Horticulture impact assessment program 2020-21 to 2022-23 (MT21015)

Annex 7: Impact assessment of the project *National Tomato Potato Psyllid (TPP) Program Coordinator* (MT16018)

Delivery partner:

Ag Econ

Report author/s:

Matthew Revell

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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 *MT16018 National Tomato Potato Psyllid (TPP) Program Coordinator.* The project was funded by Hort Innovation over the period June 2017 to June 2021.

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 2020-21 dollar terms and were discounted to the year 2020-21 using a real (inflation-adjusted), risk free, pre-tax 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

The Hort Innovation investment in Project MT16018 enabled the employment of a full time National Tomato Potato Psyllid program coordinator for a period of 3 years to assist in managing this newly established pest to Australia. A key aspect of the roll was to enable a coordinated and strategically focused response to limit the impact of TPP as it had been agreed by industry and government that TPP was no longer able to be eradicated from the country and instead a transition to management program should be implemented.

As TPP was affecting many industries the National Coordinator role facilitate collaborations between researchers, industry groups, government, growers and service providers to aid in the development of national and industry management plans.

The impacts valued were:

- [Economic] Limiting trade restrictions in domestic supply chains to enable business continuity.

Not all of the identified impacts could be valued in the assessment, particularly where there was a lack of credible data. These additional economic, social and environmental impacts have the potential to provide additional industry impact above what has been identified.

Investment criteria

Total funding from all sources for the project was $1.01 million (2021 equivalent value). The investment produced estimated total expected benefits of $2.14 million (2021 equivalent value). This gave a net present value of $1.12 million, an estimated benefit-cost ratio of 2.11 to 1, an internal rate of return of 67% and a modified internal rate of return of 10%.

Conclusions

Project MT16018 was successful in delivering a range of activities which Improved overall management of TPP limiting its national spread and impact. One the of the primary outputs of the role was the development of a national TPP management strategy to aid the ongoing management of TPP in Western Australia. This would also be utilised nationally if the disease was to arrive in other states.

Sensitivity testing showed that changes in the underlying variables resulted in a BCR ranging from 1.06 to 3.17.

Keywords

Impact assessment, cost-benefit analysis, vegetable, seed potato, fresh potato, processing potato, Tomato Potato Psyllid, TPP

Introduction

Evaluating the impacts of levy investments is important to demonstrate to levy payers, Government and other industry stakeholders the economic, social and environmental outcomes of investment for industry, as well as being an important step to inform the ongoing investment agenda.

The importance of ex-post evaluation was recognised through the Horticulture Innovation Australia Limited (Hort Innovation) independent review of performance completed in 2017, and was incorporated into the Organisational Evaluation Framework.

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. The assessments were required to meet the following Hort Innovation evaluation reporting requirements:

- Reporting against the Hort Innovation's Strategic Plan and the Evaluation Framework associated with Hort Innovation's Statutory Funding Agreement with the Commonwealth Government.
- Reporting against strategic priorities set out in the Strategic Investment Plan for each Hort Innovation industry fund.
- Annual Reporting to Hort Innovation stakeholders.
- Reporting to the Council of Rural Research and Development Corporations (CRRDC).

As part of its commitment to meeting these reporting requirements, Ag Econ was commissioned to deliver the *Horticulture Impact Assessment Program 2020-21 to 2022-23 (MT21015)*. This program consisted of an annual impact assessment of 15 randomly selected Hort Innovation RD&E investments (projects) each year.

Project *MT16018 National Tomato Potato Psyllid (TPP) Program Coordinator* was randomly selected as one of the 15 investments in the 2020-21 sample. This report presents the analysis and findings of the project impact assessment.

General method

The 2020-21 population was defined as an RD&E investment where a final deliverable had been submitted in the 2020-21 financial year. This generated an initial population of 175 Hort Innovation investments, worth an estimated $101.14 million (nominal Hort Innovation investment). The population was then stratified according to the Hort Innovation RD&E research portfolios and five, pre-defined project size classes. Projects in the Frontiers Fund, and those of less than $80,000 Hort Innovation investment being removed from the sample. From the remaining eligible population of 59 projects, with a combined value of $39.51 million, a random sample of 15 projects was selected worth a total of $9.7 million (nominal Hort Innovation investment), equal to 25% of the eligible RD&E population (in nominal terms).

