Horticulture Impact Assessment Program:

Appendix 11: Growing Leaders 2015 (VG15030 Impact Assessment)

Impact analyst:

Michael Clarke

Delivery partner:

AgEconPlus and Agtrans Research

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Level 8
1 Chifley Square
Sydney NSW 2000

Telephone: (02) 8295 2300

www.horticulture.com.au

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What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *VG15030: Vegetable Leaders 2015 – National Vegetable Industry Leadership Program.* The project was funded by Hort Innovation over the period January 2016 to December 2018.

Methodology

The investment was first analysed qualitatively within a logical framework that included activities and outputs, outcomes, and impacts. Actual and/or potential impacts then were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation in monetary terms (quantitative assessment). Past and future cash flows were expressed in 2019/20 dollar terms and were discounted to the year 2019/20 using a discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

Results/key findings

Investment in this research project has generated 50 graduate leaders who will contribute to better industry decision making and community initiatives in regional Australia. Graduates from the Growing Leaders program are also likely to have higher salaries and business profits than their non-trained peers.

Investment Criteria

Total funding from all sources for the project was $0.71 million (present value terms). The investment produced estimated total expected benefits of $2.09 million (present value terms). This gave a net present value of $1.38 million, an estimated benefit-cost ratio of 2.93 to 1, an internal rate of return of 46.5% and a MIRR of 10.5%.

Conclusions

The Hort Innovation investment in Project VG15030 has created leaders for the vegetable industry. As one of the social impacts identified was not valued, credible assumptions could not be established, the investment criteria estimated by the evaluation may be underestimates.

Keywords

Impact assessment, cost-benefit analysis, vegetable industry, leadership, capacity, development, people, graduates, Growing Leaders, capability, mission, vision, learning, experience

Introduction

Horticulture Innovation Australia Limited (Hort Innovation) required a series of impact assessments to be carried out annually on a number of investments in the Hort Innovation research, development and extension (RD&E) portfolio. The assessments were required to meet the following Hort Innovation evaluation reporting requirements:

- Reporting against the Hort Innovation's current Strategic Plan and the Evaluation Framework associated with Hort Innovation's Statutory Funding Agreement with the Commonwealth Government.
- Annual Reporting to Hort Innovation stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

Under impact assessment program MT18011, the first series of impact assessments were conducted in 2019 and included 15 randomly selected Hort Innovation RD&E investments (projects). The second series of impact assessments (current series), undertaken in 2020, also included 15 randomly selected projects worth a total of approximately $7.11 million (nominal Hort Innovation investment). The second series of projects were selected from an overall population of 85 Hort Innovation investments worth an estimated $44.64 million (nominal Hort Innovation investment) where a final deliverable had been submitted in the 2018/19 financial year.

The 15 investments were selected through a stratified, random sampling process such that investments chosen represented at least 10% of the total Hort Innovation RD&E investment in the overall population (in nominal terms) and was representative of the Hort Innovation investment across six, pre-defined project size classes.

Project *VG15030: Vegetable Leaders 2015 – National Vegetable Industry Leadership Program* was randomly selected as one of the 15 investments under MT18011 and was analysed in this report.

General Method

The impact assessment follows general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental, and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses cost-benefit analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

Background & Rationale

Background

The Australian vegetable industry is one of Australia's largest horticultural industries with a five year estimated annual production value of $4.19 billion and a production volume of 3.6 million tonnes – Table 1.

Table 1: Australian Vegetable Production and Value 2014/15 to 2017/18

Year Ended 30 June	Production (tonnes)	Gross Value of Production ($m)	Area of Production (ha)
2015	3,514,125	3,786.5	114,366
2016	3,584,516	3,801.2	118,500
2017	3,502,673	4,291.6	N/a
2018	3,695,345	4,345.7	N/a
2019	3,722,378	4,722.1	N/a
Average	3,603,807	4,189.4	

Source: Horticulture Statistics Handbook 2016/17 and 2018/19

Australian vegetable growers grow more than 130 different vegetable crops. The majority of growers are located in New South Wales, followed by Queensland and Victoria. The top three states by value of production are Queensland, Victoria, and South Australia.

