Hort Innovation

Final Report

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Horticulture Impact Assessment Program:

Appendix 11: Vegetable Industry Communication Program (VG15027 Impact Assessment)

Impact analyst:

Michael Clarke

Delivery partner:

AgEconPlus and Agtrans Research

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Level 7
141 Walker Street
North Sydney NSW 2060

Telephone: (02) 8295 2300

www.horticulture.com.au

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Executive Summary

What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *VG15027: Vegetable Industry Communication 2016-2019.* The project was funded by Hort Innovation over the period February 2016 and August 2019.

Methodology

The investment was analysed qualitatively within a logical framework that included activities and outputs, outcomes, and impacts. Impacts were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation. 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.

Results/key findings

VG15027 delivered a comprehensive communication plan for the vegetable industry between 2016 and 2019. The project fostered increased awareness and on-farm adoption of levy-funded R&D via print media, electronic newsletter, the mainstream media, and social media. Readily available information is expected to contribute to increased adoption of a range of technologies that, over time, will lower the cost of vegetable production. Other project impacts include increased grower awareness of the role of the vegetable R&D levy and improved vegetable production environmental sustainability.

Investment Criteria

Total funding from all sources for the project was $5.7 million (present value terms). The investment produced estimated total expected benefits of $11.4 million (present value terms). This gave a net present value of $5.7 million, an estimated benefit-cost ratio of 2 to 1, an internal rate of return of 13.1% and a modified internal rate of return of 7.2%.

Conclusions

Five environmental and social impacts were not valued. When inability to value all impacts is combined with conservative assumptions for the principal economic impacts valued, it is reasonable to conclude that the valuation may be an underestimate of the actual performance of the investment.

Keywords

Impact assessment; cost-benefit analysis; VG15027; vegetable, communication, R&D adoption, vegetable levy.

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 the impact assessment program (Project MT18011), three series of impact assessments were conducted in calendar 2019, 2020 and 2021. Each included 15 randomly selected Hort Innovation RD&E investments (projects). The third series of impact assessments (current series) was randomly selected from an overall population of 56 Hort Innovation investments worth an estimated $38.9 million (nominal Hort Innovation investment) where a final deliverable had been submitted in the 2019/20 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 *VG15027: Vegetable Industry Communication Program 2016-2019* 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 for levied vegetables of $2.9 billion and a production volume of 1.7 million tonnes – Table 1.

Table 1: Levied Australian Vegetable Production and Value 2015/16 to 2019/20

Year Ended 30 June	Production (tonnes)	Gross Value of Production ($m)	Farmgate Value of Production ($m)
2016	1,627,149	2,462.1	2,339.0
2017	1,638,539	2,762.5	2,624.4
2018	1,709,198	2,792.2	2,652.6
2019	1,752,690	3,092.5	2,937.9
2020	1,749,935	3,330.9	3,164.4
Average	1,695,502	2,888.0	2,743.6

Source: Horticulture Statistics Handbook 2018/19 and 2019/20 total vegetable production less estimates for potato, tomato, onion, mushroom, asparagus, sweetpotato, garlic, and ginger. Farmgate value estimated by AgEconPlus.

Australian vegetable growers grow more than 130 different vegetable crops. Most 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 most 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.

The peak industry body representing levy-paying vegetable growers is AUSVEG. AUSVEG has responsibilities in advocacy and industry service provision. Services provided by AUSVEG include biosecurity, crop protection, environmental protection, export development, industry development, and industry communication. Effective communication of R&D results is essential to ensure awareness and adoption of R&D outcomes by levy payers.

Rationale

In 2015, a review of vegetable industry communication found that the current AUSVEG program was effective in delivering R&D outcomes to on-farm growers. The multi-channel approach catered to the different type of adopters of technology and in different formats. Six communication projects combined to deliver regular printed material, weekly electronic newsletters, electronic consumer insights, social media tweets, short You Tube videos, podcasts using InfoVeg Radio and the media to keep growers and industry stakeholders informed on R&D outcomes.

