking, vintage specific issues and techniques suitable for Ontario's climate.

- **Experts Tasting and VQA Promoter Awards**

  The Experts Tasting is an annual event held during the Cuvée weekend to promote VQA wines to sommeliers, wine writers, wine educators and restaurant owners. The very popular educational tasting, by invitation only, has been running for more than 20 years.

  Established in 2008, the VQA Promoters Awards are given annually at the Experts Tasting. The awards recognize individuals who have consistently promoted VQA wines through education and/or promotion categories of retail, hospitality, media, education, promoter-at-large and lifetime achievement.

- **Targeted Program and Issue Specific Workshops**

  Over the years, CCOVI has added numerous other workshops to address the new issues and targeted areas facing the industry. To name a few, these workshops include Berry sensory analysis, PALL filtration, Vineyard basics, Wine marketing and wine business training, Reducing waste — pollution prevention, Dealing with winter injury, Botrytis, Asian lady beetle workshop, Powdery mildew, Sprayer, VineAlert information sessions (Niagara, PEC, LENS), Cold hardiness (Atlantic Canada), Certified Sustainable Low Input Viticulture and Enology Inc.

Seminars

The seminars that CCOVI runs help to ensure research knowledge is communicated out to the members of the industry that can benefit most from it.

- Since 2004, the **Triggs International Premium Vinifera Lecture Series** has provided grape growers with a unique opportunity to learn from internationally recognized viticulture experts in the vineyard while at the same time increasing the international recognition of our wine region. In 2011, the Triggs International Premium Vinifera Lecture series was extended nationally, to the Okanagan Valley in British Columbia following the Ontario tour, to further broaden the impact of this event for the Canadian wine industry.

- The **CCOVI Lecture Series** was established in 2008 and features talks by CCOVI researchers, fellows and professional affiliates on current topics of importance to grape growers and winemakers, ranging from viticulture and winemaking to business practices, wine marketing, policy and culture. CCOVI has also taken this popular lecture series to live webcasts, making it accessible nationally. Since CCOVI began tracking online analytics in 2012, posted online videos as of December 2014 were viewed over 4,813 times in over 40 countries, having a truly global impact.

- During the annual Niagara Wine Festival, CCOVI presents two weekends of **Niagara Wine Festival Wine Seminars**. The sessions, enable winemakers to share the story behind their wines and their approach to winemaking. Many of the seminars feature alumni winemakers of the Oenology and Viticulture program at Brock University.

- **Additional seminars hosted at CCOVI** include talks from world-renowned experts in their respective grape and wine fields such as Jancis Robinson (U.K.), Richard Smart (Australia), Mike Croad (N.Z.) and Tim Hanni (U.S.), to name a few.

- In addition to the CCOVI Lecture Series, the institute has initiated industry supported guest speakers giving **Special Guest Lectures and** targeted talks on issues facing the grape and wine industry. Talks have been given by speakers from California, Germany, Italy and Portugal, each supported by industry suppliers including AO Wilson, Scott Laboratories, Lallemand Canada and Laffort USA.

Continuing Education Programs

From the institute's early days in 1997, CCOVI has a deserved reputation as an "institute of choice" for individuals and industry actors looking for high quality, industry specific education and training to support the grape and wine discipline.[9]

Various educational and program offerings are available that focus on heightening wine knowledge and appreciation, to the widely recognized and internationally respected Wine and Spirit Education Trust (WSET) certificate program.[10]

In fact, between the years of 2011 and 2014, 480 people were certified through these professional development programs. Numbers and uptake have remained consistently high since the inception in 2011 with attendance at 122 in 2012, 143 in 2013, and 122 in 2014.[11]

- **Wine Tasting Challenge**
  The annual Wine Tasting Challenge (established in 2004) is Canada's largest and most prestigious wine competition. Hosted by CCOVI, it provides a platform to

9 Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". P.21

10 Ibid

11 CCOVI internal data collection, accessed 2015

identify and celebrate some of the county's brightest talent. The competition is open to "professional sommeliers, servers, wine industry experts, students and amateur wine enthusiasts wishing to challenge themselves" through the identification of a variety of wines and spirits.[12]

2.3.4.1 Outreach Services Summary

In the 2014/15 Fiscal Year, the impact of CCOVI programs through outreach services included:

- The 5 core researchers/scientists at CCOVI made 28 conference presentations
- The 5 core researchers/scientists at CCOVI produced 14 publications
- CCOVI provided approximately 602 work orders for its analytical services, serving 95 customers
    - Since the inception of analytical lab testing in 2010, CCOVI has seen a positive growth trend in increased work orders year after year
- 759 people attended the 8 workshops for professional development
- 360 people attended 2 conferences for professional development
- 143 people attended the continuing education in wine appreciation.
- 2,106 page views of the database during the August to October harvest season for the Preharvest Grape Monitoring program.
- 15,533 page views of data posted during October to April yearly for the VineAlert grapevine risk management program
- 1,528 video downloads of archived videos of the CCOVI lecture series highlighting CCOVI researchers, fellows and professional affiliates
- 7 media releases from CCOVI to the external community, and 55 media stories covered by news articles, TV interviews and radio interviews
    - 44 articles were written about CCOVI and 11 were CCOVI Initiated stories across various industry publications

Outreach Services Economic Impact

The outreach programs and services identified in the section above benefit the local industry, broader economy, and community at multiple levels. They support job creation and have direct and indirect effects on the community through increased economic impacts.

They also work to heighten the level of industry expertise through targeted education, and professional development, as well as facilitating industry wide communication.

12 Cool Climate Oenology and Viticulture Institute, "Harvesting Innovation: Brock University's Cool Climate Oenology and Viticulture Institute". P.21

Ultimately, this supports the overarching goal of increasing the levels of knowledge transfer and information exchange between academia and industry, and within the sector itself.

The economic value of CCOVI knowledge and information adopted by industry will be analyzed separately in section 2.4.2. For the purpose of this section, the table below assesses the economic impact of CCOVI as an organization generating income in providing these services.

FIGURE 9: CCOVI SERVICES IMPACT 2014/15 FISCAL YEAR

	Output	Value Added	Labour Income	Jobs
Direct Effect	161,259.91	104,120.92	91,454.46	1.33
Indirect Effect	66,786.47	37,846.87	24,749.32	0.45
Induced Effect	79,756.62	47,366.63	22,695.46	0.44
Total Effect	307,803.00	189,334.42	138,899.25	2.22

Source: MDB Insight

As can be seen from the table in Figure 9 above, the total effect of CCOVI operations in delivering the various outreach services as prescribed in the section above is estimated at $307,803 on the broader economy.

This resulted in $189,334 in value added economic activity in the local economy, and generated an estimated $138,899 in related labour income.

2.4 Knowledge Transfer and Industry Impact

Investments from Brock University, industry partners and government funding have enabled CCOVI to establish industry-relevant research programs and services to help drive industry growth.

The following section provides a detailed assessment of the impact that CCOVI research programs and services have through, and on the broader grape and wine industry itself. It should be understood, that some of the greatest benefit that CCOVI provides to the industry is through intangible assets. These are difficult to quantify at a large scale, and often difficult to articulate as the take-aways for each stakeholder or industry participant in the broader grape and wine value chain may be slightly different.

Further, when looking to quantify knowledge transfer, it is often difficult to associate direct attribution to new products, increased efficiencies, or new ways of thinking that ultimately translate into improved processes or higher value. It may be something as simple as a lack of measurement of certain operations or activities, or aspects of the business that a local owner or operator may not have tracked performance on before. Further, it may be that no suitable measure exists.

The following section takes a conservative approach to tackling this issue in order to provide CCOVI, and its partners and industry stakeholders, with a frame of reference

that can be used to draw some connectivity between CCOVI and its positive impact on industry in more concrete terms.

As first hand perspective from industry is key, the following section includes summary analyses of the industry engagement conducted for this report. In cooperation with the Goodman School of Business, MDB Insight administered an Online Industry Stakeholder Survey and conducted in-depth Industry Interviews with select Ontario grape growers and wineries who are also CCOVI clients.

Overview of the Grape and Wine Value Chain

CCOVI and its programs serve this broader industry group in multiple ways. Further, CCOVI knowledge and information are transferred to industry through each encounter with the institute. A good understanding of these services along the value chain of the wider grape and wine industry is valuable to understanding the economic impact of CCOVI and its programs.

The following figure summarizes the value chain of the wider grape and wine industry. It is important to note that CCOVI programs and services (as identified in the sections above) currently serve nearly every stage of the value chain for the industry.

FIGURE 10: VALUE CHAIN OF THE GRAPE AND WINE INDUSTRY

For instance, the VineAlert and Wine Grape-Preharvest Monitoring programs mainly serve Grape Growers (Crop Production), while Analytical Laboratory Services mainly support Wine Makers (Wine Production). Targeted workshops and specific educational programming serves the wholesale and retail links in the value chain, while seminars and conferences bring together consumers, aficionados and connoisseurs, media, experts, and industry together to celebrate and promote growth and vitality in the industry.