The impact assessment followed 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 included both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved reviewing project contracts, milestones, and other documents; interviewing relevant Hort Innovation staff, project delivery partners, and growers and other industry stakeholders where appropriate; and collating additional industry and economic data where necessary. Through this process, the project activities, outputs, outcomes, and impacts were identified and briefly described; and the principal economic, environmental, and social impacts were summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were 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 and rationale

Industry background

The Australian vegetable industry had a gross value of production of around $4.9 billion in 2020-21, roughly in line with its 9 year average value of $4.6 billion. This represented approximately 33% of the total value of Australian horticultural production (Hort Innovation 2022a).

Australia's vegetable growers produce a wide range of vegetable crops on a commercial scale to meet market demands. Over 90 per cent of all fresh vegetables sold in Australian supermarkets are grown in Australia, with the few imports covering vegetables with production windows that are restricted to small growing seasons, like asparagus and garlic (Hort Innovation 2022a).

Potatoes are the largest vegetable commodity grown in Australia by volume, with over 1.4 million tonnes of potatoes grown for human consumption and processing in 2020-21. The next-largest crops were tomatoes (around 472,000 tonnes) and carrots (around 335,000 tonnes). Potatoes are also the most valuable crop grown in Australia as measured by value of production, with a value of around $807 million in 2020-21 (Hort Innovation 2022a).

Producers in the fresh potato, processing potato and vegetable industries pay levies to the Department of Agriculture, Fisheries and Forestry (DAFF), who is responsible for the collection, administration and disbursement of levies and charges on behalf of Australian agricultural industries. Levy is payable on produce that are produced in Australia and either sold by the producer or used by the producer in the production of other goods. Hort Innovation manages the fresh potato, processing potato and vegetable levy funds which are directed to R&D.

Rationale

Project MT16018 was developed in recognition of the extensive impact that the 2017 detection of TPP in Western Australia was having on the potato and vegetable industries. TPP was listed as one of the top 40 exotic pests of concern for Australia, particularly as it is the only known vector for *Candidatus* Liberibacter solanacearum (CLso), although it was found that CLso wasn't present in the Australian TPP population which is a unique situation compared to the rest of the world.

Alignment with the Potato Processing, Potato Grower and Vegetable Strategic Investment Plans 2017-2021

With a focus on reducing the impact and spread of TPP throughout the Australian vegetable industries the project's outcomes were aligned with the:

- Vegetable Industry Strategic Investment Plan Outcome 3: Improved farm productivity, pests and diseases, Biosecurity
- Potato-processing Strategic Investment Plan Outcome 3: Quality – Losses from pest and disease are reduced, resulting in improved quality and increased marketable yield
- Potato Grower Strategic Investment Plan Outcome 3, Strategy 4.3: Establish an appropriate prioritised regional extension program to address pest and disease challenges/ threats.

Alignment with national priorities

The Australian Government's National RD&E priorities (2015a) and Science and Research Priorities (2015b) are reproduced in Table 1. The project outcomes and related impacts will contribute to RD&E Priority 2 & 4, and to Science and Research Priority 1.

Table 1. National Agricultural Innovation Priorities and Science and Research Priorities

Australian Government	
National RD&E Priorities (2015a)	**Science and Research Priorities (2015b)**
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.

Project details

Summary

Table 2. Project details

Project code	MT16018
Title	*National Tomato Potato Psyllid (TPP) Program Coordinator*
Research organization	AUSVEG Ltd
Project leader	Alan Nankivell
Funding period	June 2017 to June 2021

Logical framework

A logical framework is shown in Table 3 to highlight the connection between the project activities, outputs, outcomes, and impact.

