Impact assessment of the investment:

Export Facilitators Part 3 – Tasmanian Delivery & Export Plans (VG16085)

*By Matthew Revell and George Revell, **Ag Econ***
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Hort Innovation

Disclaimer:

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Level 7
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Telephone: (02) 8295 2300

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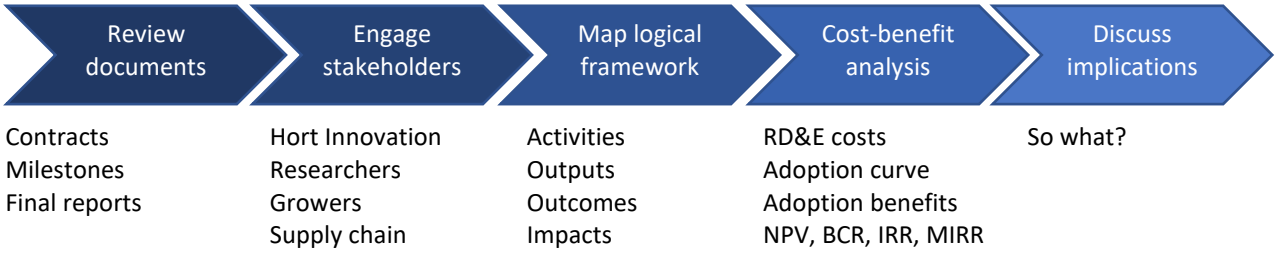
Executive summary

What the report is about

Ag Econ conducted independent analysis to determine the economic, social, and environmental impact resulting from delivery of the project VG16085 *Export Facilitators Part 3 – Tasmanian Delivery & Export Plans*. The project was funded by Hort Innovation over the period Jan 2018 to Dec 2020 using the fresh vegetable research and development levy and contributions from the Australian Government.

The analysis applied a five step analytical process to understand the impact pathway and collect supporting data.



Research background

Through the funding of a dedicated Tasmanian Export market Facilitator, the project improved Tasmanian vegetable growers knowledge of export markets and processes and increasing their skills and access to resources to take advantage of export opportunities. The project built on the wider work of Hort Innovation to increase vegetable exports under national projects including the vegetable industry export strategy (VG15052) and the national vegetable industry export program (VG16061).

Key findings

The nominal investment cost of $0.6 million was adjusted for inflation (ABS, 2023) and discounted (using a 5% real discount rate) to a present value (PV) of costs equal to $0.9 million (2022-23 PV).

Through the logical framework, a clear impact pathway was identified for VG16085. The Export Facilitator engaged with a total network of 1067 Tasmanian vegetable industry stakeholders, including growers (more than 71% of production), suppliers, government, logistics, customers and other stakeholders. Through this engagement, the project contributed to an increase in Tasmanian vegetable grower knowledge of export markets, and skills and resources to capitalise on export opportunities. There was consensus in discussions with stakeholders that the work of the Facilitator provided valuable information that growers were able to directly apply to their businesses to establish or increase vegetable exports. This increased capacity for vegetable exports was assessed to support three impacts: increased export value, decreased industry risk from market diversification, and increased regional community wellbeing and resilience from more profitable vegetable growers.

Due to data gaps outlined in the analysis, only the benefit of increased export value was able to be quantified, with an estimated benefit of $2.0 million (2022-23 PV) attributed to VG16085. When compared to the investment costs of $0.9 million (2022-23 PV), this generated a BCR of 2.4:1. Sensitivity testing of the results to changes in the underlying variables showed that 99% of model simulations had a BCR greater than 1:1, giving a high level of confidence that investment in VG16085 generated a positive impact.

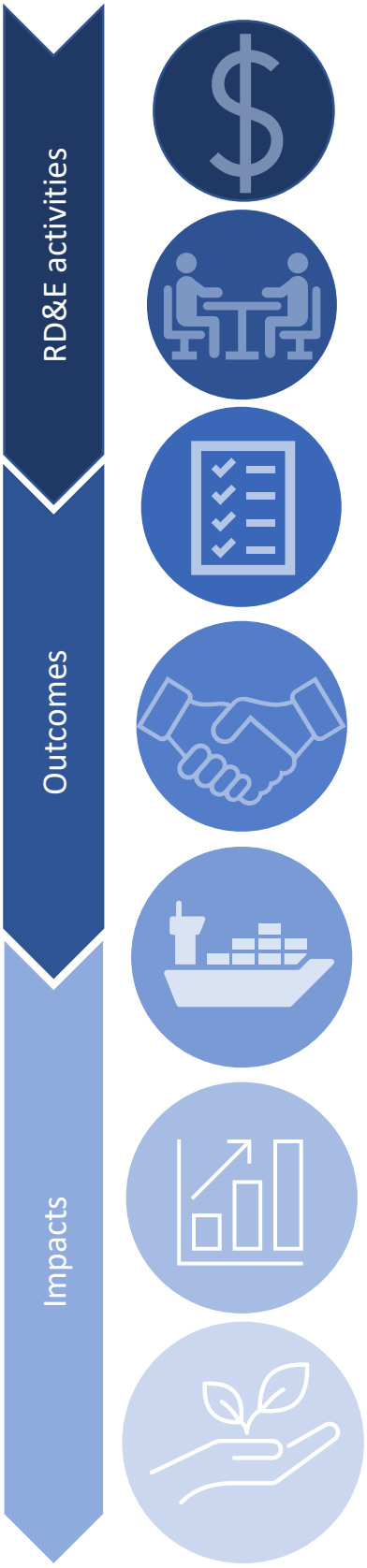
The key findings of the VG16085 impact assessment are summarized in Figure 1 below.