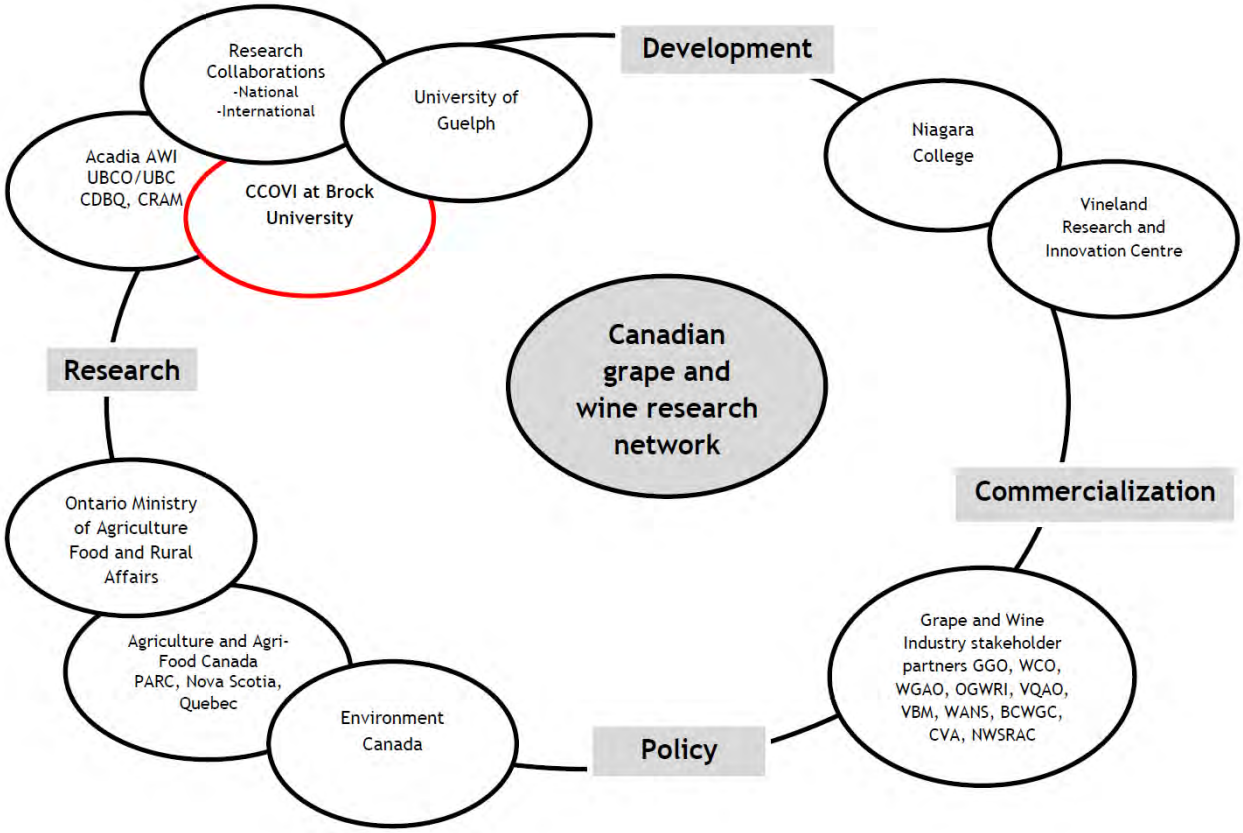
Industry – Education Research Network

At the very root, through direct service or indirect information exchange, CCOVI and its programs help provide the knowledge base and establish a platform for industry and community stakeholders to work together.

Harkening back to its inception in 1996 through a collective partnership between Brock University, the Grape Growers of Ontario, and the Wine Council of Ontario, and the deepening of industry partnership with the establishment of Inniskillin Hall in 1999, the institute has been the product of valuable industry/education networks.

Altogether, CCOVI and its programs help to create a network to support industry wide advancement and development. This is further enhanced by its strategic positioning within the broader Canadian grape and wine research network (as seen in Figure 11 below).

FIGURE 11: CANADIAN GRAPE AND WINE RESEARCH NETWORK DIAGRAM



Source: CCOVI

The value of the intangible assets that CCOVI has helped create through its network is enormous. For example, in the 2014/15 fiscal year, the CCOVI network included:

- 5 federal and provincial government representatives, 5 cross disciplinary Brock University representatives, and 2 outside educational institute representatives on the CCOVI Advisory Council
- 26 Industry experts on core CCOVI committees including the Advisory Council, Executive Committee, and Outreach Committee