The vegetable industry has a research and development (R&D) levy that is used for vegetable RD&E activities across a range of disciplines targeting both on-farm and supply chain sectors in accordance with industry priorities. The levy is collected on the majority of vegetable commodities, with exceptions of particular note being potato, onion, and tomato, and is matched by Hort Innovation with funding from the Australian Government. Some 1,676 growers pay the vegetable levy each year (Hort Innovation, 2017).

Vegetable R&D levy investment is guided by the Vegetable industry's Strategic Investment Plan (SIP). The current SIP has been driven by levy payers and addresses the Australian vegetable industry's needs from 2017 to 2021. Strategies and priorities in the Plan have been driven by a set of five desired outcomes (Hort Innovation, 2017):

1. Growth in the domestic market
2. Growth in export markets
3. Improved farm productivity
4. Increased levels of post-farmgate integration
5. Improved industry capabilities for adoption and innovation.

Rationale

The initial research to develop a national leadership program for the vegetable industry originated with the Australian Vegetable Industry Training Needs Analysis (2007). The needs analysis concluded:

> 'that good leaders, across the industry, have similar characteristics and skills; however, more skills were needed by a wider range of people. There is a lack of leadership development for younger growers and little encouragement for them to participate in industry organisations. Most industry participants felt that leadership training should build on the skill base that exists already in the vegetable industry'

Leaderships skills identified through the leadership needs analysis were:

- Communication, including media skills
- Conflict resolution and negotiation skills
- Work/life balance, including time management
- Presentation skills
- Team building skills
- Understanding of government networks.

The current SIP identified that leadership and professional development remain an area of focus for the industry. A review of successful leadership programs indicated that inclusion of a personal project encouraged participants to practice skills learned in a training program. Current industry leaders also felt that leadership training programs should include networking opportunities and a mentoring component. Growing Leaders commenced in 2009 and the current iteration has been refined with feedback from past graduates.

Project Details

Summary

Project Code: VG15030

Title: *Vegetable Leaders 2015*

Research Organisation: Rural Training Initiatives Pty Ltd (Affectus Pty Ltd)

Project Leader: Jill L Briggs

Period of Funding: January 2016 to December 2018

Objectives

The specific objectives of project VG15030 were:

1. To develop the leadership capacity of forty-five (15 participants per year) diverse participants from across the Australian vegetable industry supply chain and build their capability to transform the Australian vegetable industry through vision, engagement, action, and leadership.
2. To support the industry to deliver on its vision 'to be a cohesive, financially and environmentally sustainable and highly efficient industry focused on growing demand profitably'.
3. To enable positive exposure of the industry and better networked industry through the active involvement and participation of stakeholders from across the supply chain and beyond via project activities.

Additionally, Growing Leaders 2015 was required to meet the following targets:

- Review, enhance and develop the Growing Leaders program.
- Develop and deliver a recruitment and application process for Growing Leaders.
- Promote Growing Leaders.
- Deliver Growing Leaders on an annual basis.
- Monitor and evaluate Growing Leaders.
- Report on Growing Leaders including a final Report.

Logical Framework

Table 2 provides a detailed description of the project in a logical framework.

Table 2: Logical Framework for Project VG15030

Activities	Major project activities included: • Review, enhance and develop the Growing Leaders 2015 program – review of Growing Leaders 2013-15 and adjust the offering for Growing Leaders 2016-18. Adjustments included formation of a program advisory group, profile raising through industry forums and development of the Growing Leaders 2016-18 Missions. • The participants, as a group develop a Vision for the Australian vegetable industry and then commit to a 6-month Mission (action) to move the industry toward the Vision. From the Mission participants then develop strategies (group projects) that were completed by the conclusion of the Growing Leaders program hence delivering the Mission to the industry. Delivery of the group Mission stretches each participant and consolidates the theoretical content of the program. • Develop and deliver a recruitment process for Growing Leaders to achieve the required ratio of two levy payers for every one other participant. Activities included production of general information on the program and application materials for candidates, distribution of materials to relevant organisations, website, and social media posts. The research provider's own contact lists were used to direct email relevant organisations and individuals.