Keywords

Impact assessment, cost-benefit analysis, Export Facilitator, vegetables

Figure 1. Summary of impact assessment findings

VG16085 Tasmanian export facilitator



Total RD&E costs:

- $0.6 m (nominal value)
- 100% from R&D levy and Government matching.

Facilitator activities:

- Export readiness and development was provided through a wide range of work primarily focused on growers and their industry networks.
- Grower export training, and support in developing individual export strategies.
- Ongoing advice and updates provided to growers through newsletters, social media, and industry webinars.
- Overall the project engaged:
  - 206 grower contacts representing more than 71% of Tasmanian vegetable farms.
  - A total network of 1067 businesses including growers, suppliers, government, logistics, customers, and other stakeholders.

Outcomes:

- Fostered an export culture among Tasmania's vegetable producers by supporting increased knowledge of export markets and processes, and increased skills and access to resources to take advantage of export opportunities.
- Created and fostered the collaborative partnerships required for an export culture among growers and industry.

Economic impacts:

- A sustained increase in Tasmanian fresh vegetable exports.
- Decreased market risk through the diversification of markets / sales channels.

Social impacts:

- Increased regional community wellbeing from more profitable vegetable growers.

Total attributable benefits and impact:

- Present value (PV) of RD&E costs of $0.9 between 2018 and 2021 (5% real discount rate).
- PV benefits of $2.0 million over 30 years from 2019.
- Net present value (NPV) of $1.2 million
- Benefit cost ratio (BCR) of 2.4:1, with a 90% confidence of a BCR between 1.4:1 and 3.7:1

Introduction

Evaluating the impacts of levy investments is important to demonstrate the economic, social and environmental benefits realised through investment to levy payers, Government and other industry stakeholders. Understanding impact is also an important step to inform the ongoing investment agenda.

Reflecting its commitment to continuous improvement in the delivery of levy funded research, development and extension (RD&E), Hort Innovation required a series of impact assessments to be carried out annually on a representative sample of investments of its RD&E portfolio. Commencing with MT18011 in 2017-18, the impact assessment program consisted of an annual impact assessment of 15 randomly selected Hort Innovation RD&E investments (projects) each year. In line with this ongoing program, Ag Econ was commissioned to deliver the *Horticulture Impact Assessment Program 2020-21 to 2022-23* (MT21015).

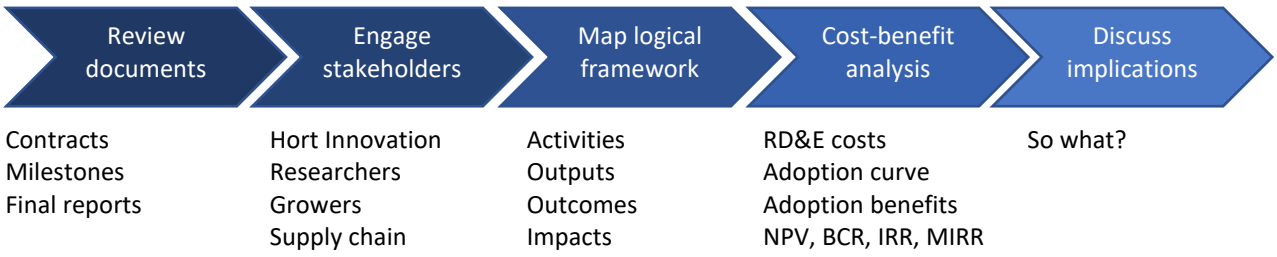
Project *VG16085 Export Facilitators Part 3 – Tasmanian Delivery & Export Plans* was randomly selected as one of the 15 investments in the 2021-22 sample. This report presents the analysis and findings of the project impact assessment.

The report structure starts with the general method of analysis used, followed by the RD&E background and an outline of the impact pathway in a logical framework, then describes the approach used to quantify the identified costs and benefits including any data gaps and limitations to the analysis, presents the results including from the sensitivity analysis, and finally discusses any implications for stakeholders.