- 45 Industry experts donating time to CCOVI planning committees for the outreach programs (conferences, experts tasting event, Wine Tasting Challenge, Triggs International Premium Vinifera Lecture Series)
- 36 research affiliates across value chain of grape and wine including 5 core researchers/scientists
- CCOVI partnering with between 50 and 70 wineries, growers, and other industry stakeholders annually to solve sector related issues
- 21 CCOVI fellows and professional affiliates come from outside of the Brock Community, while 15 are from the Brock community with multiple MOUs signed with other organizations
- $3,210,663 in government funding secured by CCOVI with Industry partners since 2012 to date
- $5,574,767 in total research funding secured by CCOVI for collaborative, industry based, applied, and theoretical research to support the grape and wine sector growth and advancement since 2012 (to date)
- 67 countries viewing data through the VineAlert program related to crop loss prevention
- 2000 page views of Pre-harvest Monitoring Program data annually from 23 countries
- CCOVI is unique to Ontario being the only university research institute in Ontario dedicated to the priorities of the grape and wine industry

As such, when taking all of the direct program impacts and the enhanced knowledge transfer, information exchange, and network value together, CCOVI's contribution to the grape and wine sector, its growth, advancement, and development within the local economy, and abroad, is significant.

2.4.1 Stakeholder Interviews and Online Survey

As outlined above, the following section provides a summary overview of the online survey administered to the Ontario grape and wine sector at large, as well as the targeted local industry stakeholder interviews.

It should be noted that the industry stakeholder interviews served two purposes; one to gather key insights and intelligence from grape growers and wine makers of their level of knowledge of CCOVI and its programs/services; and two, to gather first hand data to be used as a baseline sample for establishing an estimated economic impact of CCOVI research programs and services.

2.4.1.1 CCOVI Online Survey

It is recognized that CCOVI's influence extends throughout the province of Ontario, and arguably, across Canada as well. Therefore, it was important to receive feedback from the broader wine and grape grower industry group in order to better understand their knowledge of CCOVI, and to gain further insight into the impact that CCOVI has on the industry as a whole.

An online survey was sent to this broader group with the assistance of three industry associations; the Winery and Grower Alliance of Ontario, the Grape Growers of Ontario and the Wine Council of Ontario. These membership based organizations agreed to forward the survey link to their members.

As a result, a total of 57 responses to the online survey were received, 31 of those were completed, representing a sample frame slightly over half of the target audience. The majority of those who responded to the survey were growers (36 in total), with a further 13 responses coming from wineries.

The majority of respondents were located in the Niagara region (26), with an additional five respondents from Prince Edward County, and the remaining respondents from various areas within Ontario.

Awareness of CCOVI Programs

When asked about their awareness of CCOVI programs and services, overall, there was a generally high level of awareness indicated across the respondents. The areas of highest recognition were as follows:

- Grapevine Cold Hardiness Program (91.4%)
- CCOVI Professional Workshops and Seminars (90%)
- Ladybug Program (Asian Lady Beetle Workshop) (84.8%)
- Conferences and Outreach Events (84.4%)
- Analytical Services and Preharvest Program (81.8%)

Further, nearly 60% of those who answered the question were aware that CCOVI conducts research into consumer behaviour and marketing as well as technical research. This included awareness of the Icewine and Emerging Wine Styles programming.

The greatest positive impacts on the industry by CCOVI (81%) were seen as:

- Research
- Introducing new practices that lead to efficiencies
- Improved techniques, and,
- Loss avoidance

An additional 75% of respondents indicated that providing services that are needed for the industry, for example, the Analytical Service offerings, were among the highest positive impacts CCOVI has on the sector.

When asked about areas for continued improvement, respondents indicated that the positive impacts could best be increased by further enhancing knowledge transfer services and product commercialization for grape growers and wine producers.

Grapevine Cold Hardiness

The majority of respondents are using VineAlert to follow the bud hardiness of varieties through the dormant season (82%) and monitoring bud survival data posted through VineAlert (89%).

Most respondents agreed that this research has increased productivity and improved bud survival and vine viability. Most also agreed that VineAlert helped them to reduce their fuel costs by providing temperature information that better directed when wind machines, or preventative measures were actually needed.

Over 50% respondents agreed that the cold hardiness program had enabled them to save more crops using VineAlert and the wind machines together. Further, it was identified that CCOVI programs had resulted in between 25% and 83% less damage to vines.

Below are some generalized findings related to cost savings:

- Wind machine usage reduced by 10% to 50% at a cost ranging from $25/hr to over $50/hr depending on size and number of machines
- Crop loss prevention resulting in crops saved ranging from 20% to 50% additional grape tonnage
- Vine damage reduction from 50% to 80% less than without VineAlert
- Significant savings in vine health, reduced labour cost, and increased tonnage/crop yield for various respondents through workshop attendance, retraining, and analytical services

Half of the survey respondents are utilizing bud survival data from VineAlert to assess damage in their area. When asked about the value of CCOVI pruning workshops and online strategies through VineAlert, 81% of respondents indicated they are using knowledge gained from attending workshops or referencing online data. CCOVI's pruning workshops and bud survival data resulted in efficiencies for 64% of the growers or wineries who responded.

