Hort Innovation

Final Report

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Impact assessment report for project *Mango industry communication program 2016-2017* (MG15006)

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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 *MG15006: Mango Industry Communication Program 2016-2017.* The project was funded by Hort Innovation over the period February 2016 to May 2018.

Methodology

The investment was first analysed qualitatively within a logical framework that included activities and outputs, outcomes, and impacts. Actual and/or potential impacts then were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation in monetary terms (quantitative assessment). Past and future cash flows were expressed in 2020/21 dollar terms and were discounted to the year 2020/21 using a discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

Results/key findings

Investment in MG15006 has communicated research, marketing, market access and biosecurity information to Australian mango growers and other stakeholders in the industry. Communication channels used have included quarterly, monthly, and weekly updates, provision of information on the AMIA website, webinars, workshops, and videos, as well as production and marketing guides.

Investment Criteria

Total funding from all sources for the project (in the case all funds were sourced from Hort Innovation) was $0.75 million (present value terms). The investment produced estimated total expected benefits of $1.46 million (present value terms). This gave a net present value of $0.75 million, an estimated benefit-cost ratio of 2 to 1, an internal rate of return of 13.4% and a modified internal rate of return of 7.3%.

Conclusions

The Hort Innovation investment in Project MG15006 has delivered useful information to mango growers and a share of these growers have been assumed to adopt cost saving and profit generating measures in response to the information provided. As four social impacts identified were not valued, the investment criteria estimated by the evaluation may be underestimates of the actual performance of the investment.

Keywords

Impact assessment, cost-benefit analysis, mangoes, communication, magazine, newsletter, best practice guides, webinars, videos.

Introduction

All research, development, and extension (RD&E) and marketing levy investments undertaken by Horticulture Innovation Australia Limited (Hort Innovation) are guided and aligned to specific investment outcomes, defined through a Strategic Investment Plan (SIP). The SIP guides investment of the levy to achieve each industry's vision. The relevant industry SIPs apply for the financial years 2016/17 – 2020/21.

In accordance with the Organisational Evaluation Framework, Hort innovation has the obligation to evaluate the performance of its investment undertaken on behalf of industry.

This impact assessment program addresses this requirement through conducting a series of industry-specific ex-post independent impact assessments of the berry (RB + BS), mango (MG), turf (TU) and nursery (NY) RD&E investment funds.

Fourteen RD&E investments (projects) were selected through a stratified, random sampling process. The industry samples were as follows:

- Four RB + BS projects were chosen worth $1.44 million (nominal Hort Innovation investment) from an overall population of 16 projects worth an estimated $8.59 million,
- Three MG projects worth $1.77 million (nominal Hort Innovation investment) from an overall population of 16 projects worth approximately $7.9 million,
- Four TU projects worth $0.66 million (nominal Hort Innovation investment) from a total population of 15 projects worth $4.81 million, and
- Three NY projects worth $0.96 million (nominal Hort Innovation investment) from an overall population of 19 projects worth $7.32 million.

The project population for each industry included projects where a final deliverable had been submitted in the five-year period from 1 July 2015 to 30 June 2020.

The projects for each industry sample were chosen such that the investments represented (1) at least 10% of the total Hort Innovation RD&E investment expenditure for each industry, and (2) the SIP outcomes (proportionally) for each industry where possible given the small sample sizes.

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 mango industry has a five-year average production volume of 70,706 tonnes and a Farmgate Value of $188.9 million – Table 1.

Table 1: Mango Industry Performance 2016-2020

Year Ended 30 June	Producing Trees (000 trees)	Production (t)	Gross Value of Production ($m)	Farmgate Value ($m)
2016	1,217	61,800	210.3	199.8
2017	1,178	61,474	195.7	185.9
2018	1,262	83,314	204.3	194.1
2019	N/a	74,920	198.6	188.7
2020	N/a	72,022	185.2	175.9
Average	N/a	70,706	198.8	188.9

Source: Australian Horticulture Statistics Handbook 2017/18, 2018/19 and 2019/20.

Mangoes are a tropical fruit crop grown in the Northern Territory (NT) (51% of production), Queensland (QLD) (45%), Western Australia (WA) (3%) and New South Wales (NSW) (1%). Australian mango production is dominated by four main varieties – Kensington Pride, Calypso, R2E2, and Honey Gold. Other mangoes, such as Keitt, Tommy Atkins, Palmer, and Nam Dok Mai make a minor contribution to total production (Australian Horticulture Statistics Handbook 2019/20).