	• Forums used to raise the profile of Growing Leaders included industry value chain tours, industry lunches, industry dinners, Hort Connections, guest speaking workshops, Mission delivery, media releases, online communications, mentoring, and alumni events. • Deliver the Growing Leaders program on an annual basis for three years. Annual delivery consisted of three work areas – Pre-program, Program and Post-program. Pre-program included event management, guest speakers, and applicant support. The Program was delivered annually over nine months and involved delivery of three residentials of 3 day duration. The annual program structure provides nine days of face-to-face facilitated residential learning. Additional activities delivered beyond the nine days of face-to-face workshops include participant support and professional coaching, social media activities, and involvement with industry including program mentoring. The Program included communication and joint activities with Nuffield Australia, the Department of Agriculture, Minister for Agriculture, the Australian Rural Leadership Foundation and Hort Connections. Post-program had two elements – graduate management and program evaluation. Graduate management activities included production of an implementation / communication plan that addressed leadership targets, workplace transformation, a one-on-one coaching session, and integration into the Growing Leaders Alumni. • Monitoring and Evaluation was completed via an advisory group and online survey. The advisory group comprising industry stakeholders, Hort Innovation staff and program graduates, met four times per year. The Growing Leaders advisory group provide additional evaluation, reviewed project deliverables and assisted with access to speakers and guests. The evaluation survey addressed participant learning and leadership development, participant outcomes, industry involvement, Mission delivery and industry engagement with graduates.
Outputs	The important outputs of the project were: • 50 graduates from the Growing Leaders program over three years (45 targeted). The program attracted 88 applications which was a 50% increase from the previous Hort Innovation project. Mostly the increase in applications was from levy paying vegetable growers and a ratio of three growers to one supply chain participant was achieved. Only four participants failed to complete the training program.
Outcomes	The outcomes created by the project span personal, business and industry development: • Personal – improved confidence, communication skills, leadership recognition, ability to build networks and work with others professionally and as a community member, managing conflict more constructively, effectively utilising personal and positional power and understanding strategic thinking. • Business - additional ability to communicate concepts and seek input from co-workers, understanding project development and delivery processes, implementing strategic thinking. Participants were also able to apply motivational and team building theory in the workplace and apply program knowledge to business decision-making along with a willingness to step up and take on leadership roles within the business organisation. • Industry – increased industry leadership capacity with graduates having a better understanding of the whole value chain through the development of the Vision and Mission, contributing to membership of decision-making bodies, participating, chairing, and facilitating industry events, initiating new and sharing valuable ideas for industry improvement.
Impacts	• Better industry decisions – more integrated, efficient, and profitable supply chains, better allocation of public R&D, and capacity to shape favourable public policy outcomes. • Improved earnings for those participating in leadership training – additional salary or profit in their own business sooner. • Trained leaders are more able and willing to contribute to community initiatives in regional Australia.

Project Investment

Nominal Investment

Table 3 shows the annual investment made in Project VG15030 by Hort Innovation. There were no other investors in the project.

Table 3: Annual Investment in Project VG15030 (nominal $)

Year ended 30 June	HORT INNOVATION ($)	OTHER ($)	TOTAL ($)
2016	86,965	0	86,965
2017	130,447	0	130,447
2018	130,447	0	130,447
2019	195,671	0	195,671
Total	**543,530**	**0**	**543,530**

Source: VG15030 Executed Research Agreement

Program Management Costs

For the Hort Innovation investment the cost of managing the Hort Innovation funding was added to the Hort Innovation contribution for the project via a management cost multiplier (1.162). This multiplier was estimated based on the share of 'payments to suppliers and employees' in total Hort Innovation expenditure (3-year average) reported in the Hort Innovation's Statement of Cash Flows (Hort Innovation Annual Report, various years). This multiplier was then applied to the nominal investment by Hort Innovation shown in Table 3.

Real Investment and Extension Costs

For purposes of the investment analysis, the investment costs of all parties were expressed in 2019/20 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2020). No additional extension costs were incurred.

Impacts

Table 4 provides a summary of the principal types of impacts delivered by the project, based on the logical framework. Impacts have been categorised into economic, environmental, and social impacts.

Table 4: Triple Bottom Line Categories of Principal Impacts from Project VG15030

Economic	• Improved earnings for those participating in leadership training – additional salary or profit in their own business sooner. • Better industry decisions – more integrated, efficient, and profitable supply chains, better allocation of public R&D, and capacity to shape favourable public policy outcomes.
Environmental	• Nil
Social	• Trained leaders are more able and willing to contribute to community initiatives in regional Australia.

