

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

Annex 10: Impact assessment of the project *Australian papaya industry communication program* (PP16001)

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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 *Australian Papaya Industry Communication Program (PP16001)*. The project was funded by Hort Innovation over the period August 2017 to August 2020.

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.

Results/key findings

The Hort Innovation investment in Project PP16001 delivered a bi-annual industry newsletter Papaya Press, and developed and maintained the *For Growers* page on the Papaya Australia website. From these outputs, PP16001 was assessed to have supported a range of potential impacts.

- [Economic] Earlier adoption of levy research outputs generating increased farm productivity and profitability.
- [Social] Increased contribution to regional community wellbeing from more profitable papaya growers as a result of adoption of new levy research outputs.
- [Social] Increased sustainability of quality and affordable papaya supply, supporting increased consumption of papayas with associated health and wellbeing benefits.
- [Social] Increased contribution to regional community wellbeing from more profitable papaya growers.
- [Environmental] Increased environmentally sustainable production from adoption of industry best practice.

Discussions with industry stakeholders indicated that while the underlying R&D was valued by stakeholders, there was a high level of uncertainty relating to on-farm practice change as a result of PP16001. At the same time, for the other identified impacts, a lack of reliable data prevented valuation. As a result, no impacts were quantified for PP16001.

Investment criteria

Total funding from all sources for the project was \$0.12 million (present value terms). Impact metrics could not be calculated as the identified benefits were not able to be quantified.

Conclusions

The results reflect the benefit of earlier industry awareness of minor-use R&D, particularly among smaller growers that may not have been as readily engaged with alternative communication and extension channels. Outside of minor-use, additional R&D that was communicated through PP16001 was assessed to have had no direct industry impact due to a lack of available outputs (in the case of ongoing or preliminary research) or a focus at a whole of industry rather than grower specific impacts (in the case of industry marketing and biosecurity plans). While this additional research has the potential for impact (e.g. increased industry level biosecurity preparedness or increased consumer demand), this was not assessed to have been supported by communication to growers in PP16001. However, other (unquantifiable) benefits were still generated through this process through increased awareness and engagement in the papaya R&D and marketing levy processes and outcomes. At the same time, a lack of underlying data meant that there were also environmental and social outcomes identified but not quantified which had the potential to provide additional impact to the papaya industry.

Keywords

Impact assessment, cost-benefit analysis, papaya, communications, extension

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 *PP16001 Australian Papaya Industry Communication Program* 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 papaya industry includes approximately 130 growers across Northern Australia from Queensland to Western Australian (Hort Innovation 2022a). The industry had a five year average production of 17,495 tonnes (to year ending June 2021) growing at a 5-year average of 2% per year, and with a nominal production value of \$33 million. Queensland accounts for 85% of production, with 99% of production going to the domestic fresh market (Hort Innovation 2022b). Dependent on the year, between 30 to 60 per cent of the Australian crop will come from the two largest producers.

Producers in the papaya industry 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. A levy is payable on papaya 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 papaya levy funds which are directed to RD&E and marketing.

Rationale

The Papaya industry's levy investments are guided by a Strategic Investment Plan (SIP). The Papaya SIP 2017-21 (under which PP16001 was delivered) identified 'Improved industry information and data sharing to advance production methods, supply chain forecasting, handling techniques and biosecurity defences' as a key opportunity for Australia's papaya industry. Effective industry communications was considered central to achieving this.

Alignment with the Papaya Strategic Investment Plan 2017-2021

With a focus on supporting the timely delivery of R&D and marketing content to levy-payers and enhance on-farm productivity and research profitability, PP16001 was closely aligned to Outcome 2 of the Papaya 2017-21 SIP: *Access to new varieties and improved pest and disease management improves growers' productivity and profitability.*

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 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)
<ol style="list-style-type: none"> 1. Advanced technology 2. Biosecurity 3. Soil, water and managing natural resources 4. Adoption of R&D. 	<ol style="list-style-type: none"> 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	PP16001
Title	<i>Australian Papaya Industry Communication Program</i>
Research organization	Cox Inall Communications
Project leader	Suzanne Lewis
Funding period	August 2017 to August 2020