Mango research and development (R&D) activity is guided by the Mango industry's Strategic Investment Plan (SIP). The activities are funded by levies payable on mangoes produced in Australia; and the R&D levy funds are managed by Hort Innovation.

The recently completed SIP has been driven by levy payers and addressed the Australian mango industry's needs from 2017 to 2021. The SIP focussed on four outcome areas:

- Increased industry productivity through increased yields and reduced costs per hectare.
- Increased grower profitability through increased consumer demand for Australian mangoes.
- Increased R&D and extension capacity and resources supporting industry development.
- Improved industry sustainability and management of risks.

The Australian Mango Industry Association (AMIA) is the industry's peak body. Its aim is to encourage the growth and development of the industry. It is a 'not for profit' organisation. AMIA's members include mango growers, associated businesses and industry people. AMIA has an established history of delivering research, development, and extension (RD&E) messages on behalf of Hort Innovation's Mango Fund as well as communication messages for industry.

Rationale

Prior to this project (MG15006), communication activities were included in project *MG13017: Capacity Building in the Australian Mango Industry*. During 2015, an independent mid-term review of MG13017 was conducted to assess and measure industry adoption and what impact the project was having on different industry sectors. The review also looked at the extension component of the project and assessed its value.

The review had multiple recommendations, those concerned with the communication component of the project were that extension activities were difficult to distinguish from those of communication. Therefore, it was decided to separate the communication component from the industry development activities within MG 13017. This project (MG15006) is primarily concerned with industry communication.

As the Australian mango industry is geographically and demographically diverse, it was important to deliver communication using a variety of methods to ensure communication reach was maximised. To deliver communication messages effectively some information was delivered in multiple formats, so that the target audience could access information from a range of sources.

MG15006 Mango Industry Communication Program 2016-2017 commenced in February 2016 and was due to finish in December 2017, however the project was extended by Hort Innovation until May 2018. The project supported the Mango SIP by facilitating, maintaining, and improving access to information. Other projects completed during this period that also contributed to mango communication included MG13017, *MG15003: Data Collection to Facilitate Supply China Transparency – Stage 3*; and *MG16001: the 11th Australian Mango Conference*.

Project Details

Summary

Project Code: MG15006
Title: Mango industry communication program 2016-2017
Research Organisation: Australian Mango Industry Association (AMIA)
Project Leader: Trevor Dunmall and Jessica Mitchell
Period of Funding: February 2016 to May 2018

Objectives

To maintain and improve communication to all mango industry stakeholders. Key industry stakeholders (the target audience) include growers (levy payers), retailers, wholesalers, industry organisations, researchers, industry media and federal and state government departments. Communication was to focus on ensuring stakeholders understand the:

- Industry's programs
- Factors that impact productivity and quality
- Supply chain management practices and how they can be applied
- How information can be accessed.

Logical Framework

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

Table 2: Logical Framework for Project MG15006

Activities	February 2016 to June 2016 project activities included: • Autumn edition of quarterly magazine Mango Matters published and distributed. Winter edition in design phase with printing and distribution in July 2016. Approximately 850 copies of Mango Matters were distributed by post and 920 by web/email. • The Slice - monthly editions published in April and May. The Slice is published monthly outside the industry's production period. It was distributed to 920 people and included information on industry meetings and events. • My Mango Weekly - editions published 1 February to 29 February 2016. Mango Weekly is only published during the season. It includes mango crop forecasts (timing and volume), crop flow (weekly dispatches by region), objective reporting for the week and topical issues. • Maintenance of the AMIA website and communications database. Key indicators of website use were upward trending for the period February to June 2016. • Mango Industry Development Manager attended workshops on the Magpie Geese Project and the Agvet Chemical Workshop. • No webinars hosted during the reporting period.

