

Final Report

Economic impact assessment for Hort Frontiers: An evaluation of *Masterclass in Horticultural Business* (LP15001)

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HA20000

Project:

Economic impact assessment for Hort Frontiers (HA20000)

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Public summary

Hort Frontiers invests funds from a wide range of co-investors including businesses, research agencies, government departments, education institutions, the Australian Government and horticulture levies. Economic impact assessment of these investments is required to meet Hort Innovation obligations under its Organisational Evaluation Framework, its Statutory Funding Agreement, and to demonstrate a return to a diverse set of co-investors and other stakeholders.

This economic impact assessment of the Hort Frontiers program addresses these requirements through the completion of a series of project-specific, ex-post, independent impact assessments of the program. The economic impact assessment was completed using guidelines prepared by the Council of Rural Research and Development Corporations (CRRDC, 2018).

The project assessed in this impact assessment was *LP15001: Masterclass in Horticultural Business*. Investment in project LP15001 facilitated the design and implementation of a Masterclass in Horticultural Business through UTAS (now a Graduate Diploma of Agribusiness). Over 100 horticultural industry personnel graduated from the Masterclass between 2017 and May 2022. Graduate feedback has been highly positive with four graduates reporting that they had moved to more senior positions in their businesses and ten graduates reporting that they had implemented some or all of the business plans developed during the course. Further, several graduates stated that the business management and leadership skills that they gained through the Masterclass had directly contributed to increased profitability for their horticulture business.

Sensitivity analyses demonstrated that the positive results were realistic and robust. Based on the conservative assumptions used in the analysis, and the fact that several impacts identified were not valued, the investment criteria reported are likely to be underestimates of the true performance of the investment in LP15001.

Technical summary

This report presents the results of an impact assessment of a Hort Frontiers Leadership Fund project *LP15001: Masterclass in Horticultural Business*. The project was funded by Hort Innovation over the period July 2016 to May 2022.

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 2021/22-dollar terms and were discounted to the year 2021/22 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).

Investment in project LP15001 facilitated the design and implementation of a Masterclass in Horticultural Business through UTAS (now a Graduate Diploma of Agribusiness). Over 100 horticultural industry personnel graduated from the Masterclass between 2017 and May 2022. Graduate feedback has been highly positive with four graduates reporting that they had moved to more senior positions in their businesses and ten graduates reporting that they had implemented some or all of the business plans developed during the course. Further, several graduates stated that the business management and leadership skills that they gained through the Masterclass had directly contributed to increased profitability for their horticulture business.

Total funding from all sources for the project was \$4.25 million (present value terms). The investment produced estimated total expected net benefits of \$19.69 million (present value terms). This gave a net present value of \$15.44 million, an estimated benefit-cost ratio of 4.6 to 1, an internal rate of return of 22.5% and a modified internal rate of return of 12.0%.

Sensitivity analyses demonstrated that the investment criteria remain positive even when assumptions were set to much lower values. This indicated that the positive results were realistic and robust. Based on the conservative assumptions used in the analysis, and the fact that several impacts identified were not valued, the investment criteria reported are likely to be underestimates of the true performance of the investment in LP15001.

Keywords

Impact assessment, Cost-Benefit Analysis, Leadership Fund, Hort Frontiers, Leadership Development, Horticulture Business Training, Horticulture Management Masterclass, Graduate Diploma of Agribusiness, Capacity Building

Introduction

The Hort Frontiers program facilitates collaborative cross-industry investments that are focused on high-risk, transformative research, development, and extension (RD&E) with the potential for significant impact. Investments are longer-term, complex, and focus on traditionally underinvested themes.

Hort Frontiers invests funds from a wide range of co-investors including businesses, research agencies, government departments, education institutions, the Australian Government and horticulture levies. Economic impact assessment of these investments is required to meet Hort Innovation obligations under its Organisational Evaluation Framework, its Statutory Funding Agreement, and to demonstrate a return to a diverse set of co-investors and other stakeholders.

This economic impact assessment of the Hort Frontiers program addresses these requirements through the completion of a series of project-specific, ex-post, independent impact assessments of the program. A total of eight (8) RD&E investments (projects) were selected through a stratified, random sampling process. The projects, and the total life-of-project (LOP) value of their Hort Innovation managed investment in nominal terms are described in Table 1.

Table 1: Hort Frontiers Project Sample for Impact Assessment

| Hort Frontiers Fund | Project Code | Project Title | Total LOP Investment ^(a) (nominal \$) |
|---------------------------------|--------------|--|--|
| Advanced Production Systems | AS19005 | Australian Protected Cropping RD&E Strategy 2030 | 140,322 |
| Fruit Fly | HG14033 | SITplus: Raising Qfly Sterile Insect Technique to World Standard | 20,502,806 |
| Green Cities | GC15002 | Which plant where when and why database | 10,573,638 |
| Health, Nutrition & Food Safety | HN15000 | Innovative Cold Plasma for Horticultural Industries | 5,080,321 |
| International Markets | AM15007 | Market Development Program - Almonds | 925,499 |
| International Markets | AM17001 | Developing a national systems approach for meeting bio-security requirements to access key Asian markets | 4,830,614 |
| Leadership | LP15001 | Global Masterclass Horticulture | 3,235,805 |
| Pollination | PH16004 | Securing pollination for productive agriculture: guidelines for effective pollinator management and stakeholder adoption | 2,182,967 |

(a) Hort Innovation managed investment

The project population for each fund from which the random sample was selected included completed projects where a final deliverable had been submitted and accepted in the three-year period from 1 July 2019 to 30 June 2022.

The projects in the random sample were selected such that:

- (1) The total LOP sample value (in nominal dollar terms) represented at least 10% of the total Hort Innovation managed investment in the overall Hort Frontiers project population, and
- (2) The total Hort Innovation managed investment in each project was greater than, or equal to, \$100,000 (to exclude 'trivial' projects).

Further, the random sample was stratified first by Hort Frontiers Fund, to ensure all relevant Funds were represented, and then by LOP value range.