Table 3. Project logical framework

Activities	• Establishment of a steering committee to guide the work of MT16018. • Appointment of the Program Coordinator. • The coordinator role provided a central point for all matters concerning TPP • Targeted surveillance for TPP and monitoring of the TPP situation nationally. • Guiding a collaborated approach to research and investment to improve understanding of TPP, its biology and options for control. • Monitoring of the latest research and surveillance data • Ensuring that investments were directed to where research and development was required. • Ensuring that industry was informed about the distribution and impact of TPP, progress of research and development, and best practices. • An important aspect for Western Australia was to re-establish trade with the other jurisdictions. This required high level negotiation to identify the other jurisdictions expectations and what processes (monitoring and testing) were required to build confidence, so that trade could be resumed. • The project worked extensively with stakeholders across the potato, vegetable, and processing tomato industries. Within the potato industry, the project worked with all sectors of the supply chain – seed, warehousing and processing from tissue culture, seed, tuber production and product to consumers. Importantly, government biosecurity agencies were an important stakeholder, especially regarding the economic impact of restricting the movement of product across state borders.
Outputs	• Tools were developed to detect TPP (monitoring) and, if detected, the tools and knowledge to manage the ongoing presence of TPP. • National and enterprise management plans were developed.

	• Results were compiled in a series of factsheets available to industry online. • 22 grower meetings with a total of 455 growers attending, nine presentations at industry meetings and conferences of which approximately 400 participants attended • Three workshops conducted with industry and Plant Health Committee members specifically on the movement of potato tubers. • Information resources were produced and a TPP Portal was established where all resources are available. • A TPP article was published in each issue of Potatoes Australia and Vegetables Australia for the life of the project. • Industry Communique from Plant Health Committee to the potato industry regarding the movement of potato tubers.
Outcomes	• Increased knowledge and resources relating to TPP and CLso amongst all key stakeholder groups including for detection and management in the case of an incursion. • Increased coordination of TPP and CLso R&D plans across industries.
Impacts	• [Economic] Improved overall management of TPP, reducing the risk of national spread and impact. • [Economic] Reduced risk of trade restrictions in domestic supply chains, enabling business continuity. • [Social] Coordinated Research and Development reducing duplication and improving research deliverables across industries. • [Social] Avoided shocks to the supply of fresh and affordable domestic vegetable and potato produce, supporting consumption with associated health and wellbeing benefits. • [Social] Avoided loss of industry spillovers from a disrupted potato and vegetable sector, supporting a sustainable and important source of employment and economic stimulant to local communities. • [Environmental] Improved understanding of IPM as a means to control TPP, reducing chemical use and associated environmental impacts. • [Economic and social and environmental] Longer-term improvement in industry TPP IPM research likely to benefit future levy-payers and stakeholders.

Project costs

Nominal investment

Table 4. Project nominal investment

Year end 30 June	Hort Innovation ($)	Other ($)	Total
2017	$128,452	$0	$128,452
2018	$96,339	$0	$96,339
2019	$244,059	$0	$244,059
2020	$115,270	$0	$115,270
2021	$176,030	$0	$176,030
Total	$760,150	$0	$760,150

Program management costs

R&D costs should also include the administrative and overhead costs associated with managing and supporting the project. The Hort Innovation overhead and administrative costs were calculated for each project funding year based on the data presented in the *Statement of Comprehensive Income* in the *Hort Innovation Annual Report* for the relevant year. Where the overhead and administrative costs were equal to the total expenses, less the research and development and marketing expenses. The overhead and administrative costs were then calculated as a proportion of combined project expenses (RD&E and marketing), averaging 15.7% for the MT16018 funding period (2018-2021). This figure was then applied to the nominal Hort Innovation investment shown in Table 4.

Real Investment costs

For purposes of the investment analysis, the investment costs of all parties were expressed in 2020-21 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2022).

Extension costs

There were no additional costs associated with MT16018 for project extension. Results were communicated to industry, growers and other stakeholders as part of the project.

Project 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.

The following impacts were valued.

- [Economic] Reduced risk of trade restrictions in domestic seed potato supply chains, enabling business continuity.

Valuation method

The impact valuation focussed on the potato industry and in particular seed potatoes. The experience in WA showed that a TPP incursion would completely shuts down interstate trade, and with seed potatoes being grown on a just-in-time basis, production would be significantly disrupted, with the industry experiencing large losses. While experiences in WA showed that most other vegetable industries were also affected by trade restrictions, discussion with industry found that supply and demand elasticities meant that most of this production was absorbed into the local market. As there was a lack of specific market data to quantify these effects they were excluded from the analysis.