Professional Workshops and Seminars

When asked about attendance at CCOVI professional workshops and seminars,88% of respondents indicated having attended these events. The majority, roughly 78% of respondents, reported that attending CCOVI workshops and seminars had resulted in an increase in product quality. Further, 75% reported having seen new or increased production as a result of the applied learnings, over half of also indicated that attendance had resulted in increased productivity.

2.4.1.2 Industry Interviews

Early in 2015, CCOVI hired five MBA consultants from Brock University's Goodman School of Business to conduct one-on-one in-depth interviews with 55 grape growers and winemakers in Ontario that have previous business or service relationships with CCOVI.

These interviews were conducted to collect firsthand information of the industry's perceptions and to determine the economic impact of CCOVI programs. These findings will assist CCOVI in ensuring that their programs and services offer the best support possible to industry, and work to assist the industry in achieving maximum impact in dollar value to support sector growth.

The 55 interview participants included business representatives of small, medium, as well as large grape growers and wineries in Ontario. Overall, it was clear that CCOVI as an institute, along with its core programs are well known to the industry.

The participants could identify nearly all the core programs that CCOVI provides. Some of the participants have been active supporters or benefiting from CCOVI since its inception, roughly 20 years ago.

As a whole, interviewees were pleased to see CCOVI programs mature and expand over the years, and given their success and value to the grape and wine industry, recommended further investment into programming in order to advance CCOVI services to the next level.

In addition, there is a growing need and therefore opportunity, to offer CCOVI services outside of Ontario, thereby increasing accessibility to a broader cross section of the sector. Taken in sum, the recommendations respondents made were for extended services to accommodate needs related to industry development.

These recommendations included:

- Market development and expansion outside of Canada
- Connect businesses with talent pools
- Organic product development and testing
- New freeze protection technology development
- Bring workshops to more local areas
- Business services including, but not limited to, rule interpretation, business planning and development, and infrastructure planning and development
- Extend services and programming outside of Ontario and,
- Applying grape crop protection technology to other crops (e.g., tender fruit)

2.4.2 Economic Benefits of CCOVI Research Programs and Outreach Services

As identified earlier in the report, one of the purposes of conducting detailed and in-depth industry interviews was to obtain key business related data in order to better evaluate the potential economic benefits and impact that CCOVI programs and services are having on the local (and potentially broader) industry.

From the total number of participants, 24 were able to share some quantifiable information regarding the economic benefits that CCOVI programs have provided. Although this sample frame is smaller than desired, the information gathered can be used with confidence, as some of the largest wineries and growers are located within

this group. This group represents greater than 85% of the wines produced and sold in Ontario. Further, the interviews captured key insights and data representing industry trends in the area.

It is important to understand that the data gathered through the interview process represents a current point in time, and the level of sophistication behind how the various participants gather and maintain business data varies widely across respondents.

Further, in circumstances where information was best informed by (or only available) in crop tonnage, a formula was developed to convert tonnage into a monetary value. This took the form of farm gate values, and also in winery price per bottle of saved grapes converted into wine.

Economic Benefits of CCOVI Research Programs and Services

Through structured questions, data was gathered across seven CCOVI program and service areas as follows:

- Grapevine Cold Hardiness
- Ladybugs
- New wine styles
- Icewine
- CCOVI services
- Workshops and seminars
- Conference outreach

Data was cross tabulated across four variables to measure relative outcomes related to the various CCOVI programs and services identified above. The variables were:

- Cost Savings
- Crop Loss Prevention (tonnes)
- Crop Loss Conversion (in terms of wine sales)
- Wine Production (sales at winery price)

The tabulation also included a totals column illustrating total cumulative effect of services as reported.

Cost Savings

The most appropriate manner of reporting for cost saving associated with CCOVI programming and services in general, is as they were reported. As monies saved were reportedly due to CCOVI programs, exactly where saved monies were spent or absorbed cannot be specifically accounted for. These savings are associated with nearly all of the service areas examined including:

- Grapevine Cold Hardiness
- Ladybugs
- New wine styles
- CCOVI services
- Workshops and seminars

Crop Loss Prevention and Crop Loss Conversion

As described in the sections above, a formula was established to determine the relative economic benefit for grape growers and wine producers as a result of the Grapevine Cold Hardiness and ladybug research programming as well as services such as VineAlert and workshops or conferences.

The Crop Loss Prevention variable relates to total tonnes of grapes saved due to CCOVI program usage. The Crop Loss Conversion variable represents the total amount of saved grapes that have been converted into wine and sold at winery prices.

The following formula was used to estimate the total value of grapes saved and converted into wine:

- Average value of grape tonnage saved is $1,250/tonne[13]
- Average retail price per bottle (at winery prices) is $17[14]
- One tonne of grapes can produce 650 Litres of wine[15]

Other Wine Sales (Wine Production at Winery Prices)

It is important to note that this variable is not meant to capture all economic activities related to the retail sale of a bottle of wine (that one would find at regular retail outlets such as the LCBO). It does not capture the various elements that feed into the value chain of wine sales such as wholesaling, packaging, transportation costs, marketing and advertising, etc. It represents wine production and corresponding sale of wine produced at winery prices.

This variable also relates to 'other wine sales' as a result of CCOVI research programs and services, and does not reflect the Crop Loss Conversion identified above. Care has been taken to ensure that data provided by interview participants has not been double counted with the converted wine sales from other variables.

The reported increase in other wine sales was identified across the following CCOVI services:

- New wine styles
- Icewine
- CCOVI services
- Workshops and seminars
- Conference outreach

[13] Vine Alert – An Economic Impact Analysis, Brock University, Goodman School of Business Consulting Group: Annual Grape Tonnage and Farm Gate Values derived from Grape Growers of Ontario Annual Reports. Figure derived by dividing total farm gate value by total tonnage for 2013.

[14] LCBO, Shari Mogk-Edwards, LCBO Vice President Products, Sales, and Merchandising, "Shopping Patterns at LCBO, Shari Mogk-Edwards, LCBO Vice President Products, Sales, and Merchandising" (March 4, 2014. Contains average purchase prices by wine category. Average derived from mean of all 2014 categories; adapted by MDB Insight Inc.

[15] Sourced from CCOVI – this amount represents a widely accepted industry standard.

Economic Benefits across All Categories

Figure 12 below provides a summary of the economic benefits of CCOVI programs or services, identified in the interviews, in terms of cost savings, crop damage prevention, crop loss conversion, and increased wine sales.

For the current period, in total, the economic benefits through industry for all CCOVI programs and services are estimated to be $58,152,371.

FIGURE 12: ECONOMIC BENEFITS OF CCOVI PROGRAMS AND SERVICES

Programs	Cost Savings	Crop Loss Prevention (tonnes)	Crop Loss Conversion (in terms of wine sales)	Other Wine Sales (Production at Winery Price)	Total
Grapevine Cold Hardiness	$529,900.00	1,501.72	$22,125,400.00	-	$22,656,801.72
Ladybugs	$3,328,000.00	1,570.50	$23,138,700.00	-	$26,468,270.50
New Wine Styles	$362,000.00	50.00	$736,666.67	$110,500.00	$1,209,216.67
Icewine	-	-	-	$3,250,000.00	$3,250,000.00
CCOVI Services	$176,475.00	60.00	$884,000.00	$150,000.00	$1,210,535.00
Workshops Seminars	$441,000.00	62.50	$920,833.33	$200,000.00	$1,561,895.83
Conferences / Outreach	-	118.00	$1,738,533.33	$57,000.00	$1,795,651.33
Total	**$4,837,375.00**	**3,362.72**	**$49,544,133.33**	**$3,767,500.00**	**$58,152,371.06**

Source: CCOVI Stakeholder Interviews performed by Goodman School of Business MBA Consultants 2015; Adapted by MDB Insight.

From the data collected it is clear that the greatest economic benefit in direct terms comes mostly from the:

- Grapevine Cold Hardiness programs at a total benefit of $22.6 Million, and,
- Lady Beetle Program resulting in a benefit of $26.4 Million

Other areas of economic benefit are seen in:

- Icewine programs = $3.25 Million
- Conferences and Outreach = $1.79 Million
- Workshops and Seminars = $1.56 Million
- CCOVI Services = $1.21 Million
- New wine styles = $1.20 Million

2.4.3 Economic Impact of CCOVI Research Programs and Services

The following section builds off of the economic benefits of CCOVI research programs and services identified in the section above, and will convert them into economic impacts. The challenge for economic impact evaluation is to estimate the total value of

all the services provided by CCOVI. It is not a simple addition, as economic trade-offs or overlapping impacts associated with the services provided by CCOVI exist at different stages of the value chain. In addition, the value of the intangible assets that CCOVI and its programs have created over the years helps inspire and stimulate further development for the broader grape and wine sector. The values of the stimulation effects are not quantifiable by the standard economic impact evaluation methods. As was mentioned above, the economic benefits reported on the Cost Savings variable are taken as the most effective measure in this case. The following variables are calculated below.

Crop Loss Prevention

The Grapevine cold hardiness and ladybug research programs are two major programs developed to serve the industry and the crop production link in the value chain. These two programs help prevent crop loss and maximize the grape harvest. As a result, there is less grape tonnage lost and increased grape tonnage crop harvested. In the wine industry, not only are the total grape tonnages important but also the quality of the grapes. Thus, the farm gate value helps justify the value proposition of the CCOVI programs to the grape growers.

As identified in Figure 12: economic benefits of ccovi programs and services, the total reported tonnage of grapes from saved crops was 3,362.72 tonnes.

Adopting from the formula above, the following assumptions were made:

- Average price per tonne at farm gate value is $1250.
- Total value of crop loss prevention 3362.72 tonnes x $1,250 = $4,203,400

For Crop Loss Prevention, a complete economic impact analysis was able to be run. This was due to the fact that the full range of economic multipliers was available under the Provincial Multiplier: Crop Production.

From the table below (Figure 13) it is estimated that the Total Effect of economic impact related to the crop loss prevention of 3362.72 tonnes of saved grape due to CCOVI programs is $7.088 Million. Part of this impact is an estimated $2.16 Million in indirect effect on the local economy in response to increased demands, along with an estimated $715,457 in induced effects.

Moreover, the impact of CCOVI programs in crop loss prevention also supported the generation of 38 jobs, an estimated $1.6 Million in labour income, and additional $3.3 Million in value added impact.

FIGURE 13: ECONOMIC IMPACT OF CCOVI ON CROP LOSS PREVENTION

Impact Type	Output	Value Added	Labour Income	Jobs
Direct Effect	$ 4,203,400.00	$1,878,839.23	$ 787,502.29	22
Indirect Effect	$2,169,673.09	$1,025,781.13	$636,349.08	12
Induced Effect	$715,457.48	$422,966.33	$203,699.83	4
Total Effect	$7,088,530.56	$3,327,586.69	$1,627,551.20	38

Source: MDB Insight

Crop Loss Conversion

As described in the previous sections, crop loss conversion here refers to the amount of saved grapes (due to CCOVI research and service programs) that are converted into wine. The principle assumption in this impact analysis is that 100% of grapes saved are converted into wine. This is not an unreasonable assumption given that the varieties of grapes that are produced locally by growers, and used by the wine makers, as well as being under study by CCOVI, are not used for jams or jellies. In fact, juice and jam grapes represent a very small and relatively insignificant portion of the contemporary grape and wine industry.

Following the formula established above:

- One tonne of grapes can produce 650 Litres of wine[16]
- Average retail price per bottle (at winery prices) is $17

Based on the total amount of grapes saved through CCOVI related programming (3,362.72 tonnes), and assuming each tonne produces 650 Litres of wine, and each 750ml bottle can sell for an average winery price of $17/bottle, the total economic benefit of crop loss conversion into wine is $49,544,133 Million.

In this instance, Total Impact is the best and only means of reporting as the Statistics Canada 2010 Provincial Input-Output Multipliers available do not include any other multipliers that can be used for calculating a Direct, Indirect, and Induced effect (as is the case for 'crop production' used above).

Figure 14 (below) highlights that out of the direct benefit identified above, there is a total economic impact of $73.72 Million on the broader economy due to CCOVI related programming for lost grape crops being converted into saleable wine.
Further, there is an additional $37.3 Million in value added economic impact, and an estimated $14.1 Million in labour income generated. The impact of CCOVI programs resulting in 3,362 tonnes of saved grape converted in wine also resulted in an estimated 250 jobs being created.

[16] Sourced from CCOVI – this amount represents a widely accepted industry standard.

FIGURE 14: ECONOMIC IMPACT OF CCOVI ON CROP LOSS CONVERSION

	Output	Value Added	Labour income	Jobs
Total Impact	$ 73,724,003.93	$37,363,424.10	$14,100,471.57	250

Source: MDB Insight

Other Wine Sales

As highlighted in the sections above, this variable is illustrative of the impact of CCOVI programs and services on the creation of other wine products and sales not associated with the Grape Cold Hardiness or Ladybug programs. Careful attention has been paid to ensuring that crop loss conversion figures have not been double counted or included in the calculation for Other Wine Sales.

For this category, total impact is again the best means of reporting the economic impact as supporting multipliers are not available through the Statistics Canada 2010 Provincial Input-Output Multipliers (Wineries and Distilleries) for calculating a Direct, Indirect, and Induced effect.

Based on the total economic benefit of CCOVI programs and services on Other Wine Sales (i.e., wine production and subsequent sale at winery prices) identified in Figure 12: economic benefits of ccovi programs and services of $3,767,500, the following total economic analysis was calculated.

Figure 15 (below) highlights that of the aforementioned economic benefit due to CCOVI programs and services on new and other wine products and their subsequent sales (at winery prices) there is a total economic impact of $5.6 Million on the broader economy. Moreover, this lead to the generation of an estimated $2.8 Million in value added economic impact, along with the creation of 19 jobs and the generation of an estimated $1 Million in additional labour income.

FIGURE 15: ECONOMIC IMPACT OF CCOVI ON OTHER WINE SALES

	Output	Value Added	Labour income	Jobs
Total Impact	$5,606,217.45	$2,841,238.52	$1,072,246.56	19

Source: MDB Insight.

3 Concluding Summary

When assessing the preceding sections on the economic benefits and impacts that CCOVI research programs and services have on the grape and wine industry and broader economy, it is clear that they are having a positive and significant impact.

Based on the insight and data provided by key industry stakeholders, grape growers, and wineries that participated in the interviews, for the current fiscal period of 2014-15, CCOVI has had the following estimated economic effect:

- **A Total Direct Economic Benefit[17] to industry of CCOVI Research Programs and Services of $58,152,371**

- **This economic benefit in turn generated a total economic impact of $86,338,750 to the provincial economy comprised of:**
    - Total Economic Impact through Crop Loss Prevention of $7,008,530
    - Total Economic Impact through Crop Loss Conversion of $73,724,003
    - Total Economic Impact through Other Wine Sales of $5,606,217

- **The annual investment from Brock University and government/industry research funding into CCOVI generated a total economic impact of $4,785,176 to the local economy comprised of:**
    - Total annual impact from Brock's yearly investment in CCOVI of $1,085,644
    - Total impact from government and industry funding in 2014-15 of $2,482,885
    - Total impact from student services in 2014-15 of $908,844
    - Total impact from revenue generated from CCOVI services in 2014-15 of $307,803

- **In summary, the combined economic impact generated by CCOVI research programs and services along with investments from Brock University, government and industry in 2014-15 is $91,123,926, resulting in the following estimated economic effect:**
    - **Total Employment Impact of 307 jobs created**
    - **Total Labour Income of $16,800,269**
    - **Total Crop Loss Avoidance of 3,362 Tonnes of grapes**

[17] Across all CCOVI programs and services based on data as reported in the stakeholder interviews and for the current year. It is assumed this benefit may include cumulative impact of efforts/results witnessed or achieved over the preceding 1-2 years.

What is also clear from the report above is the important role that CCOVI plays in acting as a centre of excellence for industry education, professional development, and training.

In delivering its core industry supports in Research Services, Business Services, and Knowledge Transfer, it has positioned itself and Brock University as a leader in industry based research and solution provision in the Canadian Grape and Wine Research Network.

It has reached a state of maturity both as a valuable organization in the science and business of wine, and through ever increasing domestic and international brand recognition, a driver for industry innovation and collaboration.

The intention of this report has been to provide a baseline of quantitative information that can be leveraged by CCOVI to forge its path forward, and enter into the next stage of institutional growth.

Many thanks are expressed to the various industry associations, vintners, growers, merchants, scientists, researchers, businesses, technicians and technologists, innovators, and entrepreneurs that supported the development of this report.

We look forward to the future, and continuing to foster innovation, growth, and serving the grape and wine community.

4 Appendix

MDB Insight is Canada's largest specialist economic development consultancy, with four offices across the country. Established in 2007, the firm has helped hundreds of clients across North America and around the world as they pursue economic development, growth and investment goals. In 2010, Profit Magazine named the company to its "Hot 50" list of Canada's fastest growing companies.

The firm's work focuses on strategic planning, economic analysis, impact assessment and workforce development, particularly as they relate to identifying and understanding opportunities for economic growth and job creation. MDB Insight utilizes diverse, multidisciplinary teams of expert employees – armed with both academic and professional credentials – to assist its clients in meeting the challenges of the emerging economy.

In the field of economic impact assessment, MDB Insight has carried out numerous projects for both public and private sector clients. While public clients have traditionally used the results of this work for strategic planning purposes, private clients have linked the work to expansion and growth opportunities. Recent projects in this space include work for TransCanada Energy as it sought to understand the full impacts of new generating capacity in eastern Ontario, and IVACO Rolling Mills (a Heico Holdings Company) as it sought to justify additional investment in a major steel plant expansion.

In all of its award-winning work, MDB Insight looks to balance economic well-being and investment with community growth, social development, and environmental concern, with the goals of building truly equitable and sustainable communities.

For further inquiries, please www.mdbinsight.com, or contact the firm by e-mail at info@mdbinisght.com or by telephone toll-free at 1-855-367-3535.