	July 2016 to December 2016 project activities included: • Mango Matters – two editions prepared and published. • The Slice – monthly editions prepared and distributed. • My Mango – weekly editions delivered from 16 August 2016 on a Tuesday. • The website and database have been maintained. Key indicators of website use were upward trending for the period July to December 2016. • Pre-season workshops delivered in production regions with a total of 224 attendees. • Crop monitoring workshops delivered in production regions – total 69 attendees. • Spray calibration and application workshops held in QLD in July 2016 with a total of 49 attendees (private sector completed workshops in the NT). Two DVDs and a best practice guide for sprayer calibration and spray application prepared and distributed. • Three grower guides developed and distributed: 1) Understanding Crop Nutrition, 2) Export Market Requirements, and 3) Using the Felix F-750 Produce Quality Meter. • Distribution of the updated Grower/Exporter Guide for Exporting Mangoes to the USA. • No webinars hosted during the reporting period. • Two videos prepared and distributed 1) Orchard sprayer calibration and application, 2) Orchard sprayer application and the use of surfactants. • Online training in crop monitoring – Developed with DAWE and Tocal Agricultural College and targeting mango exports to China, Korea, and the USA. • Production and distribution of a new Mango Grade Standards and Defect poster. • Update of Grower/Exporter Guide for Exporting Mangoes to the USA (in partnership with DPI&F NT and project MG15004). January 2017 to June 2017 project activities included: • Mango Matters – two editions prepared and published. • The Slice – monthly editions prepared and distributed. • My Mango – weekly editions delivered from January through to 28 March 2017. • The website and database were maintained. Again- positive growth in use KPIs. • 11th AMIA Mango Conference held in Bowen, QLD, May 2017. • Pre-season workshops planned for the period August to October 2017. • Webinars presented included 1) Changes in QA programs, 2) Preparing to export to markets with specific phytosanitary requirements, 3) post-harvest dips and heated spray tunnels for managing post-harvest diseases. • Videos 1) Development of new technology/robotics in the orchard (Jesse Reader), 2) Managing magpie geese (Amelie Corriveau), Mango marketing and growing demand (Elisa King, Treena Welsh and Robert Gray). • Survey on the appropriateness of current mango industry communication activities. July 2017 to May 2018 project activities included: • Mango Matters – three editions prepared and published. • The Slice – monthly editions prepared and distributed. • My Mango – weekly editions delivered. • The website and database were maintained. • Pre-season workshops delivered between August to October 2017.
Outputs	• The publication of regular communications material addressing R&D, marketing, market access and biosecurity. • Regular updates of the industry website. • Production/delivery of best practice guides, webinars, training workshops and videos. • A final project report accepted by Hort Innovation in 2018.
Outcomes	• Efficiently and effectively managed mango industry communication activities. • Improved access to R&D, marketing, market access and biosecurity information. • Growers better informed about measures to improve industry sustainability. • Growers better informed about market access requirements and opportunities. • Growers better informed about innovations that lower production costs.

Impacts	• Lower costs of production for mango growers as a result of increased awareness and adoption of research, marketing, market access, and biosecurity information. • Additional profitable mango sales with increased awareness and realisation of new market opportunities. • A more sustainable and cohesive industry. • Additional AMIA and other provider skills in industry communication. • Additional grower skills across mango production, marketing and biosecurity. • Contribution to improved regional community wellbeing from spill-over income and employment benefits as a result of a more profitable and sustainable mango industry.

Project Investment

Nominal Investment

Table 3 shows the annual investment made in Project MG15006 by Hort Innovation and others. There were no other investors in the project.

Table 3: Annual Investment in Project MG15006 (nominal $)

Year ended 30 June	HORT INNOVATION ($)	OTHERS ($)	TOTAL ($)
2016	241,421	0	241,421
2017	160,947	0	160,947
2018	83,440	0	83,440
Total	**485,808**	**0**	**485,808**

Source: Hort Innovation Executed variation agreement 15 March 2018.

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, the investment costs of all parties were expressed in 2020/21 dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2021). No additional costs of extension were included; the project focussed on information delivery activities.

Impacts

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

Table 4: Triple Bottom Line Categories of Principal Impacts from Project MG15006

Economic	• Lower costs of production for mango growers as a result of increased awareness and adoption of research, marketing, market access and biosecurity information. • Additional profitable mango sales with increased awareness and realisation of new market opportunities.
Environmental	• Nil

Social	• A more sustainable and cohesive industry. • Additional AMIA and other provider skills in industry communication. • Additional grower skills across mango production, marketing, and biosecurity. • Contribution to improved regional community wellbeing from spill-over income and employment benefits as a result of a more profitable and sustainable mango industry.

Public versus Private Impacts

The impacts identified from the investment are both private and public in nature. Private impacts accrue to mango growers (production cost savings, additional profitable sales) and the broader industry (a more sustainable and cohesive industry). Public impacts include additional communication, production, and marketing skills as well as potential spill-overs to regional communities from enhanced mango grower profit and sustainability.

Distribution of Private Impacts

Private impacts will be distributed between growers, packers, transporters, wholesalers, retailers, and exporters depending on both short- and long-term supply and demand elasticities in the mango market.