Public versus Private Impacts

The majority of impacts identified in this evaluation are vegetable industry related and therefore are considered private benefits. The private benefits will be captured by future leaders trained by the project. These private benefits will include improved earnings for those participating in leadership training as well as better decision-making in the Australian vegetable industry. Public benefits will include gains from leaders more able and willing to contribute to regional Australia.

Distribution of Private Impacts

The private impacts will be distributed between growers, agents, wholesalers, processors, exporters, distributers, and vegetable retailers. The share of impact realised by each link in the supply chain will depend on both short- and long-term supply and demand elasticities in the fresh vegetable market.

Impacts on Other Australian Industries

Benefits to other industries include the addition of a small number of participants from the vegetable industry Growing Leaders program who contribute to broader rural policy development or leave the vegetable industry and take up positions in other sectors.

Impacts Overseas

Skilled Australian vegetable industry leaders may choose to work in overseas vegetable industries or in the overseas parts of Australian supply chains – benefiting both foreign industries and the Australian vegetable industry.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 5. The project outcomes and related impacts will contribute to Rural RD&E Priority 4, and to Science and Research Priority 1.

Table 5: Australian Government Research Priorities

Australian Government	
Rural RD&E Priorities (est. 2015)	**Science and Research Priorities (est. 2015)**
1. Advanced technology 2. Biosecurity 3. Soil, water and managing natural resources 4. Adoption of R&D	1. Food 2. Soil and Water 3. Transport 4. Cybersecurity 5. Energy and Resources 6. Manufacturing 7. Environmental Change 8. Health

Sources: (DAWR, 2015) and (OCS, 2015)

Alignment with the Vegetable Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the vegetable industry are outlined in the Vegetable Industry's Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2017). Project VG15030 primarily addressed Outcome 5, Strategies 5.3 'improve grower skills', 5.4 'efficient and effective decision-making' and 5.5 'build skills in the vegetable industry workforce'.

[1] For further information, see: https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/strategic-investment-plans/

Valuation of Impacts

Impacts Valued

Analyses were undertaken for total benefits that included future expected benefits. A degree of conservatism was used when finalising assumptions, particularly when some uncertainty was involved. Sensitivity analyses were undertaken for those variables where there was greatest uncertainty or for those that were identified as key drivers of the investment criteria.

Two impacts were valued – better industry decisions and improved earnings for Growing Leaders graduates.

Impacts Not Valued

Not all of the impacts identified in Table 4 could be valued in the assessment. Social impact 'Trained leaders are more able and willing to contribute to community initiatives in regional Australia' was not valued due to lack of data to support credible assumptions.

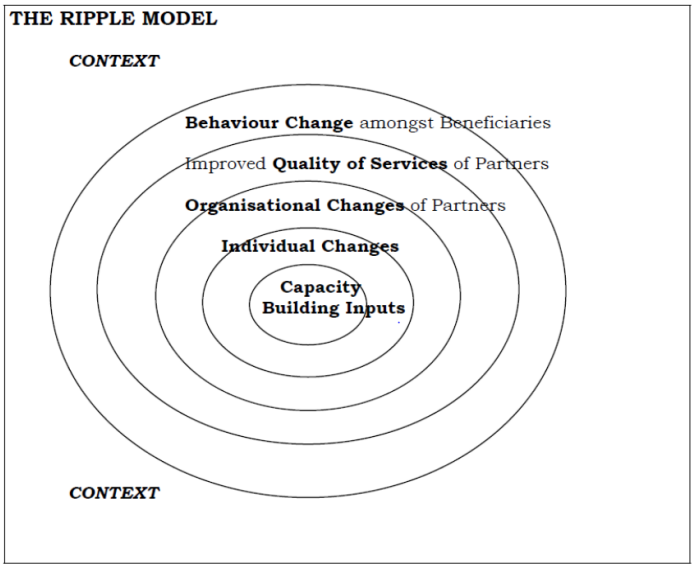
Impact 1: Better Industry Decisions

Testimonials provided by stakeholders observing Growing Leaders graduates provide insight into capacity built, industry roles embraced and how better decisions might be made (Briggs, 2018):