Following the successful review of communication, AUSVEG proposed a new communication project to Hort Innovation spanning the period 2016 to 2019. The new project would streamline into one project, existing programs such as the AUSVEG Communications Program, a variety of widely read industry publications including *Vegetables Australia*, *Grower Success Stories* and VegNotes, management, maintenance and promotion of the InfoVeg National R&D database and associated products like InfoVeg Radio and provision of services by the vegetable industry economist.

Project Details

Summary

Project Code: VG15027

Title: *Vegetable Industry Communication Program 2016-2019*

Research Organisation: AUSVEG

Principal Investigator: Shaun Lindhe

Period of Funding: February 2016 to August 2019

Objectives

The objective of this project was to foster increased awareness and on-farm adoption of the results of levy-funded projects. By communicating R&D results to growers and highlighting the practical on-farm benefits that can be gained from adopting the findings of relevant levy-funded projects, the communication project aimed to inspire Australian vegetable growers to take advantage of these outputs and encourage business innovation.

Logical Framework

Table 2 provides a description of VG15027 in a logical framework.

Table 2: Logical Framework for Project VG15027

Activities	• Develop, implement, and continuously refine a broad communication strategy that encompasses the industry's magazine publications, a national media campaign and growth of social media, online media, and industry analysis. • Prepare bi-monthly hard copy and online editions of Vegetables Australia magazine that includes a minimum of one page of R&D content per issue. • Produce and distribute the weekly industry e-newsletter. • Maintain mainstream media relations including preparation and distribution of 12 media releases every year of the project. Media releases to highlight R&D activity. • Provide timely responses to ad hoc media enquiries. • Research and publish printed and web-editions of Vegetable Grower Success Stories. • Publication of six editions of VegNotes each year of the project. VegNotes provide information for growers on technical issues and projects funded by the levy. • Routinely update the InfoVeg National R&D Database including update of the AUSVEG website and the creation of R&D content for *InfoVeg* Radio and TV podcasts. • Creation of an annual social media strategy to inform direction of future social media activities. Augment existing use of Twitter with alternatives such as LinkedIn. • Prepare and deliver a stakeholder engagement plan. Develop effective mechanisms to communicate with state-based extension officers, agronomists, and consultants. Respond to ad hoc enquiries and attend relevant industry events.

	• Review of the communications strategy at its mid-point to ensure delivery of an effective project.
Outputs	• Major outputs delivered during the 2016-2019 period were: • Vegetables Australia magazine. • Weekly Update E-newsletter. • Routine media releases featuring updates and results from R&D projects. • InfoVeg Services including upload of R&D project final reports. • Mainstream media relationships. • A social media strategy. • Communications strategy and project evaluation. • Stakeholder engagement plan. • Vegetable Grower Success Stories. • VegNotes.
Outcomes	• Increased access to R&D information. • Increased knowledge of the R&D levy system, including Hort Innovation's role, the benefits of the vegetable levy and growers' role in the system. • Increased awareness of the value of the R&D levy. • Increased knowledge and awareness of R&D outcomes, technologies, and innovation. • Growers better informed about R&D findings that will lower production costs via improved yield (lowering the average cost of supply) and enhanced environmental sustainability.
Impacts	• [Economic] Lower costs of production for vegetable growers as a result of increased research adoption. • [Environmental] An improved farm environment with adoption of research findings that facilitate sustainable vegetable production. • [Social] Additional communication capacity in AUSVEG. • [Social] Additional grower capacity and understanding of the importance of the vegetable R&D levy. • [Social] Future contribution to improved regional community wellbeing with more profitable and sustainable vegetable growers. • [Social] Enhanced vegetable industry social licence to operate with improved environmental performance.

Project Investment

Nominal Investment

Table 3 shows the annual investment (cash and in-kind) in project VG15027. Hort Innovation was the only investors in the project.

Table 3: Annual Investment in the Project VG15027 (nominal $)

Year ended 30 June	Hort Innovation ($)	Other ($)	Total ($)
2016	587,814	0	587,814
2017	1,234,003	0	1,234,003
2018	1,194,003	0	1,194,003
2019	1,018,862	0	1,018,862
2020	113,207	0	113,207
Totals	**4,147,889**	**0**	**4,147,889**

NB: Budget excludes the cost of the Economics sub-program as ultimately this was removed from VG15027 (Shaun Lindhe, Principal Investigator VG15027, pers. comm., March 2021).

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 the purposes of the investment analysis, investment costs of all parties were expressed in 2019/20 dollar terms using the GDP deflator index. No additional costs of extension were included; the project was focussed on the communication of research to growers (an extension activity).

Impacts

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

Table 4: Triple Bottom Line Categories of Principal Impacts from Project VG15027

Economic	• Lower costs of production for vegetable growers as a result of increased research adoption.
Environmental	• An improved farm environment with adoption of research findings that facilitate sustainable vegetable production.
Social	• Enhanced vegetable industry social licence to operate with improved environmental performance. • Additional communication capacity in AUSVEG. • Additional grower capacity and understanding of the importance of the vegetable R&D levy. • Future contribution to improved regional community wellbeing with more profitable and sustainable vegetable growers.

Public versus Private Impacts

Impacts identified in this evaluation are primarily private in nature – lower production costs, increased profitable sales and an improved social licence to operate for vegetable growers. Public benefits are also created, and these included an improvement in the farm environment, additional communication and grower capacity and a contribution to regional community wellbeing with more profitable and sustainable vegetable growers.

Distribution of Private Impacts

The impacts on the vegetable industry from investment in this project will be shared along the vegetable supply chain with input suppliers, growers, transporters, wholesalers, exporters, and retailers all capturing a share of the impact. The share of total impact retained by each link in the supply chain will be dependent on a combination of both short and long-term supply and demand elasticities.

Impacts on Other Australian Industries

Impacts on other Australian industries are unlikely – the project generated knowledge targeted specifically at the Australian vegetable industry.

Impacts Overseas

Impacts overseas are unlikely. While some of the knowledge may have relevance to overseas vegetable industries, most of the material was specifically targeted to the Australian vegetable industry and protected behind website passwords.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 5. The project findings and related impacts will contribute to Rural RD&E Priority 4 as well as 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 SIP 2017-2021 (Hort Innovation 2017). Project VG15027 addressed Outcome 5 ('Improved industry capabilities for adoption and innovation').

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.

A single impact was valued – lower costs of production for vegetable growers as a result of increased research adoption.

Impacts Not Valued

Not all of the impacts identified in Table 4 could be valued in the assessment. Environmental and social impacts were hard to value due to lack of evidence/data, difficulty in quantifying the causal relationship and pathway between VG15027 and the impact and the complexity of assigning monetary values to the impact.

The environmental and social impacts identified but not valued were:

- An improved farm environment with adoption of research findings that facilitate sustainable vegetable production.
- Enhanced vegetable industry social licence to operate with improved environmental performance.
- Additional communication capacity in AUSVEG.
- Additional grower capacity and understanding of the importance of the vegetable R&D levy.
- Future contribution to improved regional community wellbeing with more profitable and sustainable vegetable growers.

Valuation of Impact: Lower costs of production for vegetable growers as a result of increased research adoption

VG15027 delivered a comprehensive communication plan for the vegetable industry between 2016 and 2019. The project fostered increased awareness and on-farm adoption of levy-funded R&D via print media, electronic newsletter, the mainstream media, and social media. Readily available information is expected to contribute to increased adoption of a range of technologies that, over time, will lower the cost of vegetable production.

Attribution

Information with the potential to lower production costs is also available through other channels including, but not limited to, extension completed as part of levy-funded research projects. For this reason, an attribution factor of 60% has been assumed.

Counterfactual

It is further assumed that in the absence of Hort Innovation investment in VG15027, it is only 20% likely that the project benefits would have been generated from another source.

Summary of Assumptions

A summary of the key assumptions made for valuation of the impacts is shown in Table 6.

Table 6: Summary of Assumptions

Variable	Assumption	Source/Comment
Impact: Lower costs of production for vegetable growers as a result of increased research adoption		
Average cost of vegetable production without VG15027.	$1,067/tonne	Farm gate value of vegetable production of $4,182.9 million divide production of 3,645,684 tonnes to give a gross value of $1,147/tonne (See Table 1 above). Typically, profit averages somewhere between 2% and 10% in established horticultural industries and 7% has been used in this analysis to reflect higher value crops covered by the vegetable levy. Therefore, cost of production is $1,067/tonne ($1,147 X 0.93).
Saving in cost of production due to VG15027.	0.25%	A total saving of 2% is assumed by the analyst. However, 1.75% of this gain is attributable to the research rather than its communication via VG15027.
Annual production of levied vegetables.	1,695,502 tonnes.	See Table 1 above.
Proportion of vegetable production achieving cost reduction.	75%	Analyst estimate reflecting the comprehensive coverage achieved by the Vegetable Industry Communication Program 2016-2019.
Year of first impact.	2018/19.	One year before VG15027 completed – some adoption taking place throughout the project.
Attribution of impacts to VG15027.	60%	See above text.
Counterfactual.	20%	See above text.
Probability of valuable outputs.	90%	Valuable outputs have been created.
Probability of valuable outcome.	90%	Analyst assumption.
Probability of valuable impact.	90%	Analyst assumption.

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 (2019/20) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

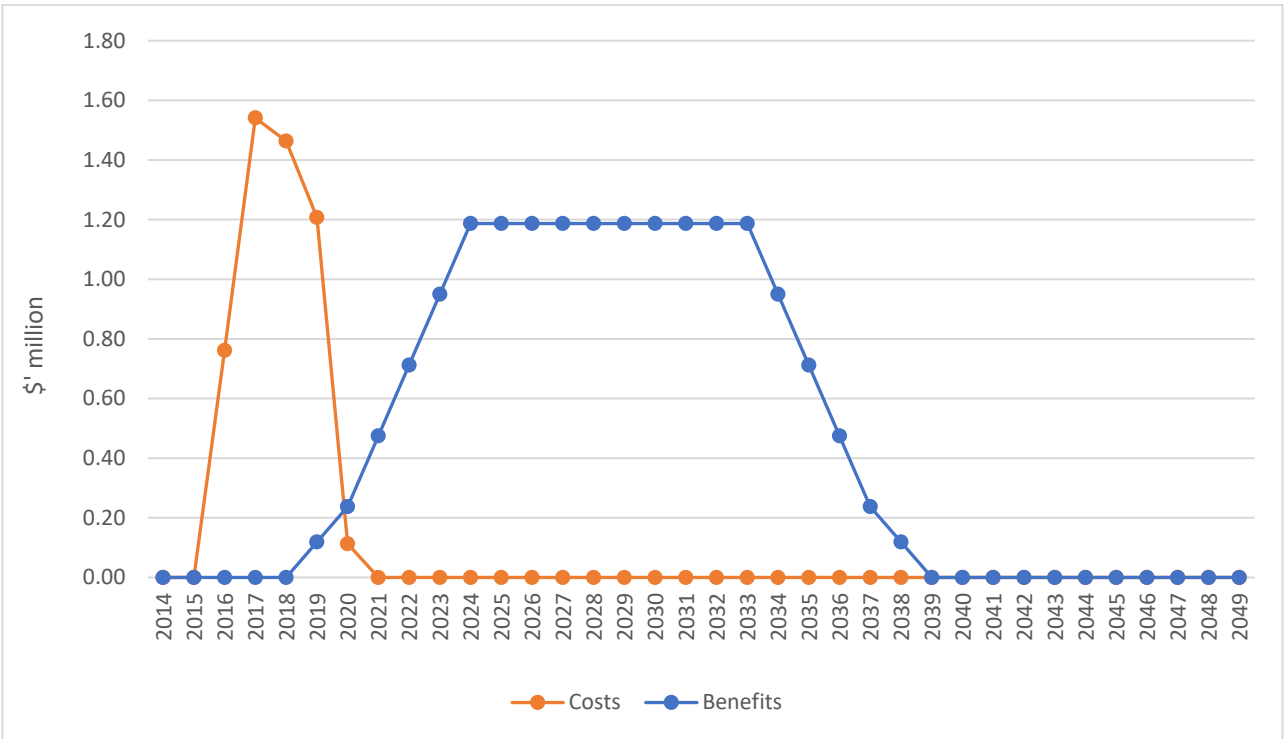
Table 7 shows the investment criteria estimated for different periods of benefit for the total investment. Hort Innovation was the only investor in VG15027.

Table 7: Investment Criteria for Total Investment in Project VG15027

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits ($m)	0.36	4.19	8.21	11.02	11.39	11.39	11.39
Present Value of Costs ($m)	5.70	5.70	5.70	5.70	5.70	5.70	5.70
Net Present Value ($m)	-5.34	-1.52	2.51	5.32	5.69	5.69	5.69
Benefit-Cost Ratio	0.06	0.73	1.44	1.93	2.00	2.00	2.00
Internal Rate of Return (%)	Negative	-0.8	10.1	12.9	13.1	13.1	13.1
MIRR (%)	Negative	1.3	7.9	8.8	8.2	7.6	7.2

The annual undiscounted benefit and cost cash flows for the total investment for the duration of VG15027 investment plus 30 years from the last year of investment are shown in Figure 1.

Figure 1: Annual Cash Flow of Undiscounted Total Benefits and Total Investment Costs



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 8 present the results. The results are moderately sensitive to the discount rate.

Table 8: Sensitivity to Discount Rate
(Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5%	10%
Present Value of Benefits ($m)	16.85	11.39	8.17
Present Value of Costs ($m)	5.09	5.70	6.38
Net Present Value ($m)	11.77	5.69	1.79
Benefit-cost ratio	3.31	2.00	1.28

A sensitivity analysis was then undertaken for the assumed share of vegetable production adopting research findings. Results are provided in Table 9. The table shows that if only 37.5% of production adopts communication plan content, then the project will breakeven.

Table 9: Sensitivity to Share of Vegetable Production Adopting Communication Plan Content
(Total investment, 30 years)

Investment Criteria	Share of Vegetable Production Adopting Communication Plan Content		
	37.5%	50% (base)	75% (base)
Present Value of Benefits ($m)	5.70	7.59	11.39
Present Value of Costs ($m)	5.70	5.70	5.70
Net Present Value ($m)	-0.01	1.89	5.69
Benefit-cost ratio	1.00	1.33	2.00

A final sensitivity analysis tested the sensitivity of the investment criteria to production cost saving. The results (Table 10) show that if the decrease in production cost is only 0.125%, and all other assumptions are held the same, then the project will breakeven.

Table 10: Sensitivity to Decrease in Vegetable Production Cost with Adoption of Communication Plan
(Total investment, 30 years)

Investment Criteria	Decrease in Vegetable Production Cost with Vegetable Communication Plan		
	0.125%	0.25% (base)	0.5%
Present Value of Benefits ($m)	5.70	11.39	22.78
Present Value of Costs ($m)	5.70	5.70	5.70
Net Present Value ($m)	-0.01	5.69	17.08
Benefit-cost ratio	1.00	2.00	3.99

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 11). 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 11: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
Medium-high	Low

Coverage of benefits was assessed as medium-high – the key economic benefit was valued. Confidence in assumptions was rated as Low – key assumptions were made by the analyst.

Conclusion

VG15027 delivered a comprehensive communication plan for the vegetable industry between 2016 and 2019. The project fostered increased awareness and on-farm adoption of levy-funded R&D via print media, electronic newsletter, the mainstream media, and social media. Readily available information is expected to contribute to increased adoption of a range of technologies that, over time, will lower the cost of vegetable production. Other project impacts include increased grower awareness of the role of the vegetable R&D levy and improved vegetable production environmental sustainability.

Five environmental and social impacts were not valued. When inability to value all impacts is combined with conservative assumptions for the principal economic impacts valued, it is reasonable to conclude that the valuation may be an underestimate 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
R&D	Research and Development
RD&E	Research, Development and Extension
SIAP	Strategic Investment Advisory Panel
SIP	Strategic Investment Plan