Impacts on Other Australian Industries

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

Impacts Overseas

Impacts overseas are unlikely. While some of the knowledge communicated may have relevance to overseas mango industries, most of the material was specifically targeted to the Australian mango industry.

Match with National Priorities

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

Table 5: Australian Government Research Priorities

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

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

Alignment with the Mango Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the mango industry are outlined in the Mango Industry's Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2017). Project MG15006 addressed outcome three ('increased R&D and extension capacity and resources supporting industry development').

Valuation of Impacts

Impacts Valued

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

Two impacts were valued:

- Lower costs of production for mango growers as a result of increased awareness and adoption of research, marketing, market access and biosecurity information.
- Additional profitable mango sales with increased awareness and realisation of new market opportunities.

Impacts Not Valued

Not all of the impacts identified in Table 4 could be valued in the assessment. Those not valued included:

- A more sustainable and cohesive industry.
- Additional AMIA and other provider skills in industry communication.
- Additional grower skills across mango production, marketing, and biosecurity.
- Contribution to improved regional community wellbeing from spill-over income and employment benefits as a result of a more profitable and sustainable mango industry.

These impacts were not valued due to lack of data to support credible assumptions.

Summary of Assumptions

A summary of the key assumptions made for valuation of progress toward lower production costs and additional profitable mango sales is provided in Table 6.

Table 6: Summary of Assumptions for Impact Valuation

Variable	Assumption	Source/Comment
Impact 1: lower costs of production for mango growers with information awareness and adoption		
Average cost of production without MG15006.	$20/tray.	AgEconPlus 2019 prepared in consultation with Trevor Dunmall, long serving IDM at AMIA.
Saving in cost of production due to MG15006.	0.5%.	A total saving of 2% is estimated by the analyst. However, 1.5% of this gain is attributable to the research rather than its communication via MG15006.
Impact 2: Additional profitable sales with increased awareness and realisation of new market opportunities		
Profit on mango production at farmgate.	$2.50/tray.	AgEconPlus 2019 prepared in consultation with Trevor Dunmall,

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

		long serving IDM at AMIA.
Increase in profit due to realisation of new market opportunities associated with MG15006 communication activities.	1%.	Analyst assumption.
Assumptions common to valuation of both impacts		
Annual production of mangoes.	10,100,857 trays.	Based on 5-year average Australian production of 70,706 tonnes (see Table 1), and an average of 7kg/tray.
Proportion of production achieving cost reduction and profit increase.	75%	Equivalent to 600 growers in an industry with 800 growers (Mango Industry SIP 2017-2021). Estimate made knowing that communication materials such as Mango Matters, and The Slice are distributed to between 850 and 920 separate addresses.
Year of first impact.	2017/18	One year before MG15006 completed – some adoption taking place throughout the project e.g., use of market insights to plan mango sales.
Number of years to maximum impact is reached.	5 years.	Analyst assumption.
Number of years of maximum impact.	10 years.	Analyst assumption.
Number of years over which impact declines to zero.	5 years.	Analyst assumption.
Attribution of impacts to this project.	50%	AgEconPlus assumption that allows for complementary work including MG13017, MG15003, and MG16001.
Probability of the project generating useful outputs.	100%	AMIA has delivered communication plan commitments.
Probability of valuable outcomes.	80%	Practice change on farm subject to multiple conditions including management capacity and availability of capital.
Probability of impact (assuming successful outcome)	80%	Reduced costs and increased profits are subject to market conditions.
Counterfactual.	50%	In the absence of MG15006 research, it is 50% likely that results would have been generated by another activity.

Results

All costs and benefits were discounted to 2020/21 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 (2017/18) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

