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

Annex 9: Impact assessment of the project *Nursery industry statistics 2017/18 to 2019/20* (NY17008)

Delivery partner:

Ag Econ

Report author/s:

George Revell

Date:

9 August 2022

Disclaimer:

Funding statement:

This project has been funded by Hort Innovation, using multiple research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Publishing details:

Published and distributed by: Hort Innovation

Level 7
141 Walker Street
North Sydney NSW 2060

Telephone: (02) 8295 2300

www.horticulture.com.au

Contents

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 the project *Nursery industry statistics 2017/18 to 2019/20 (NY17008)*. The project was funded by Hort Innovation over the period July 2018 to May 2021.

Methodology

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

Results/key findings

NY17008 continued the nursery industry's commitment to generating detailed and relevant industry data and benchmarking resources to support improved business and industry level decisions and outcomes.

The impacts valued were:

- [Economic] Use of the benchmarking data and benchmarking tool to inform improved nursery business decision making, supporting increased productivity and profitability.

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

Investment criteria

Total funding from all sources for the project was $0.75 million (2021 equivalent value). The investment produced estimated total expected benefits of $3.14 million (2021 equivalent value). This gave a net present value of $2.39 million, an estimated benefit-cost ratio (BCR) of 4.20 to 1, an internal rate of return of 21% and a modified internal rate of return of 8%.

Conclusions

Discussion with industry stakeholders indicated that the nursery industry statistics (NIS) resources fed into and re-enforced existing business strategy and decision-making processes. In particular, the availability of relevant and detailed data and benchmarking resources provided increased confidence in decision making. While the extent to which increased confidence contributes to investment outcomes is relatively subjective, this analysis was informed by both detailed industry data and discussions with industry stakeholders to establish a sound framework.

Sensitivity testing showed that changes in underlying variables resulted in a BCR ranging from 1.50 to 6.90. Importantly, the sensitivity analysis showed a positive project impact for all tested ranges of the variables.

The analysis quantified private benefits accruing to nursery businesses. This benefit was calculated as increased business profit, being the difference between increased revenue and increased costs resulting from business investment. While the increased costs were not included in the private industry benefit, they would result in a corresponding spillover increase in income for employees and businesses providing those goods and services.

Keywords

Impact assessment, cost-benefit analysis, nursery, nursery industry statistics, data, benchmarking

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 NY17008 *Nursery industry statistics 2017/18 to 2019/20* 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 nursery industry has 1651 businesses, with industry revenue of $2.8 billion in 2021 (GIA 2022). Less than 1% of production is exported while imports account for less than 2% of domestic sales (Hort Innovation 2022a). There is a wide variation in businesses making up the Australian nursery industry, with differences in the type of plants produced, marketing channels served, and the scale of the business.

Producers in the nursery 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. Levy is payable on nursery products 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 nursery levy funds which are directed to R&D and marketing.

Rationale

The nursery industry's levy investments are guided by a Strategic Investment Plan (SIP). The Nursery SIP 2017-21 (under which NY17008 was delivered) identified "better industry data showing the value of industry, number of people employed and benefit to economy" as a key opportunity for Australia's nursery industry.

In line with this, the 2017 to 2018 project *Nursery industry statistics and research 2016/17 (NY16004)* produced an initial range of industry data related to the volume and value of nursery production, and also developed a prototype business benchmarking data tool. NY16004 sought to address challenges in nursery data collection by addressing product diversity and double counting of sales. However, industry capacity and reluctance to participate remained, so the project focused on improving the data culture by demonstrating the benefits of data for business and industry growth.

NY17008 was undertaken to build on the foundational methodology and recommendations of NY16004 to continue to improve the nursery industries data and benchmarking resources.

Alignment with the Nursery Strategic Investment Plan 2017-2021

NY17008 was aligned to Nursery SIP 2017-2021 Outcome 2 – Increased marketing effectiveness and efficiency and better decision making based on increased industry knowledge, Strategy 2.2 Obtain better industry intelligence, including value of industry, and people employed.

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 broadly to Science and Research Priority 1.

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

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

Project details

Summary

Table 2. Project details

Project code	NY17008
Title	Nursery Industry Statistics 2017-18 to 2019-20
Research organization	Greenlife Industry Australia
Project leader	Peter Vaughan
Funding period	July 2018 to May 2021

Logical framework

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

Table 3. Project logical framework

Activities	• For each of the three years: ○ Conduct interviews with participants and key industry stakeholder to review the data tool and to reassess data collection priorities. ○ Discuss the results of the interviews, the previous survey (initially *Nursery industry statistics and research 2016-17 (NY16004)* final report recommendations) and finalise the survey methodology and questionnaire. ○ Modify the questionnaire as necessary to reflect new priorities such as COVID-19 impacts on businesses. ○ Conduct Computer Assisted Telephone Interviews (CATI) between October and December each year with a random sample of greenlife production businesses (568 in 2018, 691 in 2019 and 761 in 2020) to collect the data. ○ Review the data and provided comment on any statistical variation in results by year or category. ○ Develop an Excel based production nursery business benchmarking tool each year.

	○ Prepare and extend a summary report each year in collaboration with *Australian nursery industry communications program (NY18001)* • In the final year of the project, apply Political, Economic, Sociological, Technological, Legal and Environmental (PESTLE) analysis to the nursery value chain to identify the key drivers and barriers for the industry, including through structured stakeholder interviews (using the Delphi method).
Outputs	• Three benchmarking reports for 2017-18, 2019-20, and 2021-21 providing industry data with a 95% confidence level for data including: greenlife volume, value, product type, supply channel, operating costs, business investment, industry sentiment, number of businesses and employees including employment type. • Improved user-friendly interactive online benchmarking tool developed and tested with industry; circulated to all project data contributors and levy payers on request. • Greenlife Market Report – PESTLE analysis of the key drivers and barriers for the industry.
Outcomes	• Improved quality of benchmarking data from an increased interview sample size (568 in 2018, 691 in 2019 and 761 in 2020). • More refined practices in data capture and benchmarking attributes in the data tool through enhanced feedback mechanisms. • A more user-friendly and interactive benchmarking tool resulting in more effective data analysis. • Nursery stakeholders, including nursery and supply chain businesses, and RDE& and policy stakeholders have increased access to recent, relevant, and reliable statistics on the nursery industry and greenlife produced in Australia. • Nursery businesses have access to an improved benchmarking tool to inform business decision making.
Impacts	• [Economic] Use of the benchmarking data and benchmarking tool to inform improved nursery business decision making, supporting increased productivity and profitability. • [Economic and social] Use of the data by industry to inform levy funded RD&E investments, supporting more effective RD&E outcomes. • [Economic and social] Use of the data by industry to inform data-driven policy development for the nursery industry, generating more effective policy outcomes. • [Social] Increased contribution to regional community wellbeing from larger and more profitable nursery businesses. • [Social] Increased supply of a wide range of nursery products, supporting increased purchases of nursery products with associated health and wellbeing benefits.

Project costs

Nominal investment

Table 4. Project nominal investment

Year end 30 June	Hort Innovation ($)	Other ($)	Total ($)
2019	266,204	0	266,204
2020	141,144	0	141,144
2021	184,620	0	184,620
Total	591,968	0	591,968

Program management costs

R&D costs should also include the administrative and overhead costs associated with managing and supporting the project. The Hort Innovation overhead and administrative costs were calculated for each project funding year based on the data presented in the *Statement of Comprehensive Income* in the *Hort Innovation Annual Report* for the relevant year. Where the overhead and administrative costs were equal to the total expenses, less the research and development and marketing expenses. The overhead and administrative costs were then calculated as a proportion of combined project expenses (RD&E and marketing), averaging 15.7% for the CT15017 funding period (2018-19 to 2020-21). 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

The project undertook communication and extension activities as part of the project, while coordinating with *Australian nursery industry communications program (NY18001)*. The extension outcomes were assessed to have largely been achieved through NY17008 activities, so no additional extension costs were included in the analysis.

Valuation of impact

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.

Impacts valued

The impact(s) valued were:

- [Economic] Use of the benchmarking data and benchmarking tool to inform improved nursery business decision making, supporting increased productivity and profitability.

Valuation method

Discussions with stakeholders indicated that Nursery Industry Statistics (NIS) data and benchmarking tool was used to inform and validate business decision making regarding strategy and ongoing investments. Nursery Industry Statistics showed that larger businesses had a higher rate of usage of the data and benchmarking tool compared to small businesses, and also the data was more likely to influence decision making for larger businesses. This was consistent with stakeholder consultation. An adoption rate was applied to the group of larger businesses based the NIS data showing the extent to which the NIS resources were used to inform decision making. For this adopting group the analysis used NIS data to calculate the costs and benefits of investments undertaken with the support of NY17008 NIS data and the benchmarking tool. Costs reflected NIS data showing business investment in new technology and infrastructure for 2019-20 to 2021-22 in line with the release of NIS resources. Benefits reflected NIS data showing increased throughput per hectare, and lower average operational costs per unit, resulting in increased profit relative to the pre-project average (2017-18 to 2018-19). The investments were assumed to generate benefits (increased profits) for a period of 10 years. Only a portion of the investments was attributed to NY17008 in line with stakeholder consultation that the NIS resources supported existing business strategy and decision making processes.

Impacts not valued

Not all of the impacts identified in Table 3 could be valued in the assessment, particularly where there was a lack of data to quantify the identified impact. Identified extension impacts not valued included:

- [Economic and social] Use of the data by industry to inform levy funded RD&E investments, supporting more effective RD&E outcomes.
- [Economic and social] Use of the data by industry to inform data-driven policy development for the nursery industry, generating more effective policy outcomes.
- [Social] Increased contribution to regional community wellbeing from larger and more profitable nursery businesses.
- [Social] Increased supply of a wide range of nursery products, supporting increased purchases of nursery products with associated health and wellbeing benefits.

Public versus private impacts

The impacts identified from the investment were predominantly private impacts accruing to nursery growers. However, some (unquantified) public benefits also have been produced in the form of industry R&D and policy capacity, and

spillovers to local communities from enhanced nursery productivity and profit, and an increased availability of a wide range of nursery products supporting associated health and wellbeing benefits.

Distribution of private impacts

This analysis quantified private benefits accruing to nursery growers. Additional spillover private impacts would be generated in the wider economy as a result of changes in nursery production and supply chain costs. These changes in nursery costs would result in spillover changes in income for businesses providing those goods and services. In addition, the combined private impacts (industry and spillover) will have been further redistributed depending on both short- and long-term supply and demand elasticities.

Impacts on other Australian industries

Findings from the project were specific to the Australian nursery industry and unlikely to have significant impacts on other industries.

Impacts overseas

The project had a focus on Australian nursery stakeholders, and is unlikely to have significant impacts overseas.

Data and assumptions

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

Table 5. Summary of assumptions for impact valuation

Variable	Assumption	Source / comment
Discount rate	5%	Impact assessment guidelines (CRRDC 2018)
Large nursery businesses	512	NIS data (GIA 2021 & 2022) for 2019-20 to 2020-21 for large nurseries (> $2 million revenue). Nursery Industry Statistics showed that larger businesses had a higher rate of usage of the data and benchmarking tool compared to small businesses, and also the data was more likely to influence decision making for larger businesses. This was consistent with stakeholder consultation.
Adoption rate	10.3% (± 10%)	NIS data (GIA 2021-2022) for 2019-20 to 2020-21 for large nurseries (> $2 million revenue), combining the reported business usage of NIS resources (average 34%), and level of influence on business decision making (10% indicated NIS data had a high influence, and 40% indicated a little influence, 30% average, tested across full range).
Adoption area (ha)	4849 (± 14%)	NIS data (GIA 2021 & 2022) for 2018 to 2021 for large nurseries (> $2 million revenue).
Investment per ha ($) in 2020-2022 supported by NY17008	$38,119 (± 14%)	NIS data (GIA 2021 & 2022) for 2019-20 to 2020-21 for large nurseries (> $2 million revenue). Adjusted to 2020-21 using ABS 2022. Investment period based off the release of NY17008 resources.
Duration of investment benefits	10 years	Analyst assumption based on a typical life of investment.
Average unit value ($/unit)	$1.6 (± 5%)	NIS data (GIA 2021 & 2022) for 2018-19 to 2020-21 using total units and sales value. Adjusted to 2020-21 using ABS 2022.
Average sales per ha before investment (units)	331,815	NIS data (GIA 2021 & 2022) for 2018-19 and turnover per hectare for large nurseries (> $2 million revenue) and average unit prices (for the whole industry as not

		specifically available for large nurseries).
Increased sales per ha with investment (units)	355,785 (± 2%)	NIS data (GIA 2021 & 2022) for 2019-20 to 2020-21 for and average unit prices (whole industry as not specifically available for large nurseries), and turnover per hectare for large nurseries (> $2 million revenue).
Average operational costs per ha before investment	$402,449	NIS data (GIA 2021 & 2022) for 2018-19 costs as a percentage of turnover per hectare for large nurseries (> $2 million revenue). Adjusted to 2020-21 using ABS 2022.
Average operational costs per ha with investment	$405,202 (± 1%)	NIS data (GIA 2021 & 2022) for 2019-20 to 2020-21 operational costs per hectare for large nurseries (> $2 million revenue). With increased costs per ha offset by increased production (units) per ha resulting in decreased costs per unit. Adjusted to 2020-21 using ABS 2022.
Average operational profit before investment	23.28%	Calculated based on the above figures.
Average operational profit with investment	27.96% (± 1%)	Calculated based on the above figures.
Change in profit attributable to business investment	75% (± 13%)	Assumption. The NIS data (GIA 2021 & 2022) reflects aggregate trends in sales and costs, which will be partly attributable to other factors outside of the business investment in new technology and infrastructure.
Extent to which NIS resources supported the business investment decision.	5% (± 50%)	Stakeholder consultation indicated that the NIS resources fed into and re-enforced existing business strategy and decision-making processes.
Individual nursery business investment metrics	IRR 37% (15% to 67%) MIRR 18% (10% to 30%) PBP (payback period) 5 years (4 to 8 years)	Calculated based on the above figures to check data and assumptions provide reasonable business level investment outcomes.

Results

All costs and benefits were discounted to 2020-21 using a real 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 (2020-21) as per the CRRDC Impact Assessment Guidelines (CRRDC 2018).

Investment criteria

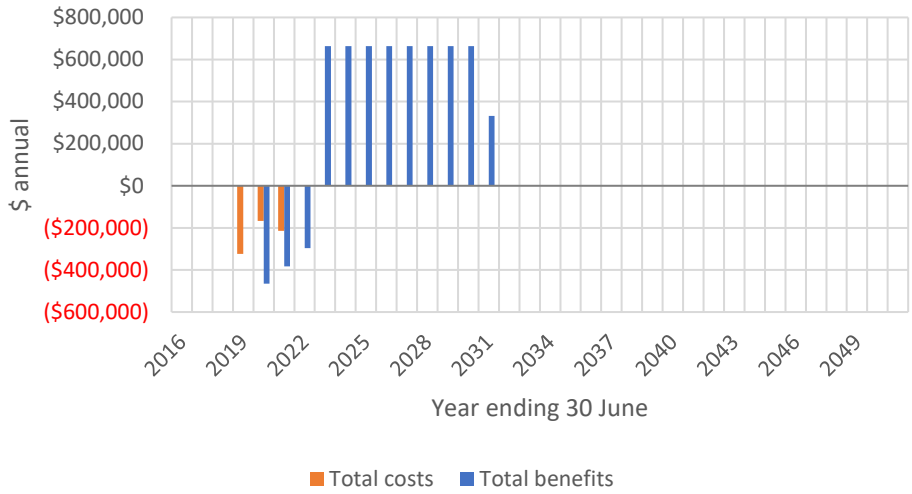
Table 6 shows the impact metrics estimated for different periods of benefit for the total investment.

Table 6. Impact metrics for the total investment in project NY17008

Impact metric	Years after last year of investment						
	0	5	10	15	20	25	30
PVC ($m)	0.75	0.75	0.75	0.75	0.75	0.75	0.75
PVB ($m)	-0.87	1.09	3.14	3.14	3.14	3.14	3.14
NPV ($m)	-1.62	0.34	2.39	2.39	2.39	2.39	2.39
BCR	-1.17	1.46	4.20	4.20	4.20	4.20	4.20
IRR	Negative	9%	21%	21%	21%	21%	21%
MIRR	Negative	8%	12%	10%	9%	8%	8%

Figure 1 shows the annual undiscounted benefit and cost cash flows for the total investment in NY17008. Cash flows are shown for the duration of the investment plus 30 years from the last year of investment.

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



Sensitivity analysis

A sensitivity analysis was carried out on key variables identified in the analysis where a data range was identified, or there was a level of uncertainty around the data (Table 7). Data ranges and sources are described in Table 5.

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

Variable		Low	Baseline	High
Discount rate	Variable range	3%	5%	8%
	BCR range	5.18	4.20	3.41
Adoption area (ha)	Variable range	435	504	573
	BCR range	3.47	4.20	4.94
Av price ($/unit)	Variable range	1.5	1.6	1.6
	BCR range	4.00	4.20	4.41
Units per ha with investment	Variable range	349,262	355,785	362,308
	BCR range	3.66	4.20	4.74
Costs per ha with investment	Variable range	403,009	405,202	407,394
	BCR range	4.61	4.20	3.79
Profit change attributable to new investment	Variable range	0.50	0.75	1.00
	BCR range	1.50	4.20	6.90
Extent to which NIS resources supported the business investment decision.	Variable range	0.025	0.050	0.075
	BCR range	2.10	4.20	6.30

Discussion and conclusions

The analysis showed that the quantified benefits were greater than the investment cost for NY17008, with a BCR 4.20:1. The results reflect the benefits of improved nursery industry data and benchmarking resources supporting more effective nursery business investments.

Sensitivity testing showed that changes in underlying variables resulted in a BCR ranging from 1.50 to 6.90. Importantly, the sensitivity analysis showed a positive project impact for all tested ranges of the variables. The results were most sensitive to the tested ranges of two inputs:

- Profit change attributable to new investment. The NIS data (GIA 2021-2022) used to quantify the benefits reflects aggregate trends in sales and costs. Changes in sales and costs would be partly attributable to other factors outside of business investments in new technology and infrastructure. An assumed attribution of 75% was used in the analysis and tested for sensitivity at 50% and 100%.
- Extent to which NIS resources supported the business investment decision. Discussion with industry stakeholders indicated that the NIS resources fed into and re-enforced existing business strategy and decision-making processes. In particular, the relevant and detailed NIS resources provided increased confidence in decision making. The extent to which investment outcomes can be attributed to increased confidence is a relatively subjective metric. A contribution of 5% was estimated based off discussions with stakeholders and tested for sensitivity at 2.5% and 7.5%.

As part of the analysis, business level investment criteria were calculated to double check all the data and assumptions, and resulted in reasonable business level investment outcomes of IRR 37% (15% to 67%), MIRR 18% (10% to 30%), and a PBP 5 years (4 to 8 years).

A lack of underlying data meant that there were economic and social outcomes identified but not quantified which had the potential to provide additional impact to the nursery industry. These included improved industry R&D and policy capacity, and spillovers to local communities from enhanced nursery productivity and profit, and an increased availability of a wide range of nursery products supporting associated health and wellbeing benefits.

The analysis quantified private benefits accruing to nursery businesses. This benefit was calculated as increased business profit, being the difference between increased revenue and increased costs resulting from business investment. While the increased costs were not included in the private industry benefit, they would result in a corresponding spillover increase in income for employees and businesses providing those goods and services.

The CRRDC Guidelines focusses on first round impacts, which calculates shifts in the supply and demand curves with no price effect. When considering these second-round price effects RD&E that focusses on increased productivity (through industry data and decision support resources) would support increased industry supply, and thereby put downward pressure on prices, effectively shifting some of the benefit from nursery businesses to consumers. The extent to which this would occur would depend on the slope of the supply and demand curves.

Acknowledgements

Ag Econ would like to acknowledge the input from the following:

Adam Briggs, Hort Innovation; Sarah Cumpston, Hort Innovation; Joanna Cave, Greenlife Industry Australia; Peter Jong, Jongs Nursery; Ashley Burns, Living Colour Nursery

References

Australian Bureau of Statistics (ABS) (2022). 5206.0 – *Australian National Accounts: National Income, Expenditure and Product, Dec 2021*. 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. Accessed July 2022.

Commonwealth of Australia (2015a). *Agricultural Competitiveness White Paper*. Retrieved from https://www.awe.gov.au/agriculture-land/farm-food-drought/agriculture-white-paper. Accessed July 2022.

Commonwealth of Australia (2015b). *Strategic Science and Research Priorities*. Canberra: Commonwealth of Australia. Retrieved from https://www.industry.gov.au/data-and-publications/science-and-research-priorities#:~:text=Australia%20depends%20on%20science%20and,and%20improve%20national%20well%2Dbeing. Accessed July 2022.

Council of Rural Research and Development Corporations (CRRDC) (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. Accessed July 2022.

Greenlife Industry Australia (GIA) (2021). *Nursery industry statistics 2017/18 to 2019/20 (NY17008).* Final report, funded by Hort Innovation using the nursery research and development levy and contributions from the Australian Government. Retrieved from https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/ny17008/. Accessed July 2022.

Greenlife Industry Australia (GIA) (2022). *2020-21 Production Nursery Data Capture Report.* Funded by Hort Innovation as part of *Nursery Industry Statistics 2020-21 to 2024-25 (NY21000)*, using the nursery research and development levy and contributions from the Australian Government. Received from Hort Innovation June 2022.

Hort Innovation (2017). *Nursery Strategic Investment Plan 2017-2021*. Retrieved from https://www.horticulture.com.au/globalassets/hort-innovation/levy-fund-financial-and-management-documents/sip-pdfs-new/hortinnovation-sip-nursery-2017-2021.pdf. Accessed June 2022.

Hort Innovation (2022a). *Horticulture Statistics Handbook 2012-13 to 2020-21*. Received from Hort Innovation pers comm. Data available https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/grower-resources/ha18002-assets/australian-horticulture-statistics-handbook/

Hort Innovation (2022b). *Nursery Strategic Investment Plan 2022-2026*. Retrieved from https://www.horticulture.com.au/globalassets/hort-innovation/levy-fund-financial-and-management-documents/sip-2022-2026-pdfs/hort-innovation-sip-2022-26-nursery.pdf. Accessed June 2022.

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.
Payback period	The time it takes to repay the upfront costs and start generating a positive return on the investment.
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

PBP Payback period

PVB Present Value of Benefits

PVC Present Value of Costs

RD&E Research, Development and Extension

SIP Strategic Investment Plan