The final stratified random sample shown in Table 1 included the required eight (8) projects. At least one project from each Hort Frontiers Fund was selected and at least one project from each LOP range (as defined by Hort Innovation). The final random sample had a total nominal LOP value of \$47.47 million (Hort Managed investment) equivalent to approximately 51.6% of the overall total nominal LOP value in the population. Also, the final random sample included one project completed in 2019/20, two completed in 2020/21, and five completed in 2021/22 (all relevant years represented).

Project LP15001: *Masterclass in Horticultural Business* was one of the investments randomly selected and is analysed in this report.

Methodology

The impact assessments 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 includes both qualitative and quantitative assessment components that are in accord with the impact assessment guidelines of the Council of Rural Research and Development Corporations (CRRDC) (CRRDC, 2018).

The evaluation process followed an input to impact continuum and involved identifying and briefly describing project objectives, activities, outputs, actual and expected outcomes, and any actual and/or potential impacts associated with project outcomes. The principal economic, environmental, and social impacts then were summarised in a triple bottom line framework.

Once impacts were identified and described, a decision then was made whether to value any of the impacts in monetary terms. Where it was decided to value one or more of the impacts, some, but not necessarily all, of the impacts identified were then valued in monetary terms. The decision to value an impact identified was based on:

- Data availability and information necessary to form credible valuation assumptions,
- The complexity of the relevant valuation methods applicable given project resources,
- The magnitude of the impact and/or the expected relative value of the impact compared to other impacts identified, and
- The strength of the linkages between the RD&E investment and the impact identified.

Where impact valuation was exercised, the impact assessment used cost-benefit analysis (CBA) as a principal tool. 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 the individual investment evaluated are likely to represent an underestimate of the true performance of the investment.

Background and Rationale

Background

In 2016/17 the Australian agriculture industry had a gross value of production (GVP) of approximately \$60.8 billion with the horticulture industry contributing about \$11.2 billion (18.4%). The value of horticulture had increased between 14% and 16% from the previous year (Australian Bureau of Statistics (ABS), 2022). The Australian Council of Deans of Agriculture (ACDA) and others had noted a skills shortage in agriculture, with about four jobs in agriculture for every one graduate annually (Pratley & Acuna, 2015). Building human resource capacity, business skills and leadership in production and processed horticulture was considered of fundamental importance to the ongoing success and growth of the industry in Australia (Hort Innovation, 2015).

Rationale

Many horticultural companies had identified the need for continued training of key staff in skills relevant to their business. Tertiary training was viewed as an opportunity to provide participants with a strong understanding of horticulture systems and to train people in critical and analytical thinking. Given evidence of the skills shortage in Australian agriculture, the lack of tertiary education was identified as a major obstacle to leadership development and was considered an imperative for the horticulture industry.

Project LP15001 was funded to design and deliver a “Masterclass in Horticultural Business” targeted at industry professionals and delivered through online learning with intensive face-to-face blocks of tuition.

Project Details

Summary

| |
|---|
| Project Code: LP15001 |
| Title: <i>Masterclass in Horticultural Business</i> |
| Lead Research Organisation: Tasmanian Institute of Agriculture (TIA), University of Tasmania (UTAS) |
| Partner Organisations: Lincoln University (LU) New Zealand, Wageningen Academy the Netherlands |
| Project Leader: Michael Sims, Academic Lead – Master Class Programs, UTAS |
| Period of Funding: July 2017 to May 2022 (final report date) |

Objectives

To address the horticultural industry’s capacity issues, a Diploma, also known as the Masterclass in Horticultural Business (hereafter referred to as the ‘Masterclass’) was tailor-designed for Australian business managers and entrepreneurs in horticulture. The aims of the project were to:

- Equip participants with the leadership and management skills to underpin successful horticultural enterprises and industries.
- Address a skills gap to meet existing and the future needs of the Australian horticultural industry.
- Provide flexible delivery for distance participation.
- Foster innovative and creative thinking, and engagement among participants.
- Communicate new knowledge and approaches to professional development that support the Australian horticulture industry through dissemination in professional and disciplinary conferences and publications.
- Produce a nationally recognised and accredited qualification at the appropriate Australian Qualification Framework (AQF) level.

Logical Framework

Table 2 provides a detailed description of project LP15001 in a logical framework.

Table 2: Logical Framework for Project LP15001

| | |
|------------|---|
| Activities | <p>The project was undertaken in three phases:</p> <ul style="list-style-type: none"> • Phase 1 focused on the design of the Masterclass including the development of the course philosophy, learning outcomes, modes of delivery and modules. • Phase 2 evaluated the delivery of the Masterclass, and participants’ attainment of the learning outcomes. • Phase 3 was a longitudinal study that evaluated the impact of the course on the participants after graduation. • A Steering Committee (SC) comprising representatives from industry, Hort Innovation, Wageningen Academy, LU and UTAS was established to advise on course learning outcomes and objectives, and appropriate modes of delivery. • The SC formed part of the official expert governance panel for the Diploma (i.e., the qualification) and was formally accredited by the UTAS Academic Senate. Thus, students that completed the Diploma would receive a formal certificate (testamur) from UTAS at graduation. <p><u>Phase 1: Design</u></p> <ul style="list-style-type: none"> • UTAS worked closely with Hort Innovation, Wageningen Academy, LU, and industry leaders to develop the Masterclass to meet workplace education and training needs. • Expertise that resided within the partner universities was drawn on to develop learning objectives, assessments, and content for the Masterclass course, which were mapped against the AQF and the Learning and Teaching Academic Standards for Agriculture. |
|------------|---|

- An independent review of the Masterclass design was undertaken by Professor Peter Oppenheim (agricultural economist and previous Director of the Deakin University Master Business Administration (MBA) Program).
- The review was then followed by a review of the course structure by the project’s industry steering committee to ensure the course targeted industry needs.
- The course reviews then were followed by the development and implementation of student selection criteria to clearly identify prerequisite skills and knowledge necessary for student success.
- The Diploma qualification (Masterclass) was designed to enable articulation and credit arrangement to a 2-year Associate Degree (equivalent to Advanced Diploma) in Agribusiness or Applied Business.
- The delivery mode of the Masterclass included both on-line (webinars, podcasts, self-directed learning etc.) and targeted face-to-face intensives (regional or national workshops at key stages of the Masterclass).
- Also, to accommodate student requirements for balancing work, study, and family, an option for a mid-year entry and part-time study were introduced in 2020.
- The project team, teaching staff and industry representatives were invited to participate in a survey, conducted in 2017, to contribute their views and insights into the development of the Masterclass.
- Survey questions considered the design of the Masterclass, its potential impact to the sector, appropriateness of the entry criteria and lessons learnt.
- Marketing and promotion of the Masterclass was undertaken by UTAS in collaboration with Hort Innovation.

Phase 2: Delivery

- The Masterclass was delivered for the first time from February through to December 2017 and ran each year from 2017 to 2021 (within the life of the current project).
- The first and subsequent student cohorts were invited to participate in entry, mid and exit surveys.
- The surveys were designed to elicit participants’/students’ reasons for enrolling in the Masterclass and personal reflections on their achievements on completion.
- Student demographic data, including age, region, educational attainment, size, and scope of their horticultural business were also collected.
- The Masterclass was delivered in eight modules that were five weeks in length, with a total duration of 40 weeks. The modules examined a range of current issues in horticultural business that were relevant to business owners and upcoming young entrepreneurs.
- Face-to-face intensives were held at the start, middle and end of the Masterclass. The final face-to-face activity included an integration of the course content and learning outcomes.
- Module topics and assignments were designed to promote interaction of the students with their staff (if they are business owners) or employers (if they work for a business owner).
- Each module was taught in parallel with a co-requisite work-integrated learning module (Practice and Portfolio or P&P) of equivalent credit.
- In this way, the students applied their learning to their workplace through work-integrated learning, raising questions and stimulating discussions about agribusiness.
- The UTAS online delivery platform called MyLO (My Learning Online), and the embedded web conferencing facilities were used to:
 - enable real-time online lectures, tutorials, support, and group work for students in different locations.
 - facilitate communication and a sense of community among staff and students.
 - create a virtual office to consult with students.
 - enable guest speakers and external experts to deliver content.
 - connect participants to professional networks.

| | |
|----------------|---|
| | <ul style="list-style-type: none"> • Automatically assessed and graded quizzes with instant feedback provided at the end of each week of lectures tested student knowledge and application. • Three online assignments per module were conducted to test student understanding of theory and application. • Also, three face-to-face block sessions situated in different regional locations were completed followed by face-to-face tours of farms and businesses that varied in structure and size. Each tour included talks by leading industry speakers and practitioners. • Intensive workshops were run in January, July and December in Victoria, Queensland, and Tasmania from 2017 to 2019. The delivery of most of the face-to-face workshops in 2020 and 2021 was interrupted by lockdowns and travel restrictions associated with COVID-19 and were replaced by virtual tours of horticultural businesses (where feasible) and online guest speakers. • At the end of each Program, in the final assessment, students prepared and presented a business plan to the broader class, academics, and leading industry representatives. <p><u>Phase 3: Longitudinal Study</u></p> <ul style="list-style-type: none"> • In 2021, all graduates of the Masterclass were contacted to participate in an online survey on graduate employability. • The survey was designed to elicit if graduates had changed their role, if they had implemented their business plan, the usefulness of the subjects since graduation, and the skills and knowledge used in their work that they attributed to the Masterclass. • Like Phase 2, student demographic data, including age, region, educational attainment, size, and scope of their horticultural business were also collected. • UTAS undertook an “Academic Transformation” of all courses between 2020 to 2022, to enhance distinctiveness and simplify course architecture. • It was decided to teach out the Diploma of Horticultural Business (AQF 5) and replace it with a Graduate Diploma of Agribusiness (Horticultural Business) (AQF 8) with the first intake in 2021. • A contributing factor was that students between 2017 to 2020, as horticultural professionals, had demonstrated their ability to succeed at university regardless of their educational background. • Therefore, applicants who do not hold a bachelor’s degree could apply for alternative entry based on five years of relevant work experience. |
| <p>Outputs</p> | <ul style="list-style-type: none"> • A Diploma qualification (Masterclass) designed to enable articulation and credit arrangement to a 2-year Associate Degree (equivalent to Advanced Diploma) in Agribusiness or Applied Business. • In 2022, the course name was changed to Graduate Diploma in Agribusiness: Horticulture Business Specialisation • The Diploma (Masterclass) conformed to the Australian Government’s Higher Education Standards Framework). This Framework includes requirements pertaining to course monitoring, review, and continuous improvement to ensure core standards such as governance, academic quality and integrity, effective assessments and achievement of expected learning outcomes are met. • As of May 2022, the Masterclass had attracted 111 enrolments since 2017, representing a range of industry professionals in horticulture from across Australia, in the vegetable, nursery, fruit and nut industries, with some operating in several areas along the horticultural supply chain. • Across all years of the project, owners or part-owners of a horticulture business and senior managers of horticultural businesses tended to predominate (>50%) the Masterclass cohort. This was followed by horticultural consultants, suppliers of inputs for horticultural production, and logistics and supply chain management. • Most participants (around two-thirds) were between 25 to 45 years of age. Overall, around 60% of students had completed a qualification equal to or higher than a Diploma. • In total, 77 students had graduated from the Masterclass as of December 2021 and 12 students were continuing their study into 2022. |

| | |
|-------------------|--|
| | <ul style="list-style-type: none"> At the end of the program, all students surveyed indicated that the relevant curricula had been addressed to meet their expectations. Components of the curricula that were reported as more interesting and enjoyable included, for example, preparing business plans, value chains, marketing strategy and finance. The longitudinal study of graduates investigated the impact of the Masterclass. The study was conducted at the start of 2021. All graduates were contacted, and 14 responses were received with four from the 2017 cohort, three from 2018, six from 2019 and one from 2020. Of the responses, 50% of respondents were business owners, while the remainder were senior managers of a horticultural business. Four businesses produced annual crops, two were in the nursery industry and two in perennial horticulture. Most businesses employed between 1 to 15 staff (53%) and only one had up to 250 employees. |
| Outcomes | <ul style="list-style-type: none"> Converting the 2017-2020 version of the Diploma to a Graduate Diploma of Agribusiness enabled UTAS to build on the success of the Masterclass and add a new specialisation in Dairy Management to the existing Horticultural Business, with five core units completed by all students. The findings of the longitudinal study reported that: <ul style="list-style-type: none"> Four respondents had moved to a more senior role in the business since graduation. The study showed that 10 of the respondents implemented all or some of their business plan within a year of graduation. Three respondents stated that their business had increased profitability, which they directly attributed to the course and implementing their business plan. For example, one graduated reported a 25% growth in their business by changing their management structure, value adding and altering the proportion of crops grown. Graduates were asked what skills and knowledge they used in their work that they could directly attribute to the Diploma. Some reported that the Diploma had reinforced and refined their existing knowledge to be more industry relevant and stated that they felt more confident in their business skills. Others acknowledged the rapid rate of technological change, which meant that some of the information was now less relevant but said that they had more confidence in business planning. Some graduates did not implement their business plans. Reasons stated included that it was not feasible, or that they had opted to work as an employee. Regardless, respondents still reported improved skill in using the financial calculations and a greater understanding of the horticultural industry. Overall, it is expected that the Masterclass has contributed to increased retention and progression of existing employees and business owners and increased leadership across the horticulture industry through capacity and capability building. |
| Potential Impacts | <ul style="list-style-type: none"> Increased businesses management and leadership capability and capacity for horticultural producers, business owners, and other industry stakeholders completing the Masterclass in Horticultural business. <p>Through the increased capacity and capability of Masterclass graduates, the investment in LP15001 is expected to have contributed to:</p> <ul style="list-style-type: none"> Increased wellbeing for individuals (graduates), particularly through increased earning capacity because of enhanced personal and professional capacity and capability. Maintained or enhanced long-term capability and capacity in horticulture and horticulture-related industries. Increased economic sustainability (long-term productivity and/or profitability) for some horticultural businesses through improved business management and leadership. Some increased wellbeing for rural/ regional communities associated with horticultural supply chains because of more economically sustainable and resilient horticultural businesses. |

Source: LP15001 project documentation and consultation with project personnel and other expert stakeholders

Project Investment

Nominal Investment

Table 3 shows the annual investment made in Project LP15001. Additional support for the project was provided by TIA/UTAS, LU, and Wageningen Academy in the Netherlands.

Table 3: Annual Investment in Project LP15001 (nominal \$, cash and in-kind)

| Year (ended 30 June) | HORT FRONTIERS (\$) | OTHERS ^(a) (\$) | TOTAL (\$) |
|-------------------------|---------------------|----------------------------|------------------|
| 2017 | 228,124 | 311,177 | 539,301 |
| 2018 | 228,124 | 311,177 | 539,301 |
| 2019 | 228,124 | 311,177 | 539,301 |
| 2020 | 228,124 | 311,177 | 539,301 |
| 2021 | 228,124 | 311,177 | 539,301 |
| 2022 | 228,124 | 311,177 | 539,301 |
| Total | 1,368,745 | 1,867,805 | 3,235,805 |

Source: Hort Innovation LP15001 Project Agreement

(a) Other funding includes TIA/UTAS, LU, and Wageningen Academy

Program Management Costs

For the Hort Frontiers 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 2021/22-dollar terms using the Implicit Price Deflator for Gross Domestic Product (ABS, 2022). Project LP15001 included marketing and promotional activities for the new Masterclass, as well as direct engagement with academic development and delivery partners, and Masterclass students. Therefore, no additional extension costs were incorporated in the quantitative analyses.

Impacts

Table 4 provides a summary of the principal types of impacts delivered by the project, based on the logical framework (Table 2). Impacts have been categorised into economic, environmental, and social impacts.

Table 4: Triple Bottom Line Categories of Principal Impacts from Project LP15001

| | |
|---------------|---|
| Economic | <ul style="list-style-type: none"> Increased wellbeing for individuals (graduates), particularly through increased earning capacity because of enhanced personal and professional capacity and capability. Increased economic sustainability (long-term productivity and/or profitability) for some horticultural businesses through improved business management and leadership. |
| Environmental | <ul style="list-style-type: none"> Nil. |
| Social | <ul style="list-style-type: none"> Increased businesses management and leadership capability and capacity for horticultural producers, business owners, and other industry stakeholders completing the Masterclass in Horticultural business. Maintained or enhanced long-term capability and capacity in horticulture and horticulture-related industries. Some increased wellbeing for rural/ regional communities associated with horticultural supply chains because of more spillover benefits from more economically sustainable and resilient horticultural businesses. |

Public versus Private Impacts

The impacts identified from the investment were both public and private in nature. Private impacts are expected to accrue to horticultural growers, business owners, and/or other horticulture stakeholders that complete the Masterclass. For example, increased earning capacity and/or increased profitability of horticultural businesses. Public impacts delivered by LP15001 include maintained or enhanced long-term capability and capacity in horticulture and horticulture-related industries, and spillover benefits to regional communities from improved economic sustainability of horticultural businesses.

Distribution of Private Impacts

Private impacts will initially be captured by the horticultural producers/businesses implementing business management and leadership learnings from the Masterclass. Over the longer-term, private impacts are expected to be shared along horticultural produce supply chains, including input suppliers, trade partners, and domestic and international consumers according to relevant supply and demand elasticities.

Impacts on Other Australian Industries

The project had a broad focus across Australian horticultural industries and was not expected to have any direct impacts on other Australian sectors. However, agricultural business management capability and capacity building learnings generated by the project and demonstrated through delivery of the Masterclass may create indirect, long-term benefits in other agricultural industries through knowledge spillovers.

Impacts Overseas

Project LP15001 included collaboration with Lincoln University New Zealand and Wageningen Academy in the Netherlands. It is therefore possible that knowledge sharing through the collaborative RD&E may contribute to improved design and delivery of agricultural business management training and education in partner countries.

Match with National Priorities

The Australian Government’s National Science and Research Priorities and National Agricultural Innovation Priorities are reproduced in Table 5. The project outcomes and related impacts will contribute to National Science and Research Priority 1. Project LP15001 has not directly contributed to the new National Agricultural Innovation Priorities. However, by increasing the capability and capacity of the Australian horticulture industry and contributing to improved business management and leadership, the investment is likely to have contributed indirectly across all four Innovation Priorities.

Table 5: Australian Government Research Priorities

| Australian Government Strategies and Priorities | |
|---|--|
| National Science and Research Priorities ¹ | National Agricultural Innovation Priorities ² |
| <ol style="list-style-type: none"> 1. Food – optimising food and fibre production and processing; agricultural productivity and supply chains within Australia and global markets. 2. Soil and Water – improving the use of soils and water resources, both terrestrial and marine. 3. Transport – boosting Australian transportation: securing capability and capacity to move essential commodities; alternative fuels; lowering emissions. 4. Cybersecurity – improving cybersecurity for individuals, businesses, government, and national infrastructure. 5. Energy and Resources – supporting the development of reliable, low cost, sustainable energy supplies and enhancing the long-term viability of Australia’s resources industries. 6. Manufacturing – supporting the development of high value and innovative manufacturing industries in Australia. 7. Environmental Change – mitigating, managing, or adapting to changes in the environment. 8. Health – improving the health outcomes for all Australians. | <p>On 11 October 2021, the National Agricultural Innovation Policy Statement was released. It highlights four long-term priorities for Australia’s agricultural innovation system to address by 2030. These priorities replace the Australian Government’s Rural Research, Development and Extension Priorities which were published in the 2015 Agricultural Competitiveness White Paper.</p> <ol style="list-style-type: none"> 1. Australia is a trusted exporter of premium food and agricultural products by 2030. 2. Australia will champion climate resilience to increase the productivity, profitability, and sustainability of the agricultural sector by 2030. 3. Australia is a world leader in preventing and rapidly responding to significant incursions of pests and diseases through futureproofing our biosecurity system by 2030. 4. Australia is a mature adopter, developer, and exporter of digital agriculture by 2030. |

Alignment with the Hort Frontiers Leadership Fund Strategic Priorities

The Hort Frontiers Leadership Fund had three key investment themes defined by the Hort Innovation’s Co-Investment Strategic Intent: Leadership Fund document (Hort Innovation, 2018):

- 1) Retain existing employees.
- 2) Promote careers in Horticulture.
- 3) Drive research innovation

Project LP15001 directly delivered against investment Theme 1 (retain existing employees) with some contribution to Theme 2 (promote careers in Horticulture).

¹ See: 2015 Australian Government Science and Research Priorities. <https://www.industry.gov.au/data-and-publications/science-and-research-priorities>

² See: 2021 National Agriculture Innovation Policy Statement. https://www.awe.gov.au/agriculture-land/farm-food-drought/innovation/research_and_development_corporations_and_companies#government-priorities-for-investment

Case Study

The following section provides real world feedback on how the outputs of the investment have benefited growers.

R&D CASE STUDY: MASTERING AUSTRALIAN HORTICULTURE

THE CHALLENGE

The Horticultural industry seemed to be experiencing a disconnect between learning on-farm, industry support sessions, and on-farm support from extension officers. This disconnect was gap presented business management challenges for Australian horticultural producers and businesses.

MEET LISA

Lisa Brassington graduated from the inaugural Masterclass in Horticultural Business in 2017. Lisa is an agricultural and agribusiness professional that undertook the Diploma with industry leaders from Peninsula Fresh Organics in Victoria. Coming from multiple generations of farmers in the King Valley region and having grown up in the north eastern Victorian town of Wangaratta, Lisa has a love and passion for the land on which she lives and works.



Lisa Brassington (photo credit: AUSVEG, 2018)

Enrolling in the Hort Innovation Leadership Fund Masterclass in Horticultural Business, Lisa was eager to take up the opportunity to upskill and increase her industry knowledge.

THE APPROACH

Best described as a mini-MBA, the Masterclass focused on topics like global trends in agriculture and horticulture, international business, and governance and risk. On completion of the Masterclass in Horticultural Business Course Learning Outcomes (CLOs) stated that participants would be able to:

- 1) Identify, analyse, and reflect on personal and/or business goals and pathways for career/business development.
- 2) Communicate contemporary knowledge of the principles of horticultural business.
- 3) Apply business and entrepreneurial skills based on relevant theory within contemporary horticultural enterprises.
- 4) Identify and articulate adaptable skills in the context of a dynamic horticultural business operating environment.

- 5) Model the principles of sustainable horticultural business practice through ethical and professional conduct within a collaborative framework; and
- 6) Develop a business improvement plan within a local, national and/or international trading environment.



Horticulture Crop Rows (photo credit: AUSVEG, 2021)

“Each week since graduating, I have used some element of learning and solution focused thinking from the course,” Lisa says. “As the curriculum was designed by Hort Innovation in partnership with the universities, plus horticultural industry leaders, it was a great intersection and learning balance between vocation, education and application of horticultural agribusiness.”

THE IMPACT

Lisa said the Masterclass’s wide range of subjects – including supply-chain management, life cycling, agriculture and farm business accounting and economics – were insightful and useful. “The knowledge enables me to interpret relevant industry data in a localised manner to tailor my horticulture and agriculture conversations with the people and community I consult with, or the agri-food services I provide in my day job,” Lisa says. “Because my background knowledge was formalised, the course has given me the courage to set up a consultancy as well as undertake specialised professional development and provide client services.” (Tasmanian Institute of Agriculture, 2022).

Following completion of the Masterclass, there are two goals that Lisa is working to achieve. One is to help facilitate and encourage business growth and business planning discussions within Peninsula Fresh Organics. “The Masterclass has enabled me to have better business discussions with my managers and farm owners...” Lisa said. “That will only lead to efficiency and having a clearer competitive advantage by really knowing our next phase of business and related business plans.” The course has also given Lisa the skills and encouragement to health-check the current varieties the business grows. “We have market advantages in some areas that perhaps can be marketed better and build a varied group of domestic and export client relationships” she explained.

Valuation of Impacts

Impacts Not Valued

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

- Increased businesses management and leadership capability and capacity for horticultural producers, business owners, and other industry stakeholders completing the Masterclass in Horticultural business. Though not valued directly because of the complexity of measuring and estimating changes in capability and capacity building, this impact was a key driver of the impacts valued and therefore is captured by the impacts valued.
- Maintained or enhanced long-term capability and capacity in horticulture and horticulture-related industries. This impact also is likely to have been partially captured by the valuation of Impact 2 (see below).
- Some increased wellbeing for rural/ regional communities associated with horticultural supply chains because of more spillover benefits from more economically sustainable and resilient horticultural businesses.

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 within the quantitative assessment:

1. Increased wellbeing for individuals (graduates), particularly through increased earning capacity because of enhanced personal and professional capacity and capability.
2. Increased economic sustainability (long-term productivity and/or profitability) for some horticultural businesses through improved business management and leadership.

Impact 1: Increased earning capacity for graduates (increased individual wellbeing)

The investment in LP15001 has contributed to increased professional capability and capacity for graduates of the Masterclass. This, in turn, may contribute to individuals with increased leadership capacity, improved business planning and management skills, and increased confidence that will enhance graduates' career opportunities and earning potential and increase the likelihood of earning higher income. This has been demonstrated through the findings of the LP15001 longitudinal study that showed that four respondents had moved to a more senior role in the business since graduation.

Benefits for individuals can be measured through higher salaries (Holbrook, Wixted, Chee, Klingbeil, & Shaw-Garlock, 2009). While there is a scarcity of studies on the return to tertiary education such as masters or doctoral degrees, Mariotti and Meinecke (2011) estimated that the return to education in Australia was 8.1% for Australian school graduates. From the international literature, in the UK, Blundell et al. (2005) found that the average annual return to a first degree ranged from 5-8% for men and 10-13% for women compared to an A-level qualification. Trostel (2007) estimated that compared to a high school qualification there were premiums of US\$51,781 for a Bachelor's degree, US\$10,323 for a master's degree and \$70,714 for professional and doctorate degrees in 2005 in the US. However, these premiums are sensitive to the supply of post-graduate degree holders in the market and the specific subject areas / professions. Additionally, the returns to individuals working in the private sector are higher than those in the public/government sector (Psacharopoulos, 1993).

The concept of rate of return on investment in further education is similar to any other investments and it requires an assessment of costs (expenditure on educational training) and benefits (additional salary). A 2019 Australian graduate outcomes survey reported that the median salary in 2019 for employed, full-time individuals with an undergraduate degree was \$65,000, \$89,700 for postgraduate research degree, and \$95,000 for a postgraduate research degree (Quality Indicators for Learning and Teaching (QILT), 2021). The median full-time salary for an Australian with an undergraduate degree in agriculture and environmental studies was approximately \$69,500 in 2021 (QILT, 2021). Further, the Australian agriculture, forestry and fisheries industry employs approximately 287,300 persons with median weekly earnings for the sector estimated at \$1,053 per week (Australian Government, 2022).

Specific assumptions used in the valuation of Impact 1 are described in Table 6.

Impact 2: Increased long-term economic sustainability for some horticultural businesses

The Masterclass in Horticultural Business has contributed to long-term economic sustainability for some horticultural businesses through increased businesses management and leadership capability and capacity for horticultural producers, business owners, and other industry stakeholders that completed the Masterclass. This has been demonstrated through graduate feedback in the LP15001 longitudinal study. For example, the study showed that 10 of the respondent graduates had implemented all or some of their business plan within a year of graduation and three respondents stated that their business had increased profitability, which they directly attributed to the course and implementing their business plan.

For the LP15001 quantitative analysis, net farm income was selected as a conservative measure of wider total farm to consumer profits that would include transport, processing, marketing, etc. Across all cropping industries in Australia the long-term average (10-year) farm cash income was estimated at \$425,415 per farm per year (Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), 2022) and were approximately 13,500 horticultural businesses in Australia (based on data reported by Agriculture Victoria, 2021). It was assumed that the LP15001 investment has contributed to a net increase in the average net farm income for a proportion of the Australian Horticulture industry.

It is worth noting that the estimated average farm cash income does not include any return to capital or owners' labour. Further, based on information produced by ABARES, the farming sector contributes some 20 to 50% of retail prices of food in Australia depending on the degree of processing and the extent of competition along the supply chain (Nguyen, Mobsby, & Goesch, 2016). Over the longer-term, changes to net farm income are likely to reflect up-stream (input) productivity and/or profitability changes, however, because of the potential contributions of other, down-stream agricultural sectors, the benefits estimated based on net farm income are likely to be an underestimate of the increased long-term productivity and resilience of Australian rural industries.

Specific assumptions used in the valuation of Impact 2 are described in Table 6.

Counterfactual

Defining the counterfactual, or without investment scenario, is critical to the outcome of the analysis, and usually entails more than simply projecting current industry trends indefinitely into the future. In ex-post analyses, the counterfactual is a hypothetical scenario and determining the characteristics of this counterfactual requires judgements about the course of events that would have transpired in the absence of the research outputs produced by the investment under consideration. This counterfactual scenario obviously did not, and will not occur, and can only be inferred from knowledge of the industry and its markets and through consultation/expert opinion (CRRDC, 2018).

For the analysis of the investment in project LP15001, it was assumed that the impacts as estimated would not have occurred without the investment.

CSIRO Adopt Model Insights

Project LP15001 was a capability and capacity building project and internal project monitoring and evaluation systems reported enrolment, graduation, and findings from the longitudinal graduate study. Due to the nature of the LP15001 outputs, the CSIRO Adopt Tool was not utilized for the quantitative analysis in this case.

Summary of Assumptions

Table 6 contains a summary of other assumptions required for estimation of quantified impacts (Impacts 1 and 2).