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	<ul style="list-style-type: none"> • Develop a communications strategy to inform the overall program delivery. The Strategy was developed in collaboration with Papaya Australia and Hort Innovation, and considering SIP priorities and previous industry communication activities. The strategy was reviewed annually. • Conduct 3 annual stakeholder surveys. This consisted of 10 questions to gain insight into the effectiveness of the program, preferred communication channels, and priority communication topics. The survey was used to inform the ongoing review of the Strategy. • Develop and implement the bi-annual publication (May and November): <i>Papaya Press</i>, a hard copy 8-page publication. • Develop and maintain the <i>For Growers</i> page on the Papaya Australia website. • Conduct ongoing stakeholder engagement relating to the Hort Innovation Papaya Fund to ensure the program communicated the most up to date and relevant information to stakeholders.
Outputs	<ul style="list-style-type: none"> • Communication strategy, updated annually. • The For Growers webpage on the Papaya Australia website from March 2018. • Six editions of the bi-annual publication (May and November 2018 to 2020) of the Papaya Press, communicating R&E and marketing investment outputs and outcomes, and other industry information. Hard copy sent to 60 growers, electronic copy to 120 growers.

Outcomes	<ul style="list-style-type: none"> • Increased awareness and knowledge of papaya levy funded R&D and marketing identified above. Key knowledge areas communicated were: <ul style="list-style-type: none"> ○ Papaya breeding program. ○ Minor use permits for papaya pest and disease management ○ Biosecurity planning ○ Marketing activities and consumer insights. ○ Pollination research. ○ Export opportunities. • Increased growers' knowledge of the R&D and marketing levy processes. • Increased Hort Innovation knowledge and understanding of preferred communication pathways for industry stakeholders.
Impacts	<ul style="list-style-type: none"> • Earlier adoption of levy research outputs generating <ul style="list-style-type: none"> ○ [Economic] Increased farm productivity and profitability. ○ [Social] Increased contribution to regional community wellbeing from more profitable papaya growers as a result of adoption of new levy research outputs. ○ [Social] Increased sustainability of quality and affordable papaya supply, supporting increased consumption of papayas with associated health and wellbeing benefits. ○ [Environmental] Increased environmentally sustainable production from adoption of industry best practice. • [Economic, social, environmental] Increased grower understanding of and engagement with the papaya levy investment process and industry level activities, potentially supporting greater industry involvement and improved future outcomes

Project costs

Nominal investment

Table 4. Project nominal investment

Year end 30 June	Hort Innovation (\$)	Other (\$)	Total (\$)
2018	23,920	0	23,920
2019	19,136	0	19,136
2020	19,136	0	19,136
2021	27,508	0	27,508
Total	89,700	0	89,700

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 16.1% for the PP16001 funding period (2017-2021). 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

PP16001 was an extension and communication project. Some of the underlying R&D communicated through PP16001 included separate communication and extension activities. As such, communications through PP16001 re-enforced

existing channels to increase awareness above that which would otherwise have occurred.

Project impacts

Impacts valued

No industry impacts were valued for PP16001. Discussions with industry stakeholders indicated that while the underlying R&D was valuable, the likelihood of faster or higher adoption as a result of communication through PP16001 was uncertain. Reasons included the R&D being ongoing with outputs not yet available; the R&D relating to industry level planning and activities with limited on-farm application; and the R&D outputs being communicated directly to growers through separate channels.

Impacts not valued

While earlier adoption of R&D remains a possible impact, the high level of uncertainty makes it difficult to quantify with confidence. A lack of reliable data also prevented valuation of other impacts identified in Table 3. In total there were five potential impacts identified but not quantified:

- Earlier adoption of levy research outputs generating
 - [Economic] Increased farm productivity and profitability.
 - [Social] Increased contribution to regional community wellbeing from more profitable papaya growers as a result of adoption of new levy research outputs.
 - [Social] Increased sustainability of quality and affordable papaya supply, supporting increased consumption of papayas with associated health and wellbeing benefits.
 - [Environmental] Increased environmentally sustainable production from adoption of industry best practice.
- [Economic, social, environmental] Increased grower understanding of and engagement with the papaya levy investment process and industry level activities, potentially supporting greater industry involvement and improved outcomes

Public versus private impacts

The potential impacts identified from the investment are predominantly private impacts accruing to papaya growers and supply chain participants. However, public benefits have also been produced in the form of capacity built and potential spillovers to regional communities from improved environmental outcomes and enhanced grower yield and income.