Effective biosecurity risk management requires sustained investment to manage the long-term risk of an incursion. The impact of MT16018 was valued in the context of its contribution to this long-term risk management, and modelled as a reduced risk profile faced by the vegetable industry starting from the delivery of key outputs.

Risk is measured as a combination of probability and consequences. Having a TPP coordinator and updated national management plans in place reduces the likely period of trade disruption (consequences) in the event of a new incursion, thereby reducing the risk faced by the industry. After the project concluded there remained a residual benefit from the established plans. This residual benefit was assumed to decline with time reflecting the need to update the plans to remain current.

Impacts not valued

Not all of the impacts identified in Table 4 could be valued in the assessment, particularly where there was a lack of data to quantify the identified impact. Identified impacts unable to be valued in monetary terms included:

- [Economic] Reduced risk of trade restrictions for other vegetables in supply chains, enabling business continuity.
- [Economic] Improved overall management of TPP, reducing the risk of national spread and impact.
- [Social] Coordinated Research and Development reducing duplication and improving research deliverables across industries.
- [Social] Avoided shocks to the supply of fresh and affordable domestic vegetable and potato produce, supporting consumption with associated health and wellbeing benefits.
- [Social] Avoided loss of industry spillovers from a disrupted potato and vegetable sector, supporting a sustainable and important source of employment and economic stimulant to local communities
- [Environmental] Improved understanding of IPM as a means to control TPP, reducing chemical use and associated environmental impacts.
- [Economic and social] Longer-term improvement in industry TPP IPM research likely to benefit future levy-payers and stakeholders.

Public versus private impacts

The impacts identified from the investment are predominantly private impacts accruing to vegetable growers and supply chain participants. However, some public benefits also have been produced in the form of increased industry TPP research and coordination capacity and R&D focus, spillovers to regional communities from enhanced grower yield and income, and increased sustainability of vegetable production supporting consumption and a healthy diet.

Distribution of private impacts

This analysis quantified private benefits accruing to vegetable growers. Additional spillover private impacts would be generated in the wider economy. Changes in farm input costs (increase or decrease) would result in spillover changes (increase or decrease) in income for businesses providing those goods and services. The total private impacts will have been further redistributed between growers, processor, wholesalers, exporters, and retailers depending on both short- and long-term supply and demand elasticities.

Impacts on other Australian industries

TPP also has the potential to affect other industries outside of vegetables due to various plants being potential hosts to the pest. MT16018 included consultation with the nursery industry and others and as such the investment in MT16018 has the potential to generate additional benefits for various other industries.

Impacts overseas

No specific overseas impacts were identified, TPP is already present in many countries, but any new outbreaks could find learnings from Australia's handling of it.

Data and assumptions

A summary of the key assumptions made in the assessment is provided in Table 5.

Table 5. Summary of data and assumptions for impact valuation

Variable	Assumption	Source / comment
Discount rate	5% (± 50%)	CRRDC Guidelines (2018)
Annual production (t)	1,390,124 (± 3%)	The industry most effected is likely to be potato industry. Potato Production, 5 year average and standard deviation (Hort Innovation 2022a).
Farmgate price $/t	$566/t (± 4%)	Australian Horticulture Statistics Handbook (Hort Innovation 2022a), 5 year average 2017-2021 and standard deviation.
Yearly likelihood of Eastern States incursion	20%pa (± 10%)	A 20% annual incursion risk into another Australian state gives a cumulative probability of approximately 91% of arrival over 10 years.
Market effected by spread to Eastern States	23% (± 25%)	Analyst assumption of arrival of TPP in 1 of the 4 major producing states of NSW QLD Victoria and TAS which make up the majority of potato production in Australia South Australia (38%), Tasmania (24%) and Victoria (21%) New South Wales (8%).
TPP Induced trade losses from interstate market closure (without project)	15% (± 50%)	Assumption based on discussion with industry. WA's interstate trade shut down in 2017-18 saw potato's and particularly seed potatoes as a heavily effected industry. Seed potatoes make up 8% of the potato industry and can suffer full losses of interstate sales. A portion of seed and eating potatoes would be absorbed into the local market. It is estimated at 15% total potato marked losses from a closed interstate boarder.

Years saved on trade restrictions due to MT16018	0.33 (± 25%)	Refer further commentary below.
Avoided trade losses from markets remaining open (with project)	90% (± 10%)	There would likely still be some decrease from markets avoiding produce from infected areas as a precaution but WA has shown that normal trading conditions can return.
Attribution of outcome (reduced consequences) to MT16018	50% (± 50%)	Refer further commentary below.
R&D counterfactual	75% (± 50%)	There is a moderate likelihood that these outcomes would have been achieved from other industry participants or government bodies if MT16018 hadn't been funded.

Years saved on interstate trade restrictions & attribution of impacts to MT16018

Discussions with industry bodies (Ausveg and WA Potatoes) have led to an assumption of 4 months (O.33 years) in saved interstate border trade restrictions due to the work of MT16018. WA was closed for approximately 12 months from some vegetable trade with other states and border re-openings occurred on a state by state basis. Practices and learnings the WA trade restrictions being worked through meant that another outbreak in Australia would likely result in a shorter timeframe to interstate trade being re-established; however, it is the National Management Plan and work completed by the TPP National coordinator on top of this that would likely have a large contribution to reducing border restrictions in the event of an outbreak in another state.

The attribution of the impacts to MT16018 has been assessed at 50% and sensitised at ± 50%. This attribution accounts for the fact that while the National facilitator is considered to be the main driving factor behind the TPP national management plan there were many industry bodies, government agencies and individuals involved in the process with outcomes partly attributed to each of these areas. Attribution of 50% is from the year 2019 when the national management plan was first input and is assessed as reducing by 20% each year after 2021 when the MT16018 national coordinator role finished, reflecting the need for continuous updating to the plan as years progress.

Results

Investment criteria:

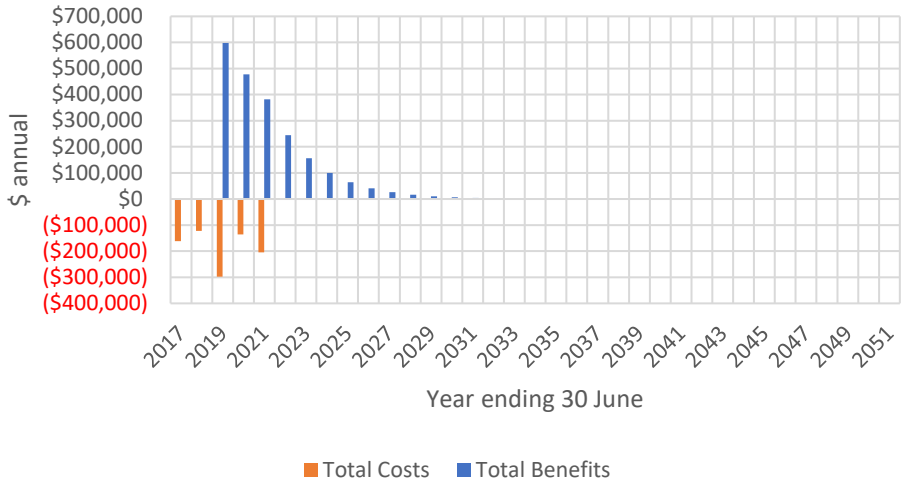
Table 6 shows the impact metrics estimated for different periods of benefit for the total investment. Hort Innovation was the only investor in MT16018.

Table 6. Impact metrics for total Investment in project MT16018

Impact metric	Years after last year of investment						
	-	5	10	15	20	25	30
PVC ($m)	1.01	1.01	1.01	1.01	1.01	1.01	1.01
PVB ($m)	1.54	2.09	2.14	2.14	2.14	2.14	2.14
NPV ($m)	0.53	1.08	1.12	1.12	1.12	1.12	1.12
BCR	1.52	2.06	2.11	2.11	2.11	2.11	2.11
IRR	57%	67%	67%	67%	67%	67%	67%
MIRR	33%	23%	17%	13%	12%	10%	10%

Figure 1 shows the annual undiscounted benefit and cost cash flows for the total investment of MT16018. Cash flows are shown for the duration of the investment plus 30 years from the last year of investment.