Table 6: Summary of Additional Assumptions for Impact Valuation

| Variable | Assumption/Value | Source/Comment |
|--|------------------|--|
| Impact 1: Increased wellbeing for individuals (graduates) | | |
| Number of individuals graduated from the Masterclass to date | 111 | LP15001 Final Report |
| Proportion of graduates achieving increased earning potential | 40% | Conservative estimate based on 10 graduates reporting that they had implemented all or some of their businesses plans within a year of graduation and four graduates reporting that they had moved to a more senior role in the business since graduation (out of 24 respondents to the longitudinal study conducted within LP15001) |
| Current mean weekly earnings in agriculture | \$1,053 | Australian Government (2022) |
| Increase in net weekly earnings for individuals utilizing increased personal and professional capability and capacity (business management and leadership) | 20% | Analyst assumption – estimate based on four graduates reporting a move to more senior positions in the LP15001 longitudinal study |
| First year of impact | 2017/18 | Based on first cohort intake in 2017 and last cohort intake in 2022 during the life of LP12001 with graduates reporting implementation of some or all of their business plans within one year of graduating |
| Year of maximum impact | 2022/23 | |
| Other factors | | |
| Attribution of benefits to investment in LP15001 | 100% | It was assumed that the benefits as estimated were specifically attributable to the Masterclass and would not have occurred without the LP15001 investment |
| Counterfactual – proportion of benefits that would have occurred without the LP15001 investment | 0% | |
| Probability of output | 100% | Represents the probability of technical success of the project investment. Based on successful completion of LP15001 and successful delivery of the Masterclass. |
| Probability of outcome | 90% | Represents the probability that the adoption/ usage of project outputs occurs as assumed given output success. Based on evidence of outcomes reported in LP15001 longitudinal study. |
| Probability of impact | 70% | Represents the probability that the impact occurs as assumed given adoption (outcome). Allows for exogenous factors that may affect the realization of impacts such as global market factors, climate change, etc. |

| Impact 2: Increased long-term economic sustainability for some horticultural businesses | | |
|--|---|---|
| Long-term average net farm cash income for cropping businesses | \$425,415 | ABARES (2022) |
| Estimated number of horticultural cropping businesses in Australia | 13,500 | Based on Agriculture Victoria (2021) – 2,850 horticultural enterprises representing approximately 21% of Australian horticulture businesses |
| No. of horticultural businesses implementing practice change to increase profitability based on business planning and other learnings from the Masterclass | 68 businesses (equivalent to approximately 0.5% of total Australian horticultural businesses) | Conservative estimate – assumes no further investment or delivery of the Masterclass after 2021/22 |
| Increase in net farm cash income achieved | 10% | Analyst assumption – conservative estimate based on one graduate reporting 25% growth in their business in the LP15001 longitudinal study |
| First year of impact | 2022/23 | Based on first cohort intake in 2017 and last cohort intake in 2022 during the life of LP12001 with graduates reporting implementation of some or all of their business plans within one year of graduating |
| Year of maximum impact | 2032/33 | |
| Other factors | | |
| Attribution of benefits to investment in LP15001 | 60% | A range of factors may influence a business's decision to implement specific planning and practice changes. The attribution of benefits to LP15001 considers influences other than the Masterclass that may have contributed to practice changes. |
| Counterfactual – proportion of benefits that would have occurred without the LP15001 investment | 0% | It was assumed that the benefits as estimated were specifically attributable to the Masterclass and would not have occurred without the LP15001 investment |
| Probability of output | 100% | Represents the probability of technical success of the project investment. Based on successful completion of LP15001 and successful delivery of the Masterclass. |
| Probability of outcome | 90% | Represents the probability that the adoption/ usage of project outputs occurs as assumed given output success. Based on evidence of outcomes reported in LP15001 longitudinal study. |
| Probability of impact | 70% | Represents the probability that the impact occurs as assumed given adoption (outcome). Allows for exogenous factors that may affect the realization of impacts such as global market factors, climate change, etc. |

Results

All costs and benefits were discounted to 2021/22 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 (2021/22) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

Table 7 and Table 8 show the investment criteria estimated for different periods of benefits for the total investment and the Hort Frontiers only investment. Hort Frontiers present value of benefits (Table 8) was estimated by multiplying the total present value of benefits by the Hort Frontiers proportion of total undiscounted costs expressed in 2021/22-dollar terms (42.3%).

Table 7: Investment Criteria for Total Investment in Project LP15001

| Investment Criteria | Years after Last Year of Investment | | | | | | |
|---------------------------------|-------------------------------------|------|-------|-------|-------|-------|-------|
| | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Present Value of Benefits (\$m) | 2.92 | 7.64 | 11.34 | 14.24 | 16.52 | 18.30 | 19.69 |
| Present Value of Costs (\$m) | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 |
| Net Present Value (\$m) | -1.34 | 3.39 | 7.09 | 9.99 | 12.26 | 14.04 | 15.44 |
| Benefit-Cost Ratio | 0.69 | 1.80 | 2.67 | 3.35 | 3.88 | 4.30 | 4.63 |
| Internal Rate of Return (%) | -29.9 | 17.2 | 21.3 | 22.2 | 22.4 | 22.5 | 22.5 |
| MIRR (%) | -19.9 | 16.7 | 16.8 | 15.3 | 14.0 | 12.9 | 12.0 |

Table 8: Investment Criteria for Hort Frontiers Only Investment in Project LP15001

| Investment Criteria | Years after Last Year of Investment | | | | | | |
|---------------------------------|-------------------------------------|------|------|------|------|------|------|
| | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Present Value of Benefits (\$m) | 1.34 | 3.52 | 5.22 | 6.55 | 7.60 | 8.42 | 9.06 |
| Present Value of Costs (\$m) | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 |
| Net Present Value (\$m) | -0.61 | 1.56 | 3.26 | 4.60 | 5.64 | 6.46 | 7.10 |
| Benefit-Cost Ratio | 0.69 | 1.80 | 2.67 | 3.35 | 3.88 | 4.30 | 4.63 |
| Internal Rate of Return (%) | -29.9 | 17.2 | 21.3 | 22.2 | 22.4 | 22.5 | 22.5 |
| MIRR (%) | -19.9 | 16.7 | 16.8 | 15.3 | 14.0 | 12.9 | 12.0 |

The annual undiscounted benefit and cost cash flows for the total investment for the duration of the LP15001 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

Table 9 shows the contribution to total benefits from each of the two benefits valued. The benefits from improved market access (increased proportion of total production going to export markets) at maintained premium export prices was the highest impact valued in terms of the contribution to total benefits.

Table 9: Source of Total Benefits
(Total investment, 30 years)

| Impact | Contribution to PVB (\$m) | Share of Total Benefits (%) |
|---|---------------------------|-----------------------------|
| Impact 1: Increased wellbeing for individuals (graduates) | 0.11 | 0.5 |
| Impact 2: Increased long-term economic sustainability for some horticultural businesses | 19.59 | 99.5 |
| Total | 19.69 | 100.0 |

Sensitivity Analyses

A sensitivity analysis was conducted 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 10 presents the results. The results showed a moderate sensitivity to the discount rate. This was largely because the benefit cash flows extended well into the future (30 years from the last year of investment) and therefore were subject to relatively more significant discounting.

**Table 10: Sensitivity to Discount Rate
(Total investment, 30 years)**

| Investment Criteria | Discount Rate | | |
|---------------------------------|---------------|-----------|-------|
| | 0% | 5% (base) | 10% |
| Present Value of Benefits (\$m) | 35.47 | 19.69 | 13.41 |
| Present Value of Costs (\$m) | 3.74 | 4.25 | 4.84 |
| Net Present Value (\$m) | 31.73 | 15.44 | 8.57 |
| Benefit-cost ratio | 9.49 | 4.63 | 2.77 |

A sensitivity analysis was then undertaken on the maximum number of horticulture businesses achieving increased profitability for Impact 1 as this was considered a key driver of the investment criteria. Results are provided in Table 11. When the maximum number of horticultural businesses was set to just over 14 businesses (0.106% of total horticultural businesses) and all other factors remain unchanged, the project is approximately at “break-even” with a benefit-cost ratio (BCR) of 1 to 1.

**Table 11: Sensitivity to No. of Horticulture Businesses Achieving Increased Profitability
(Total investment, 30 years)**

| Investment Criteria | No. of Horticulture Businesses Achieving Increased Profitability | | |
|---------------------------------|--|----------------------|----------------|
| | 14 businesses | 68 businesses (base) | 135 businesses |
| Present Value of Benefits (\$m) | 4.02 | 19.69 | 39.28 |
| Present Value of Costs (\$m) | 4.25 | 4.25 | 4.25 |
| Net Present Value (\$m) | -0.23 | 15.44 | 35.03 |
| Benefit-cost ratio | 0.95 | 4.63 | 9.23 |

A final sensitivity analysis tested the base average net farm cash income assumed for agricultural cropping enterprises. The results (Table 12) showed a relatively low sensitivity to the assumed net farm cash income. The project would ‘break-even’ at a net farm cash income of \$90,073 with all other variables unchanged.

**Table 12: Sensitivity to Average Net Farm Cash Income for Agricultural Cropping Enterprises
(Total investment, 30 years)**

| Investment Criteria | Average Net Farm Cash Income for Agricultural Cropping Enterprises | | |
|---------------------------------|--|--|---|
| | \$262,136 per farm (lowest reported for 10-year period to 2020/21) | \$425,415 per farm (10-year average; base) | \$579,775 per farm (highest reported for 10-year period to 2020/21) |
| Present Value of Benefits (\$m) | 12.18 | 19.69 | 26.80 |
| Present Value of Costs (\$m) | 4.25 | 4.25 | 4.25 |
| Net Present Value (\$m) | 7.92 | 15.44 | 22.55 |
| Benefit-cost ratio | 2.86 | 4.63 | 6.30 |

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 13). 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 13: Confidence in Analysis of Project

| Coverage of Benefits | Confidence in Assumptions |
|----------------------|---------------------------|
| Medium-High | Medium |

Coverage of benefits valued was assessed as Medium-High, two of five impacts identified were valued and the two impacts valued were deemed to represent the most important and most direct impacts from the investment in LP15001. Confidence in assumptions was rated as Medium, most of the data and assumptions used were underpinned by credible, published data and/or expert consultation. However, where no data/evidence was available within the scope of the assessment, a number of key assumptions were estimated by the analyst.

Conclusions

Investment in project LP15001 facilitated the design and implementation of a Masterclass in Horticultural Business through UTAS (now a Graduate Diploma of Agribusiness). Over 100 horticultural industry personnel graduated from the Masterclass between 2017 and May 2022. Graduate feedback has been highly positive with four graduates reporting that they had moved to more senior positions in their businesses and ten graduates reporting that they had implemented some or all of the business plans developed during the course. Further, several graduates stated that the business management and leadership skills that they gained through the Masterclass had directly contributed to increased profitability for their horticulture business.

Total funding from all sources for the project was \$4.25 million (present value terms). The investment produced estimated total expected net benefits of \$19.69 million (present value terms). This gave a net present value of \$15.44 million, an estimated benefit-cost ratio of 4.6 to 1, an internal rate of return of 22.5% and a modified internal rate of return of 12.0%.

Sensitivity analyses demonstrated that the investment criteria remain positive even when assumptions were set to much lower values. This indicated that the positive results were realistic and robust. Based on the conservative assumptions used in the analysis, and the fact that several impacts identified were not valued, the investment criteria reported are likely to be underestimates of the true performance of the investment in LP15001.

Recommendations

Impact assessment is now a mature process within Hort Innovation. No recommendations are made for further refinement.

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Abbreviations and Acronyms

| | |
|-----------------|---|
| RD&E | Research, Development, and Extension |
| ABARES | Australian Bureau of Agricultural and Resource Economics and Sciences |
| ABS | Australian Bureau of Statistics |
| ACDA | Australian Council of Deans of Agriculture |
| AQF | Australian Qualification Framework |
| BCR | Benefit-Cost Ratio |
| CBA | Cost-Benefit Analysis |
| CLOs | Course Learning Outcomes |
| CRRDC | Council of Rural Research and Development Corporations |
| GVP | Gross Value of Production |
| Hort Innovation | Horticulture Innovation Australia Ltd |
| LOP | Life of Project |
| LU | Lincoln University |
| MBA | Master Business Administration |
| MIRR | Modified Internal Rate of Return |
| MyLO | My Learning Online |
| P&P | Practice of Portfolio |
| QILT | Quality Indicators for Learning and Teaching |
| SC | Steering Committee |
| TIA | Tasmanian Institute of Agriculture |
| UTAS | University of Tasmania |

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. |