- *"The graduate now has the confidence to ask tough questions and then probe for further information"*
- *"Participation within industry activities, they now believe they can add value and make a difference"*
- *"Have witnessed numerous graduates being involved in industry organisations. By bringing passionate young leaders together you form a strong network of like for like people who may never have had the opportunity to previously meet"*
- *"The network helps to better focus RD&E levy funds towards this goal with participants providing input to this in different ways"*

The experience of graduates in the Growing Leaders program is consistent with the literature on the evaluation of capacity building investments. The ripple model shows how improved decision-making might be brought about by capacity building (leadership training) – Figure 1.

Figure 1: Ripple Model Showing Impact of Capacity Building Inputs (Leadership Training)



Source: Hailey and James, 2003 in Bath and Chudleigh, 2015

The literature on evaluating capacity building investments suggests that quantification of returns from leadership training might be achieved by measuring both the improved earning of those participating in the training and improvement in industry outcomes through the value of voluntary work undertaken. Stiefelmeyer et al (2013) used this approach to evaluate investment in the Canadian Advanced

Agricultural Leadership Program and calculated the value of voluntary work by determining the number of additional hours undertaken by graduates and applying wage equivalents. This approach is adopted in valuing returns to the vegetable industry from leadership training.

Impact 2: Improved Earnings for Graduates

In addition to industry returns, individuals participating in leadership training receive a private benefit. This benefit can be measured as additional salary earned sooner than if no leadership training was undertaken.

Stiefelmeyer et al (2013) found that career progression and salary benefits were greatest immediately after training and diminished over time. Graduates of the Growing Leaders program are thought to be between 25 and 35 years of age and earning a salary of $100,000. When alumni become vegetable industry leaders, they might reasonably expect a total salary package of $200,000. Assumed salary progression 'with' and 'without' Growing Leaders training is shown in Table 6.

Table 6: Assumed Salary Progression 'with' and 'without' Growing Leaders Training

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Salary with Growing Leaders training	100,000	120,000	125,000	130,000	140,000	150,000	160,000	170,000	180,000	200,000
Salary with Growing Leaders training	100,000	110,000	115,000	120,000	135,000	145,000	155,000	165,000	178,000	200,000
Annual benefit of training	**0**	**10,000**	**10,000**	**10,000**	**5,000**	**5,000**	**5,000**	**5,000**	**2,000**	**0**

Source: Consultant estimate

Summary of Assumptions

A summary of the key assumptions made for valuation of impacts associated with Growing Leaders is provided in Table 7.

Table 7: Summary of Assumptions for Impact Valuation

Variable	Assumption	Source/Comment
Impact 1: Better industry decisions		
Number of graduates trained.	15 graduates in 2016 16 graduates in 2017 19 graduates in 2018	AgEconPlus estimate after review of VG15030 Final Report – 16 applicants in 2016, 18 applicants in 2017 and 23 applicants in 2018 with a total of 50 trained.
Additional voluntary days worked per graduate on industry committees and representative organisations after completing Growing Leaders training.	6 days/graduate/year	AgEconPlus estimate assuming each graduate fills a single additional industry role in an organisation that meets 3 times per year with one day's preparation and travel and one day of sitting required for each meeting.
Salary equivalent of each day volunteered to the Australian vegetable industry.	$416/day	AgEconPlus estimate assuming a salary of $100,000, 1,800 hours worked per annum and a 7.5 hour work day.
Impact 2: Improved earnings for graduates		
Current salary for Growing Leader candidates.	$100,000	AgEconPlus estimate.
Salary when graduates become leaders.	$200,000	
Difference in salary between Growing Leader graduates and their peers.	Table 6.	

Common assumptions		
Attribution of benefits to this project.	100%	AgEconPlus estimate.
Probability of valuable outputs	100%	
Probability of impact	80%	
Counterfactual		
If Project VG15030 had not been funded there is a 25% chance that another source of funding or another service provider would have completed the research.		
Proportion of benefits estimated that would have been delivered without Project VG15013.	75%	AgEconPlus.