General method

The impact assessment built on the impact assessment guidelines of the Council of Rural Research and Development Corporations (CRRDC, 2018) and included both qualitative and quantitative analysis. The general method that informed the impact assessment approach was as follows:

1. Review project documentation including project plan, milestone reports, outputs and final report
2. Discuss the project delivery, adoption and benefits with the Hort Innovation project manager, project researcher/consultant, growers and other stakeholders (see *Stakeholder Consultation*)
3. Through a logical framework, qualitatively map the project's impact pathway, including activities, outputs, outcomes to identify the principal economic, environmental, and social impacts realised through the project
4. Collect available data to quantify the impact pathway and estimate the attributable impacts using cost-benefit analysis (over a maximum 30 years with a 5% discount rate), and then sensitivity test the results to changes in key parameters.
5. Discuss the implications for stakeholders.



The analysis identified and quantified (where possible) the direct and spillover impacts arising from the RD&E. The results did not incorporate the distributional effect of changes to economic equilibrium (supply and demand relationships) which was beyond the scope of the MT21015 impact assessment program.

A more detailed discussion of the method can be found in the *MT21015 2021-22 Summary Report* on the Hort Innovation project page Horticulture Impact Assessment Program 2020/21 to 2022/23 (MT21015).

Terminology

The following terminology is used to avoid confusion. A glossary and abbreviations summary is also contained at the end of the report.

- The vegetable industry / vegetables: All vegetables and mushrooms.
- The vegetable levy industry / leviable vegetables: The subset of the vegetable industry that pays the vegetable R&D

levy. The vegetable levy industry excludes onions, mushrooms, sweetpotatoes, asparagus, garlic, ginger, herbs (except fresh shallots and parsley) and tomatoes (some of which have their own R&D levy).

- Industries and commodities will also be referred to individually, e.g. the onion industry / onions.

Project background

The Australian vegetable levy industry has approximately 1,700 growers across Australia (Hort Innovation 2022a), with a 5-year average (to 2020-21) production value of $2.5 billion (Hort Innovation 2023). Leviable vegetables are grown across Australia, however Queensland accounts for the highest share (32%), followed by Victoria (24%), Western Australia (16%), New South Wales (8%), South Australia (9%) and Tasmania (8%) in 2020-21. Tasmanian vegetable levy production is made up primarily of carrots.

The Australian onion industry has approximately 256 growers nationally, with a 5-year average (to 2021-22) production value of (Hort Innovation 2023). Onions are grown across Australia, with South Australia (SA) accounting for the highest share (48%), followed by Tasmania (22%), Queensland (16%), Western Australia (8%), Victoria (6%) and New South Wales (2%) in 2020-21.

Historically the Australian onion and vegetable levy industries has had a low level of exports, which along with the relatively concentrated Australian retail market has left vegetable producers with little choice in sales options. Further, the relatively flat consumer demand in Australia has meant that any significant increases in vegetable production puts downward pressure on prices limiting the sustainable growth.

In 2015, the industry developed a *Vegetable Industry Export Strategy 2020 (VG15052)* that aimed to increase the value of vegetable exports to $315 million, or by 40 per cent, by 2020. This was reenforced by the industry 2017 to 2021 Strategic Investment Plans (SIPs) that prioritised outcomes relating to Export demand (SIP Outcome 2 for both the vegetable levy industry and onion industry) (Hort Innovation 2017a and 2017b).

In order to achieve this Hort Innovation invested significantly in export development to deliver a variety of programs and projects to grow vegetable exports, including the national vegetable export development program (VG16061), supported by export facilitators in Western Australia (VG16085 part 1), Queensland (VG16085 part 2) and Tasmania (VG16085 part 3), as well as trade missions (VG15075) and export symposia (VG13072). The state-based export facilitators and the facilitator network across Australia were tasked to promote collaboration within the industry and provide linkages across supply chains that would assist in achieving the overarching objective of the Vegetable industry Export Strategy (VG15052) of growing the value of vegetable exports by 40% by 2020.

While the Tasmanian vegetable industry (focussing on carrots and onions) has historically had a greater export focus that mainland Australia, the industry sought to further capitalise on export opportunities through improved co-ordination and communication export development information and opportunities to growers.

Project details

Vegetables WA was selected as the lead delivery partner, with the project running from 2018 to 2020 (Table 1)

Table 1. Project details

Project code	VG16085
Title	Export Facilitators Part 3 – Tasmanian Delivery & Export Plans
Research organization(s)	Tasmanian Fruit & Vegetable Export Facilitation Group Under sub-agreement to Vegetables WA
Project leader	Mr John Shannon (Vegetables WA)
Funding period	Jan 2018 to Dec 2020
Objective	To facilitate the growth of Tasmanian fresh vegetable exports.

Logical framework

The impact pathway linking the project's activities and outputs, and their assessed outcomes and impacts have been laid out in a logical framework (Table 2).

Table 2. Project logical framework detail

RD&E activities		• Through the project, the Tasmanian Export Facilitator was funded to: ○ Coordinate with AUSVEG and the wider export R&D investments. ○ Establish a total network of 1067 Tasmanian businesses including growers, suppliers, government, logistics, customers and other stakeholders. ○ Engage with 206 grower being >71% of all Tasmanian vegetable farms, with 175 of these initially presenting themselves as having a capacity to consider starting or expanding exports. ○ Provide varying levels of assessment of capacity and capability for raising export awareness and readiness with direct market knowledge and insights. ○ Deliver face-to-face export training in 2017 & 2018, with 24 growers attending. ○ Support 20 stakeholders (15 vegetable growers) from 10 organisations to attend 6 international trade shows. ○ Provide weekly newsletters (35), webinars (12), information booklets, knowledge bank and teleconference meetings. ○ Establish 'The Other Side' initiative which drew together strategies and resources to help vegetable producers re-enter the export market post COVID-19.
RD&E outputs		• Through the above activities, the following outputs were delivered: ○ Grower engagement activities as above. ○ Individual export strategies for growers across the lifespan of the project. ○ Developed a grower stakeholder map across relevant state including key lines grown and product/supply seasonality. ○ Developed and maintained an up to date a database of local industry service providers to assist in facilitating exporters.
Outcomes		• From the above activities and outputs, the following outcomes were achieved: ○ Improved Tasmanian vegetable growers' knowledge of export markets and processes, and increased their skills and access to resources to take advantage of export opportunities. ○ Created and fostered the collaborative partnerships required for an export culture among growers and industry.
Impacts	 	• Through the increased export capacity developed from the project, the following impacts were generated: ○ [Economic] A sustained increase in Tasmanian fresh vegetable exports. ○ [Economic] Decreased market risk through the diversification of markets / sales channels. ○ [Social] Increased regional community wellbeing and resilience from more profitable vegetable growers (The CIE 2023).

Project costs

The project was funded by Hort Innovation, using the fresh vegetable and onion research and development levy and contributions from the Australian Government (Table 3). Overhead costs were added to the direct project cost to capture the full value of the RD&E investment.

Nominal investment

Table 3. Project nominal investment

Year end 30 June	Hort Innovation project costs ($)	Hort Innovation overheads[1] ($)	Total nominal ($)
2018	212,500	41,368	253,868
2019	75,000	12,475	87,475
2020	119,167	20,714	139,880
2021	103,333	15,471	118,804
Total	**510,000**	**41,368**	**600,027**

1. The overhead and administrative costs were calculated from the Statement of Comprehensive Income in the Hort Innovation Vegetable Fund Annual Report 2017-18 to 2020-21 (Hort Innovation 2022), averaging 17.1% for the VG16085 funding period (2018-2021).

Present Value of investment

The nominal total investment cost of $0.6 million identified in Table 3 was adjusted for inflation (ABS, 2023) into a real investment of $0.7 million (2022-23 equivalent values). This was then further adjusted to reflect the time value of money using a real discount rate of 5% (CRRDC 2018), generating a present value (PV) of costs equal to $0.9 million (2022-23 PV). The results were sensitivity tested changes in the discount rate between 2.5% and 7.5%.

Project impacts

The potential impacts identified in Table 3 were evaluated against available data to determine if they could be quantified with a suitable level of confidence. From this process, the following impacts were valued.

Impacts quantified

- **[Economic] A sustained increase in Tasmanian fresh vegetable exports.** A natural experiment approach was used where the Tasmanian exports of vegetables (excluding potatoes) was analysed relative to states that had no dedicated export facilitator (Vic. and NSW). While this approach has potential weaknesses (such as the difference domestic-export focus of the states, and potential difference in baseline export skills of growers) the lack of data reflecting benefits to individual participants in VG16085 prevented a "bottom up" approach to analysis. The period before project impacts 2016 to 2018 was then compared to the with-project impacts period 2019 to 2022 to identify the export benefit of the investment. For the additional export value, a gross margin was applied to quantify the net benefit to growers. Discussions with project stakeholders including the export facilitator and vegetable growers and exporters were undertaken to refine and validate the underlying data and assumptions. The attribution of the full results was considered in relation to other export development investments during and following VG16085, and from this a suitable outcome attribution factor was applied. Finally, the potential for the project to have been conducted without levy investment was also considered, with results adjusted down by an estimated R&D counterfactual factor.

Impacts unable to be quantified

- **[Economic] Decreased market risk through the diversification of markets / sales channels.** Concentrated trade relationships, with a high proportion of exports going to a small number of markets, can creaste increased levels of risk for a business and industry. The risk is compounded when exports are concentrated in potentially volatile markets. The costs of export market risk have been demonstrated in Australia's agricultural markets with a loss of chickpea access to India, and losses of wine, lobster, and barley access to China. Market diversification reduces the risk of lost markets, with associated costs of developing new supply chain relationships and being forced to sell perishable produce at discounted prices. The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration. An HHI of less than 15 is considered diversified (low risk), 15 to 25 is moderately concentrated, and 25 or greater is considered highly concentrated (high risk). Data for the national vegetable industry (Trade Map 2023) showed a relatively low level of market concentration of 6.9 in 2023, averaging 7.5 over the five years to 2023. Individual data for Tasmania was not available. Quantifying the impact of changes in market concentration would also

require analysis of individual market risk to be overlaid onto the market concentration data; however, data was only available for Australia's national vegetable trade, so Tasmania specific analysis was not possible.

- **[Social] Increased regional community wellbeing and resilience from more profitable vegetable growers** (The CIE 2023). The CIE (2023) highlighted the flow-on (spillover) effects of the vegetable industry for regional economies, with Tasmania's West and North West regions being particularly reliant on vegetable production. Quantifying the flow-on effects of increased industry production and profit requires the direct impacts identified in this impact assessment to be incorporated into economic models that capture regional and national linkages, but which were beyond the scope of the R&D impact assessment program (CRRDC 2018).

Data and assumptions

To quantify the identified impacts, the necessary data was collected from the project documents and other relevant resources. Where available, empirical data was used, with estimates applied for any data gaps and projections into the future. Estimates were based on appropriate analytical techniques, or stakeholder estimates, or both. Where estimates were used, a data range was also considered to reflect underlying risk and uncertainty, which was further analysed through sensitivity testing (see *Results*). A summary of the key data, assumptions and sources is provided in Table 4.

Table 4. Summary of assumptions for impact valuation

Variable	Assumption	Source / comment
Discount rate	5% (± 50%)	CRRDC Guidelines (2018)
Tasmanian Fresh Vegetable Exports $m	$37.4m (± 50%)	Average Tas exports of carrots, onions and other veg (including potatoes) over the life of the project (2018-21)Tasmanian State Government (2022).
Average Tasmanian Vegetable Gross Margin	45.48% (± 10%)	The Average GM of the two biggest vegetable exports by value being carrots and onions was used with data from Pinion Advisory (2020).
Tas Export Growth Variance relative to states without Export Facilitator (Yearly Average)	5.86% (-99%, +101%)	The variance in Tasmanian export growth was calculated using data from Hort Stats Handbook 2016-2022 (Hort Innovation 2023), and state based export data from the Tasmanian State Government (2022), Victorian State Government (2022), and NSW department of primary industries (2022). Tasmanian fresh vegetable and onion export growth was compared to exports from states that did not have an Export Facilitator (Vic and NSW). In the period before VG16085 (2016-2018)Tasmanian export value growth was on par with Vic and NSW . Over the period of project benefit (2019-2022) Tasmanian export value grew at an average of 5.86% above those states. The actual yearly variation was used for 2019 to 2022, with the 5.86% average yearly variance used in projections beyond 2023 (tested at 0.05% and 11.78% being the 25th and 75th percentiles of observed variance between 2019-2022).
Attribution of outcome (increased export value)	50% (± 50%)	Attribution has taken into account that the export facilitator engaged with 1067 stakeholders, including >71% of Tas veg growers (85% of which were considering starting or expanding exports). The project operated alongside the national work done by the vegetable industry export strategy (VG15052) and the national vegetable industry export program (VG16061) along with ongoing investment from Hort Innovation, individual growers and industry participants all contributing to increasing exports. Attribution of 50% is being applied to the work of VG16085 which was specifically focused on Tasmanian exports.
Attribution decline compound rate (%)	25% (± 20%)	Attribution was assessed to start in the second year of the project once export coordination efforts had been initiated and was estimated to decrease by 25% pa after the conclusion of the coordinator role project in FY2021 highlighting the declining attribution to VG16085 as market conditions changed.

R&D counterfactual	80% (± 20%)	R&D counterfactual was set at 80% and tested at ± 20% to account for the potential for the investment to have been funded in the absence of Hort Innovation levy funding. It was considered a relatively low likelihood that a Tasmanian export Facilitator would have been funded through other means.

Results

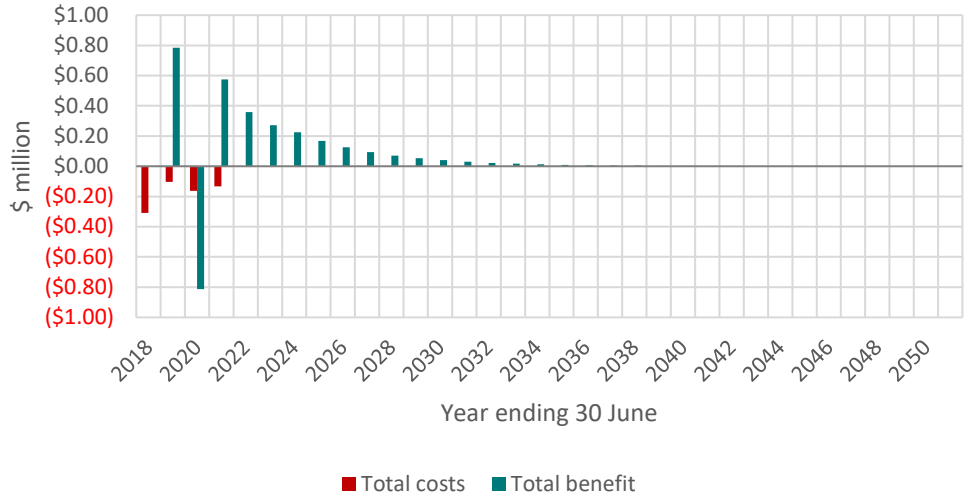
The analysis identified PV costs (PVC) of $0.86 million (2022-23 PV) between 2018 and 2021, and estimated PV benefits (PVB) of $2.04 million (2022-23 PV) accruing between 2019 and 2040 (Table 5). When combined, the PVC and PVB generated an estimated RD&E impact with a net present value (NPV) of $1.18 million, a benefit-cost ratio (BCR) of 2.38 to 1, an internal rate of return (IRR) of 47% and a modified internal rate of return (MIRR) of 7%.

Table 5. Impact metrics for the total investment in project VG16085

Impact metric	Years after last year of investment						
	0	5	10	15	20	25	30
PVC ($m)	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PVB ($m)	0.64	1.77	1.99	2.03	2.04	2.04	2.04
NPV ($m)	-0.21	0.91	1.13	1.17	1.18	1.18	1.18
BCR	-0.75	2.07	2.32	2.37	2.38	2.38	2.38
IRR	Negative	46%	47%	47%	47%	47%	47%
MIRR	Negative	11%	10%	8%	8%	7%	7%

Figure 1 shows the annual undiscounted benefit and cost cash flows for the total investment of VG16085. Cash flows are shown for the duration of the investment plus 30 years from the last year of investment. As the approach used a natural experiment (i.e. comparison of one states actual trade data with another) the results are "noisy" with Tasmania outperforming the comparison states (NSW and Vic) in some years (2019, 2021, and 2022) and underperforming those states in others (2020). The results over this period should be interpreted regarding the overall trend, which shows that Tasmanian exports grew at a faster rate than these other vegetable exporting states that didn't have an export facilitator.

Figure 1. Annual cash flow of undiscounted total benefits and total investment costs



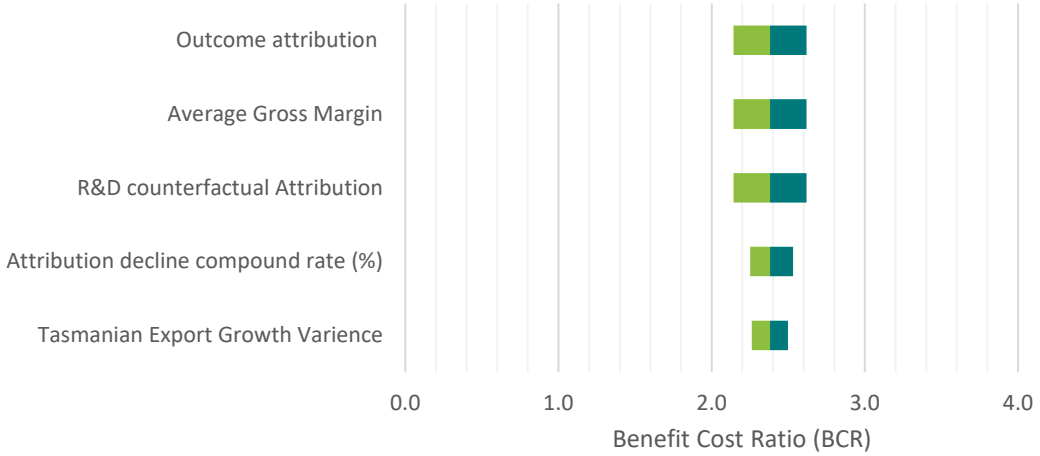
Sensitivity analysis

Given the risk and uncertainty associated with a number of underlying modelling inputs, the results were tested for sensitivity to changes in the variable where a potential value range was identified (Table 4). The results were first tested for sensitivity to individual changes in the variables, followed by combined changes.

Individual changes of a uniform 10% were undertaken to identify the variables to which the results were most sensitive. The results were most sensitive uniform changes to the five variables shown in Figure 2. The largest change in the results came from a 10% change in the Outcome attribution, R&D counterfactual attribution and average gross margin which reflects the

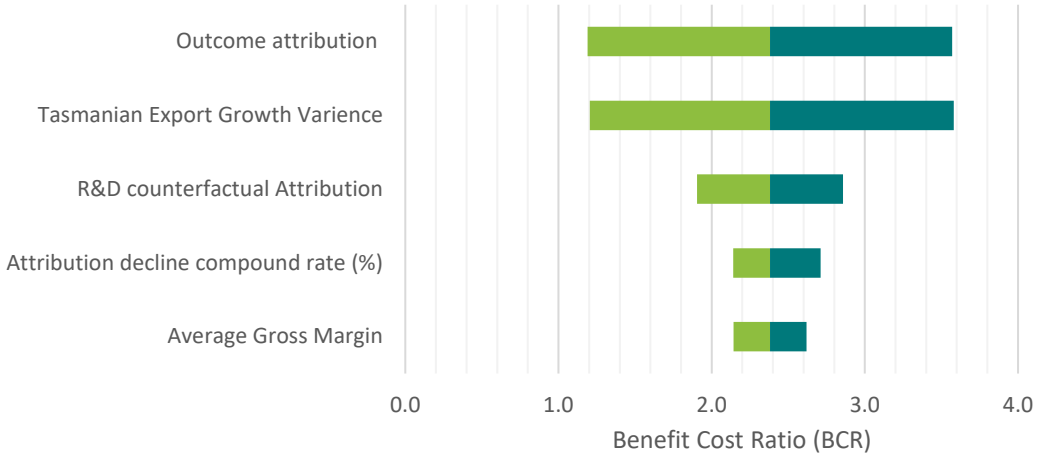
lift in Tasmanian exports that can considered likely attributed to VG16085 and therefore the economic benefit to Tasmanian vegetable growers after applying an Average gross margin of production. The results were also sensitive to assumptions around the attribution decline compound rate (how quickly the attribution of impacts stop being attributed to the work of VG16085) along with the Tasmanian growth variance being the 5th most sensitive variable.

Figure 2. Variables to which the results were most sensitive for uniform 10% changes



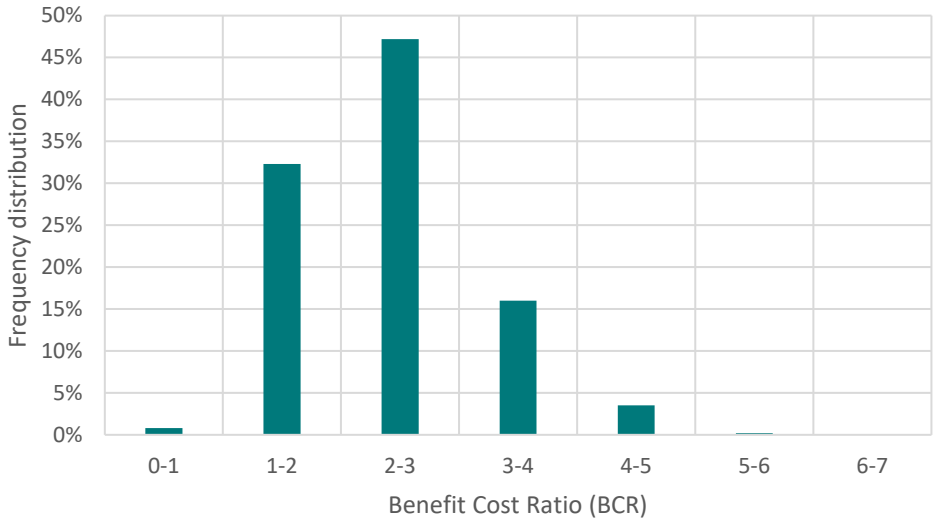
The results were next tested for sensitivity to changes across the full value range for each variable (tested individually) to reflect the differences in risk and uncertainty for each variable. The variables to which the results were most sensitive across their full range are shown in Figure 3. The results were highly sensitive to changes in the attribution which also had a wide potential value range (25% to 75%) reflecting uncertainty over this variable and it was shown to have the greatest potential influence on the modelling results. Of note, the results remained positive to all changes in individual variables.

Figure 3. Variables to which the results were most sensitive when tested at their full range



Finally, the full range of potential variation in the impact was estimated using @Risk stochastic modelling to incorporate the combined effect of changing all variables across their full ranges over 1000 simulations. This process showed an impact (BCR) range of between 0.81 and 5.40, with 95% of results falling between 1.36 and 3.74 (i.e. excluding the low probability tails) (Figure 4). 99% of simulations had a BCR greater than 1 (benefits greater than RD&E costs). This indicates a high level of confidence that this investment generated a positive impact.

Figure 4. Impact histogram. Distribution of results over 1000 simulations.



Implications and learnings

A clear path to impact was identified for VG16085 within the analysis. Primarily through direct grower contact, the Export Facilitator engaged with a high proportion of the Tasmanian vegetable industry. This included a total network of 1067 businesses including growers (more than 71% of production), suppliers, government, logistics, customers and other stakeholders . Through this engagement, the project contributed to an increase in Tasmanian vegetable grower knowledge of export markets, and skills and resources to capitalise on export opportunities. There was consensus in discussions with stakeholders that the work of the Facilitator provided valuable information that growers were able to directly apply to their businesses to establish or increase vegetable exports.

A lack of data showing direct benefits to individual growers (e.g. increased exports supporting higher production or improved prices or both) meant that a natural experiment approach was used in the analysis. This involved comparing export data for Tasmania with other vegetable exporting states that did not have an Export Facilitator (Vic and NSW). This data supported the anecdotal evidence from stakeholders by showing that prior to the project, Tasmanian vegetable export value growth was on par with Vic and NSW (who did not have dedicated Export Facilitator), whereas over the project period, Tasmanian export value grew at an average of 6% above those states. Given the potential for a range of other factors to influence the natural experiment approach, attribution was capped at 50% for the project period, and declined rapidly following project completion.

While this natural experiment approach has potential weaknesses (given the potentially large number of other factors that may contribute to the variance) the lack of data showing direct benefits to individual participants in VG16085 prevented a “bottom up” approach to analysis. Future export facilitation projects should consider collecting data from participants to measure and report on specific outcomes, e.g. the extent to which production or profit has increased as a result of participation in VG16085.

Data gaps also prevented the quantification of other benefits identified through the logical framework, including decreased export risk from market diversification, and increased regional community wellbeing and resilience from more profitable vegetable growers.

Despite only reflecting one of the three identified impacts, the results generated a benefit of $2.04 million (2022-23 PV) was estimated. When compared to the investment costs of $0.86 million (2022-23 PV), this generated aBCR of 2.38:1. Sensitivity testing showed that 99% of model simulations had a BCR greater than 1:1, giving a high level of confidence that investment in VG16085 generated a positive impact.

Stakeholder engagement

Where possible, Ag Econ sought to engage multiple stakeholders across key areas of the logical framework and impact pathway to augment existing information and data sources, and reduce any uncertainty or bias from individual stakeholders. All stakeholders were engaged through telephone or online meetings, with follow up emails as necessary. Consultation followed a semi-structured approach in line with broad topics relating to the impact pathway and associated data requirements. Table 6 outlines the stakeholders consulted as part of this impact assessment and the topics on which they were consulted.

Table 6. Stakeholder consultation by theme

Stakeholder details		Consultation theme						
Stakeholder and organisation	**Stakeholder type**	**Related research**	**Research inputs**	**Research outputs**	**Research immediate outcomes**	**Follow on research**	**Stakeholder adoption**	**Impact areas and data**
Mimi Doan, Hort Innovation	Funding organisation	✓	✓	✓	✓	✓		✓
Manus Stockdale, Vegetable WA	Research organisation	✓	✓	✓	✓	✓	✓	✓
Tim Groom, Tasmanian vegetable grower	Target beneficiary and levy contributor						✓	✓

Glossary of economic terms

Benefit-cost ratio (BCR)	The ratio of the present value of investment benefits to the present value of investment costs.
Cost-benefit analysis (CBA)	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.
Direct Effects	Impacts generated for the funding industry as a result of adoption of the RD&E outputs and recommendations, typically farm level outcomes relating to productivity and risk.
Discounting and Present Values	The process of relating the costs and benefits of an investment to a base year to reflect the time value of money or opportunity cost of RD&E investment. The analysis applies a real discount rate of 5% in line with CRRDC Guidelines (CRRDC 2018) with results sensitivity tested at discount rates of 2.5% and 7.5%.
Economic Equilibrium	Due to a market's underlying supply and demand curves, changes in supply will have an impact on price and vice-versa. The Economic Equilibrium is the point at which market supply and price are balanced. Estimating the magnitude of market response to changes in supply or demand is a complex and demanding task that is beyond the scope of most RDC Impact Assessments (CRRDC 2018).
Gross Margin (GM)	The difference between revenue and cost of goods sold, applied on a per hectare basis and excluding fixed or overhead costs such as labour and interest payments.
Internal rate of return (IRR)	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.
Modified internal rate of return (MIRR)	The internal rate of return of an investment that is modified so that the cash inflows generated from an investment are re-invested at the rate of the cost of capital (in this case the discount rate).
Natural experiment	Controlled experiments, or randomised experiments, which assign a "treatment group" and "control group" are not possible in macro-economic analysis (including international trade). Macroeconomics instead uses a natural experiment, where some exogenous event (such as a policy change or program implementation) in one group is compared to a different group that did not experience the exogenous event.
Net present value (NPV)	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.
Nominal and real values	Nominal values reflect the actual values in a given year (e.g. contracted RD&E expenses). These are converted to real (inflation adjusted) values to make them comparable across time.
Spillover Effects	Impacts generated for stakeholders who did not fund the RD&E, including other agricultural industries, consumers, communities, and the environment.

Abbreviations

CRRDC Council of Rural Research and Development Corporations.

HHI Herfindahl-Hirschman Index. A measurement of market concentration.

RD&E Research, Development and Extension.

SIP Strategic Investment Plan.

The vegetable industry / vegetables: All vegetables and mushrooms.

The vegetable levy industry / leviable vegetables: The subset of the vegetable industry that pays the vegetable R&D levy. This excludes onions, mushrooms, sweetpotatoes, asparagus, garlic, ginger, herbs (except fresh shallots and parsley) and tomatoes.

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Ends.