Distribution of private impacts

Potential private impacts will have been distributed between growers, processor/packers, wholesalers, exporters, and retailers. The share of impact realised by each link in the supply chain will depend on both short- and long-term supply and demand elasticities in the papaya market.

Impacts on other Australian industries

Communicated R&D may also be relevant to growers who produce other tropic fruit commodities.

Impacts overseas

The communication program had a focus on Australian papaya stakeholders. Furthermore, given Australia's low level of production in global terms, and limited export focus of 1% of production, the overseas impacts will be limited.

Results

All cashflows were discounted to 2020-21 using a real discount rate of 5%. All analyses ran for the length of the project investment period plus 30 years from the last year of investment (2020-21) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment criteria

As no impacts were valued, the investment criteria were limited to the Present Value of Investment Costs (PVC) (Table 5).

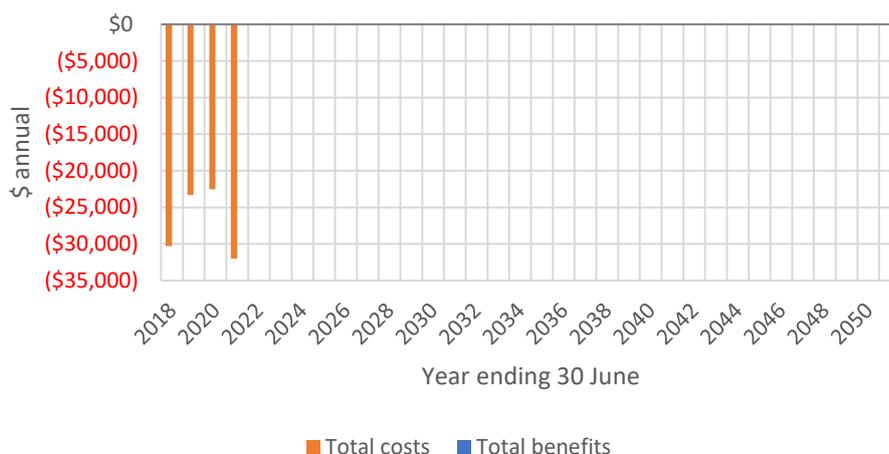
Hort Innovation was the only investor in PP16001.

Table 5. Impact metrics for the total investment in project PP16001

Impact metric	Years after last year of investment						
	0	5	10	15	20	25	30
PVC (\$)	116,412	116,412	116,412	116,412	116,412	116,412	116,412

Figure 1 shows the annual undiscounted cash flows for the total investment of PP16001. Cash flows are shown for the duration of the investment plus 30 years from the last year of investment.

Figure 1. Annual undiscounted cash flows



Discussion and conclusions

Communication programs such as PP16001 have the potential for a range of industry impacts. The impact typically quantified for communications (as part of a broader extension and communication program) is an increased awareness and knowledge of innovations and best practice supporting a faster rate of adoption than would otherwise have occurred.

For PP16001, discussions with industry stakeholders indicated that while the underlying R&D was valuable, the extent of practice change as a result of communication through the project was uncertain. Reasons included the R&D being ongoing with outputs not yet available; the R&D relating to industry level planning and activities with limited on-farm application; and the R&D outputs being communicated directly to growers through separate channels.

While this underlying research certainly has the potential for impact (e.g. increased industry level biosecurity preparedness or increased consumer demand), this was not assessed to have been changed as a result of communication to growers in PP16001.

It is important to note that the findings do not imply that papaya communications do not have the potential to generate impact in the form of practice change, but this will be dependent on the communication of material innovations and best practice with that can be adopted by industry. Furthermore, communication of R&D that does not necessarily have farm level implications (such as industry level biosecurity planning or marketing activities) can still generate value for industry such as through increased grower understanding of and engagement with the papaya levy investment process and industry level activities, potentially supporting greater industry involvement and improved outcomes. For these potential impacts, a lack of underlying data meant that they could not be quantified in this impact assessment.

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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