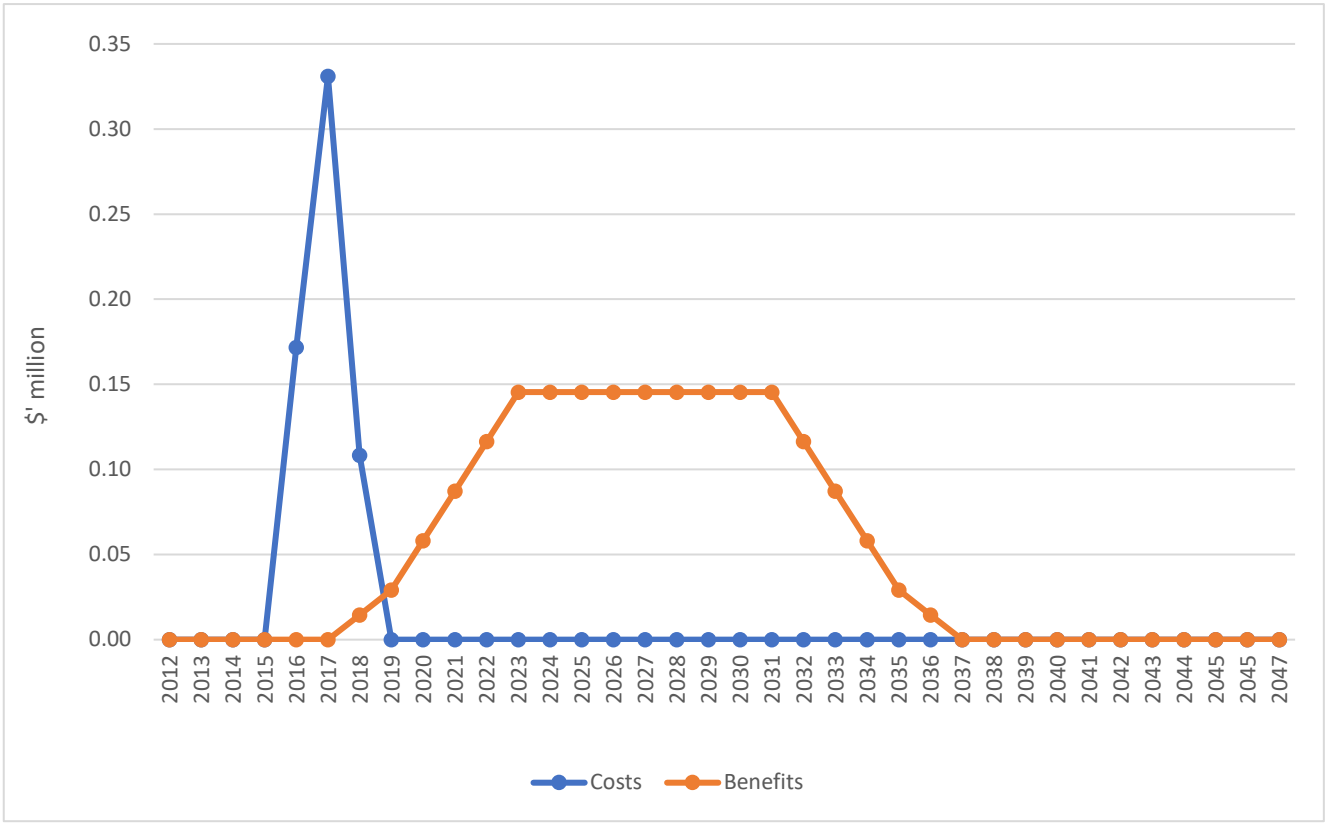
Table 7 shows the investment criteria estimated for different periods of benefits for the total investment. Hort Innovation was the only investor in the project.

Table 7: Investment Criteria for Total Investment in Project MG15006

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Benefits ($m)	0.02	0.44	1.01	1.41	1.46	1.46	1.46
Present Value of Costs ($m)	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Net Present Value ($m)	-0.73	-0.31	0.26	0.66	0.72	0.72	0.72
Benefit-Cost Ratio	0.02	0.59	1.35	1.89	1.96	1.96	1.96
Internal Rate of Return (%)	negative	negative	9.7	13.2	13.4	13.4	13.4
MIRR (%)	negative	negative	7.7	9.1	8.3	7.7	7.3

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the MG15006 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



Source of Benefits

Estimates of the relative contribution of each benefit values, given the assumptions made, are shown in Table 8.

Table 8: Contribution to Total Benefits from Each Source

	Contribution to PVB ($m)	Share of benefits (%)
lower costs of production for mango growers with information awareness and adoption.	1.22	83.3
Additional profitable sales with increased awareness and realisation of new market opportunities.	0.24	16.7
Total	1.46	100.0

Sensitivity Analyses

A sensitivity analysis was carried out on the discount rate. The analysis was performed for the total investment and with benefits taken over the life of the investment plus 30 years from the last year of investment. All other parameters were held at their base values. Table 9 presents the results. The results are moderately sensitive to the discount rate.