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



Sensitivity analysis

A sensitivity analysis was carried out on key variables identified in the analysis where a data range was identified, or there was a level of uncertainty around the data (Table 7). Data ranges and sources are further described in Table 5, where a range was not identified in available data sources, sensitivity was tested at plus and minus 50% of the baseline value.

Table 7. Impact BCR sensitivity to changes in key underlying variables

Variable		Low	Baseline	High
Discount rate	Variable range	2.5%	5.0%	7.5%
	BCR range	2.21	2.11	2.02
Annual production (t)	Variable range	1,348,420	1,390,124	1,431,828
	BCR range	2.05	2.11	2.17
Potato price ($/t)	Variable range	$543	$566	$588
	BCR range	2.03	2.11	2.19
Yearly likelihood of Eastern States incursion	Variable range	15%	20%	25%
	BCR range	1.78	2.11	2.36
Industry Losses (% of Production)	Variable range	7.5%	15.0%	22.5%
	BCR range	1.06	2.11	3.17
Market effected by spread to Eastern States	Variable range	17.1%	22.8%	28.4%
	BCR range	1.58	2.11	2.63
Reduced Losses due to Markets remaining opened	Variable range	81%	90%	99%
	BCR range	1.90	2.11	2.32
Years saved on trade restrictions due to MT16018	Variable range	0.25	0.33	0.41
	BCR range	1.60	2.11	2.62
Attribution of outcomes (reduced consequences) to MT16018	Variable range	40%	50%	60%
	BCR range	1.69	2.11	2.53
R&D counterfactual	Variable range	60%	75.00%	90%
	BCR range	1.69	2.11	2.53

Discussion & Conclusion

The National Coordinator role was put in place to reduce double handling and an inefficient use of resources between industries as it ensured that important initiatives were not being repeated by several organisations and aided in directing investments to where R&D was most needed for effective management of TPP. The coordinator role covered a vast range of activities but one the of the primary outputs of the role is seen to be the development of a national TPP management

strategy which is aiding in the ongoing management of TPP in Western Australia and would be utilised nationally if the pest was to arrive in other states.

The analysis shows that the quantified benefits were marginally higher than the investment cost for MT16018, with a BCR 2.11. The results reflect the benefits of limiting trade restrictions in supply chains to enable business continuity in the event of further TPP outbreaks.

There were several impacts identified but not quantified which had the potential to provide additional value to the investment in MT16018 and the vegetable industry that it was aimed at. The decision not to value these impacts was due to a shortage of necessary data, which means that the investment criteria reported MT16018 potentially represents an underestimate of the performance of that investment.

Sensitivity testing showed that changes in the underlying variables resulted in a BCR ranging from 1.06 to 3.17. The sensitivity analysis showed that the results were most sensitive to the tested changes in the potential industry Losses from market closure (% of production) and the percentage of market effected by a spread to Eastern States. While a TPP outbreak has the potential to shut down interstate trade, the analysis assumed an incursion into a single producing state, limiting the impact to 23% of production/trade.

The CRRDC Guidelines focusses on first round impacts, which calculates shifts in the supply and demand curves with no price impact. In reality, RD&E that focusses on reducing TPP risk relating to domestic trade restrictions would avoid vegetable supply shocks in local markets, which would put upward or downward pressure on prices depending on the level of local production relative to local demand. The change in prices would effectively shift some of the benefit from producers to consumers. The extent to which this would occur would also depend on the slope of the supply and demand curves.

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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.
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.

Abbreviations

CRRDC Council of Rural Research and Development Corporations

DAFF Department of Agriculture, Fisheries and Forestry (Australian Government)

GDP Gross Domestic Product

GVP Gross Value of Production

IRR Internal Rate of Return

MIRR Modified Internal Rate of Return

PVB Present Value of Benefits

PVC Present Value of Costs

RD&E Research, Development and Extension

SIP Strategic Investment Plan