Results

All costs and benefits were discounted to 2019/20 using a discount rate of 5%. A reinvestment rate of 5% was used for estimating the Modified Internal Rate of Return (MIRR). The base analysis used the best available estimates for each variable, notwithstanding a level of uncertainty for many of the estimates. All analyses ran for the length of the project investment period plus 30 years from the last year of investment (2018/19) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

Table 8 shows the investment criteria estimated for different periods of benefits for the total investment. Hort Innovation was the only investor in the project.

Table 8: Investment Criteria for Total Investment in Project VG15030

Investment Criteria	**Years after Last Year of Investment**						
	0	**5**	**10**	**15**	**20**	**25**	**30**
Present Value of Benefits ($m)	0.45	1.71	2.09	2.09	2.09	2.09	2.09
Present Value of Costs ($m)	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Net Present Value ($m)	-0.26	1.00	1.38	1.38	1.38	1.38	1.38
Benefit-Cost Ratio	0.63	2.40	2.93	2.93	2.93	2.93	2.93
Internal Rate of Return (%)	negative	44.2	46.5	46.5	46.5	46.5	46.5
MIRR (%)	negative	28.0	20.4	15.7	13.2	11.6	10.5

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the VG15030 investment plus 30 years from the last year of investment are shown in Figure 2.

Figure 2: Annual Cash Flow of Undiscounted Total Benefits and Total Investment Costs

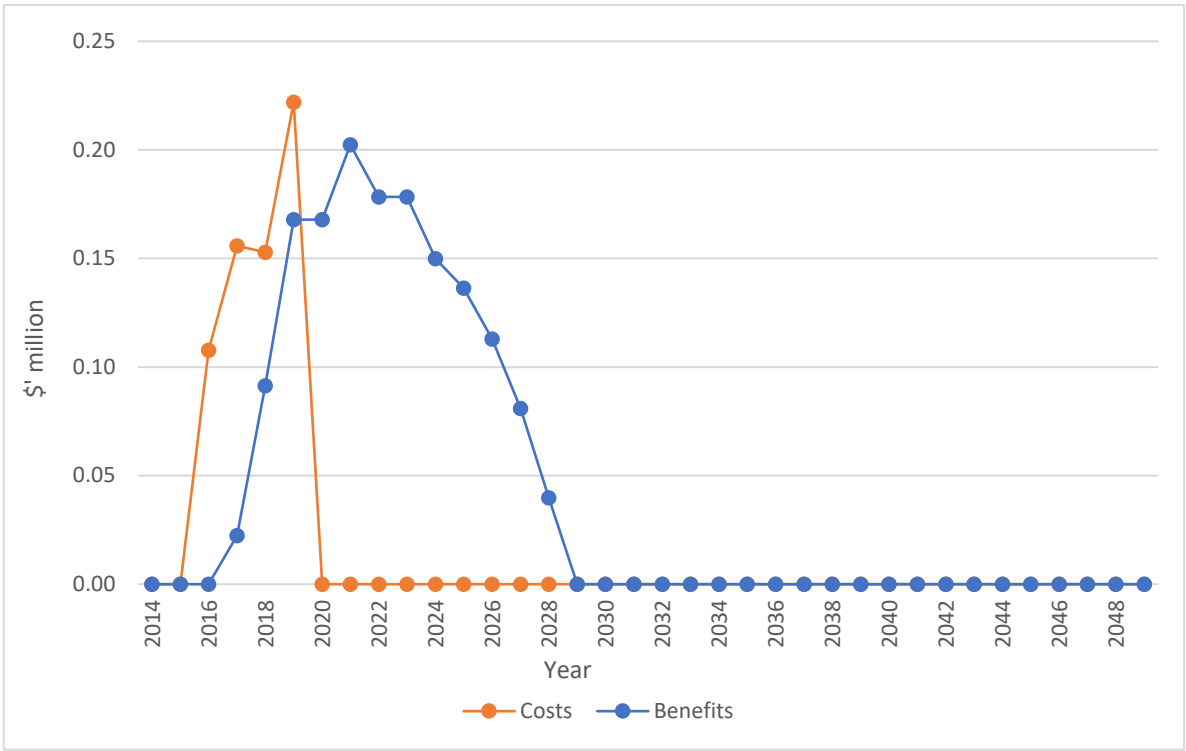


Table 9 shows the contribution of each impact to the total PVB.

Table 9: Contribution of Benefits

Impact	PVB ($M)	% of Total PBV
Impact 1: Better industry decisions	0.67	31.9%
Impact 2: Improved earnings for graduates	1.42	68.1%
Total	2.09	100.0%

Sensitivity Analyses

A sensitivity analysis was carried out on the discount rate. The analysis was performed for the total investment and with benefits taken over the life of the investment plus 30 years from the last year of investment. All other parameters were held at their base values. Table 10 presents the results. The results are not sensitive to the discount rate.

Table 10: Sensitivity to Discount Rate (Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present Value of Benefits ($m)	2.31	2.09	1.93
Present Value of Costs ($m)	0.64	0.71	0.79
Net Present Value ($m)	1.67	1.38	1.13
Benefit-cost ratio	3.62	2.93	2.43

A sensitivity analysis was then undertaken for the increase in salary due to training – estimates shown in Table 6 were halved and doubled. Results are provided in Table 10. Even when salary increase due to Growing Leaders training is halved, and given all other assumptions remaining unchanged, the project returns a favourable benefit cost ratio.

Table 11: Sensitivity to Increase in Salary Due to Growing Leaders Training (Total investment, 30 years)

Investment Criteria	Increase in Salary with Training		
	Maximum increase $5,000/year	Maximum increase $10,000/year (base)	Maximum increase $20,000/year
Present Value of Benefits ($m)	1.38	2.09	3.51
Present Value of Costs ($m)	0.71	0.71	0.71
Net Present Value ($m)	0.67	1.38	2.80
Benefit-cost ratio	1.93	2.93	4.93

A final sensitivity analysis tested the sensitivity of the investment criteria to the number of days graduates volunteer for industry committees and representative organisations after completing Growing Leaders training. The results (Table 12) show that even if only three days per year are volunteered, the project generates a favourable benefit cost ratio.

Table 12: Sensitivity to Days Volunteered to Industry by Growing Leaders Graduates (Total investment, 30 years)

Investment Criteria	Days Volunteered by Graduates		
	3 days/graduate /year	6 days/graduate /year (base)	12 days/graduate /year
Present Value of Benefits ($m)	1.76	2.09	2.76
Present Value of Costs ($m)	0.71	0.71	0.71
Net Present Value ($m)	1.04	1.38	2.04
Benefit-cost ratio	2.46	2.93	3.87

Confidence Rating

The results produced are highly dependent on the assumptions made, some of which are uncertain. There are two factors that warrant recognition. The first factor is the coverage of benefits. Where there are multiple types of benefits it is often not possible to quantify all the benefits that may be linked to the investment. The second factor involves uncertainty regarding the assumptions made, including the linkage between the research and the assumed outcomes.

A confidence rating based on these two factors has been given to the results of the investment analysis (Table 13). The rating categories used are High, Medium, and Low, where:

High: denotes a good coverage of benefits or reasonable confidence in the assumptions made

Medium: denotes only a reasonable coverage of benefits or some uncertainties in assumptions made

Low: denotes a poor coverage of benefits or many uncertainties in assumptions made

Table 13: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
Medium-high	Medium

Coverage of benefits valued was assessed as Medium-high two key impacts – better industry decisions and improved earnings for graduates were valued. Confidence in assumptions was rated as Medium, most data used came from credible sources.

Conclusion

The investment in VG15030 has generated 50 graduates from the Growing Leaders program for the Australian vegetable industry. These graduates will contribute to better industry and community decisions and additional personal earnings.

Total funding from all sources for the project was $0.71 million (present value terms). The investment produced estimated total expected benefits of $2.09 million (present value terms). This gave a net present value of $1.38 million, an estimated benefit-cost ratio of 2.93 to 1, an internal rate of return of 46.5% and a modified internal rate of return of 10.5%.

As one of the social impacts identified was not valued, the investment criteria estimated by the evaluation may be underestimates of the actual performance of the investment.

Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of investment costs.

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Abbreviations

CRRDC	Council of Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Australian Government)
GDP	Gross Domestic Product
GVP	Gross Value of Production
IRR	Internal Rate of Return
MIRR	Modified Internal Rate of Return
OCS	Office of Chief Scientist Queensland
PVB	Present Value of Benefits
RD&E	Research, Development and Extension