Table 9: Sensitivity to Discount Rate (Total investment, 30 years)

Investment Criteria	Discount rate		
	0%	5% (base)	10%
Present Value of Benefits ($m)	1.92	1.46	1.17
Present Value of Costs ($m)	0.61	0.75	0.91
Net Present Value ($m)	1.31	0.72	0.26
Benefit-cost ratio	3.14	1.96	1.29

A sensitivity analysis was then undertaken on the assumed share of mango production adopting research, marketing, market access and biosecurity information. Results are provided in Table 10. The table shows that if only 40% of production adopts information communicated via MG15006, then the project will 'breakeven'.

Table 10: Sensitivity to Share of Mango Production Adopting Findings (Total investment, 30 years)

Investment Criteria	Share of Mango Production Adopting Communication Information Found Generate by MG15006		
	40%	50%	75% (base)
Present Value of Benefits ($m)	0.78	0.97	1.46
Present Value of Costs ($m)	0.75	0.75	0.75
Net Present Value ($m)	0.03	0.23	0.72
Benefit-cost ratio	1.04	1.31	1.96

A final sensitivity analysis tested the probability of reduced production cost and increased profitable mango sales with adoption of material communicated through MG15006. The results (Table 11) show that the probability of impact would need to fall to 40% before the project would 'breakeven'.

Table 11: Sensitivity to Probability of Material Communicated via MG15006 Impacting Mango Grower Business (Total investment, 30 years)

Investment Criteria	Probability of Communicated Material Impacting Production Cost and Profitable Sales		
	40%	60%	80% (base)
Present Value of Benefits ($m)	0.73	1.10	1.46
Present Value of Costs ($m)	0.75	0.75	0.75
Net Present Value ($m)	-0.02	0.35	0.72
Benefit-cost ratio	0.98	1.47	1.96

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 12). 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 12: Confidence in Analysis of Project

Coverage of Benefits	Confidence in Assumptions
High	Medium-Low

Coverage of benefits valued was assessed as High – two key economic impacts were valued. Confidence in assumptions was rated as Medium-Low – a number of key assumptions were made by the analyst.

Conclusion

Investment in MG15006 has communicated research, marketing, market access and biosecurity information to Australian mango growers and other stakeholders in the industry. Communication channels used have included quarterly, monthly, and weekly updates, provision of information on the AMIA website, webinars, workshops, and videos, as well as production and marketing guides.

Total funding from all sources for the project was $0.75 million (present value terms). The investment produced estimated total expected benefits of $1.46 million (present value terms). This gave a net present value of $0.75 million, an estimated benefit-cost ratio of 2 to 1, an internal rate of return of 13.4% and a modified internal rate of return of 7.3%.

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

Glossary of Economic Terms

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

Reference List

AgEconPlus (2019) Profitability Analysis of Northern Australian Kensington Pride Production. Prepared for PHA Tropical Plant Industries Biosecurity Strategy.

Australian Bureau of Statistics. (2021, June 02). *Australian National Accounts: National Income, Expenditure and Product. Quarterly estimates of key economic flows in Australia, including gross domestic product (GDP), consumption, investment, income and saving*. Table 5. Expenditure on Gross Domestic Product (GDP), Implicit price deflators. Retrieved from Australian Bureau of Statistics: https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release#data-download

Council of Rural Research and Development Corporations. (2018). Cross-RDC Impact Assessment Program: Guidelines. Canberra: Council of Rural Research and Development Corporations. Retrieved from http://www.ruralrdc.com.au/wp-content/uploads/2018/08/201804_RDC-IA-Guidelines-V.2.pdf

Department of Agriculture and Water Resources (DAWR). (2015). Agricultural Competitiveness White Paper. Canberra: Commonwealth of Australia. Retrieved from http://agwhitepaper.agriculture.gov.au/SiteCollectionDocuments/ag-competitiveness-white-paper.pdf

Hort Innovation (2017) Mango Strategic Investment Plan - 2017-2021. Retrieved from https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/strategic-investment-plans/

Hort Innovation (2019) Horticulture Statistics Handbook 2019/20. Retrieved from https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/australian-horticulture-statistics-handbook/

Office of the Chief Scientist (OCS). (2015). Strategic Science and Research Priorities. Canberra: Commonwealth of Australia. Retrieved from http://www.chiefscientist.gov.au/wp-content/uploads/STRATEGIC-SCIENCE-AND-RESEARCH-PRIORITIES_181214web.pdf

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Abbreviations

AMIA	Australian Mango Industry Association
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
IDM	Industry Development Manager
IRR	Internal Rate of Return
MIRR	Modified Internal Rate of Return
NT	Northern Territory
OCS	Office of Chief Scientist Queensland
PVB	Present Value of Benefits
R&D	Research and Development
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan