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International Agricultural Research

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program



2

ACIAR OUTCOME
EVALUATION SERIES

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program

Clare Hanley and Luke Passfield
Alinea International



2022

The Australian Centre for International Agricultural Research (ACIAR) was established in June 1982 by an Act of the Australian Parliament. ACIAR operates as part of Australia's international development assistance program, with a mission to achieve more productive and sustainable agricultural systems, for the benefit of developing countries and Australia. It commissions collaborative research between Australian and developing-country researchers in areas where Australia has special research competence. It also administers Australia's contribution to the International Agricultural Research Centres.

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Foreword

This report is the second in a new series of reports that are based on outcome evaluations of research programs supported by the Australian Centre for International Agricultural Research (ACIAR). ACIAR initiates, brokers, funds and manages international research partnerships between scientists from Australia and partner countries in the Indo-Pacific region to improve the productivity and sustainability of agriculture, fisheries and forestry for smallholder farmers.

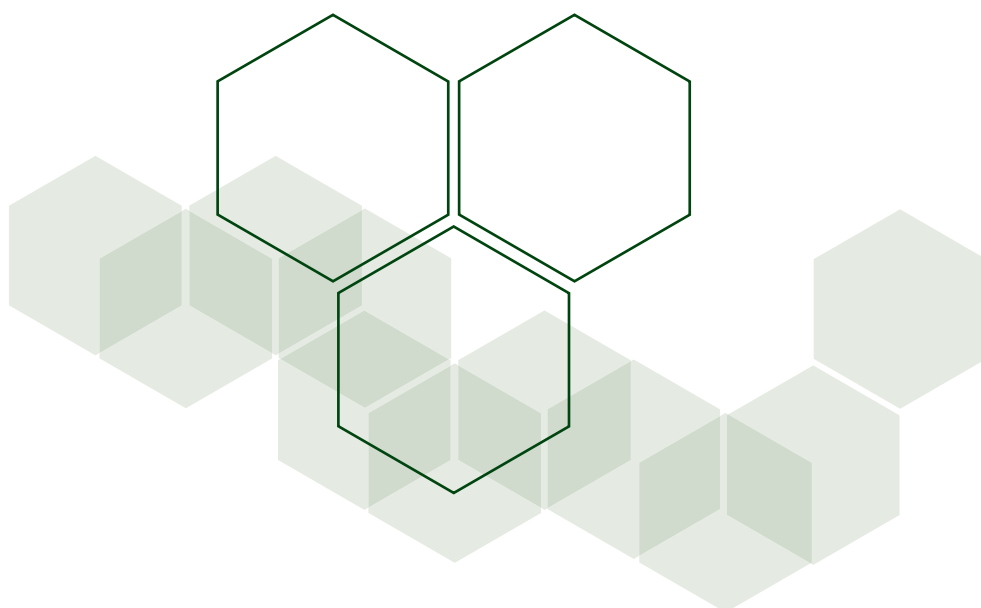
As a learning organisation, ACIAR is committed to understanding the diverse outcomes delivered by the research collaborations we develop, to demonstrate the value of investment of public funds, to inform research design and to boost the capacity of our research to improve the lives of farming communities in partner countries. An important mechanism for achieving our aims is to work closely with the wider Australian aid program to transition promising research into better agricultural practices and more profitable enterprises at scale.

This report presents a suite of evaluations of the Transformative Agriculture and Enterprise Development Program (TADEP), co-funded by the Department of Foreign Affairs and Trade (DFAT) and ACIAR from 2015 to 2021. The program was an opportunity for the 2 agencies to promote agricultural development in Papua New Guinea by leveraging a foundation of strong scientific research. It focused on opportunities to scale up successful innovations from previous ACIAR projects focused on cocoa, galip nut and sweetpotato, as well as a project developing extension methodology through the family farm teams approach. The program was also an opportunity to engage the private sector, expanding reach of the projects over larger areas and to more people. The DFAT and ACIAR investment sought to deliver efficiencies and co-benefits by linking a group of 5 projects into a programmatic structure.

The evaluations ultimately seek to understand the value that this programmatic structure delivered and identify lessons for future research-for-development investments. To inform these insights, a series of project-level outcome evaluations were conducted to see how the funded projects contributed to short-term development outcomes. Outcome evaluations adopt a largely qualitative, theory-based approach and seek to empirically test project logic and underpinning assumptions. These outcome evaluations are also intended to generate data for cross-case analysis that, over time, will help us to improve our research-for-development practice.



Andrew Campbell
Chief Executive Officer, ACIAR



An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program

| | |
|---|------------|
| Part 1: Programmatic approach | 1 |
| Part 2: PNG cocoa project | 43 |
| Part 3: Bougainville cocoa project | 81 |
| Part 4: Galip nut project | 125 |
| Part 5: Sweetpotato project | 169 |
| Part 6: Family Farm Teams project | 207 |



Part 3: Bougainville cocoa project

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program Bougainville cocoa project

Abbreviations and acronyms

| | |
|----------------|---|
| ABG | Autonomous Bougainville Government |
| ACIAR | Australian Centre for International Agricultural Research |
| ARoB | Autonomous Region of Bougainville |
| ASLP | Agriculture Sector Linkages Program |
| BACRA | Bougainville Agricultural Commodities Regulatory Authority |
| CB | Cocoa Board |
| CCI | Cocoa and Coconut Research Institute Limited |
| CFHF | Cocoa Farming Health Framework |
| CRG | Collaborative Research Grant |
| DFAT | Department of Foreign Affairs and Trade (Australia) |
| DoH | Department of Health |
| DPI | Department of Primary Industries |
| FFT | Family Farm Teams |
| IPDM | Integrated Pest and Disease Management |
| KEQ | Key Evaluation Question |
| PNG | Papua New Guinea |
| PPAP | Productive Partnerships in Agriculture Project |
| R&D | Research and Development |
| RPM | Research Program Manager |
| TADEP | Transformative Agriculture and Enterprise Development Program |
| UNRE | PNG University of Natural Resources and Environment |
| VEW | Village-level extension worker |
| VRC | Village Resource Centre |

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Part 3 contents

| | |
|--|------------|
| Abbreviations and acronyms | 82 |
| Acknowledgements | 82 |
| Summary | 84 |
| Key findings..... | 85 |
| Conclusion and lessons learned..... | 89 |
| Introduction | 91 |
| Purpose, scope and audience..... | 91 |
| Methodology | 93 |
| Data collection and analysis..... | 93 |
| Limitations..... | 93 |
| Ethical considerations..... | 94 |
| Overview of project | 95 |
| Context..... | 95 |
| The project..... | 96 |
| Findings | 97 |
| 1. What was the project’s theory of change and how did this evolve during implementation?..... | 97 |
| 2. What outcomes (intended and unintended) has the project achieved or contributed to?..... | 99 |
| 3. How did project activities and outputs contribute to the outcomes achieved?..... | 106 |
| 4. What strategies were adopted to address gender equity and social inclusion and how effective were these?..... | 108 |
| 5. How did management arrangements impact delivery of the project?..... | 110 |
| 6. How well did the project align with and contribute to the overall goals of its umbrella program?..... | 112 |
| Conclusions and lessons learned | 114 |
| References | 116 |
| Appendices | 117 |
| Appendix 3.1: Stakeholders consulted..... | 117 |
| Appendix 3.2: Theory of change..... | 118 |
| Appendix 3.3: Project team members..... | 119 |
| Appendix 3.4: Research outputs..... | 120 |
| Appendix 3.5: Evaluation framework..... | 122 |

Summary

From 2015 to 2021, the Australian Centre for International Agricultural Research (ACIAR) oversaw the Transformative Agriculture and Enterprise Development Program (TADEP), which was a multidisciplinary research program that aimed to improve the livelihoods of rural men and women in Papua New Guinea (PNG). The program involved 5 research-for-development projects: PNG cocoa, Bougainville cocoa, galip nut, sweetpotato and Family Farm Teams.

This evaluation focuses on 'Developing the cocoa value chain in Bougainville' (HORT/2014/094), known as the 'Bougainville cocoa project'. This project sought to **improve the profitability and vitality of smallholder cocoa farming families and communities in Bougainville**. It was implemented from February 2016 to December 2022.

The project focused on improving productivity on cocoa farms, improving the efficiency of the cocoa value chain, increasing the diversity of farming family income, and improving the health and nutrition of cocoa farming families. It operated through a 'hub and spoke' model wherein the project built the capacity of village-level extension workers (VEWs) and linked them to regional hubs where they could access training and support. It was anticipated these VEWs would share their knowledge with other farming families. This capacity building was coupled with support for farmers to set up small enterprises to deliver improved production and processing services to increase the quality of cocoa produced, and support to improve marketing to increase sales.

To build evidence and raise awareness of health-related factors affecting agricultural productivity, the project led a large-scale livelihoods survey across Bougainville, and a village-level integrated health and farming initiative building on the survey's findings through a TADEP Collaborative Research Grant (CRG).

The project addressed the following objectives and research questions:

1. To improve the productivity, profitability and sustainability of cocoa farming and related enterprises.
Key research question: Among the many technologies available for intensification of cocoa production, which options and combinations are most appropriate to the social and biophysical context of Bougainville?
2. To understand and raise awareness of the opportunities for improved nutrition and health to contribute to agricultural productivity and livelihoods.
Key research question: To what extent is poor health and nutrition a barrier to improved agricultural labour capacity and living standards?
3. To foster innovation and enterprise development at community level.
Key research question: Can public sector research and development (R&D) investment catalyse enterprise development leading to diversified and stable incomes and improved social outcomes for cocoa farming families?
4. To strengthen value chains for cocoa and associated horticultural products.
Key research question: How can market access and value chain efficiency for cocoa and other farm and garden outputs of Bougainville be enhanced to improve farm family livelihoods?

The budget for the project was A\$5,994,982.

This project evaluation is Part 3 of a suite of evaluations of TADEP, which assess the effectiveness of each of the 5 individual projects (Parts 2–6) and the lessons learned from the overall TADEP programmatic approach (Part 1).



Ano Yonda holds a tablet while Mark Aik (left), Francis Kui (right) and Juponse Bocosou (2nd from right) inspect holes in the base of a *Canarium* tree left by borers as part of the TADEP mobile acquired data research series. Photo: Conor Ashleigh, ACIAR



Key findings

1

What was the project's theory of change and how did this evolve during implementation?

The project's core proposition is that higher yields of cocoa beans can be achieved when farm families adopt intensified management practices and whole family extension approaches. Intensified cocoa production will release land for other farming activities such as food crops and small livestock, leading to diversified incomes and improved nutritional outcomes. Furthermore, better fermentation and drying procedures will produce higher quality beans that will, when linked through more efficient value chains, return significantly higher prices.

The limited data on project outcomes means that it is difficult to determine the accuracy of some of the causal linkages. It appears that the training and demonstration approach adopted by the project, as well as building awareness of cocoa quality issues through activities such as the Chocolate Festival, are leading to greater awareness and implementation of improved cocoa farming practices by Village Extension Workers (VEWs). The extent to which this is delivering higher yields and sales of standard quality cocoa in the broader farming community, as well as increased income from non-cocoa farming produce, is not yet known, although there are promising indications. The assumption that producing higher quality cocoa combined with greater marketing knowledge will result in increased incomes has not yet proven true. This is due to unexpected export barriers, wherein farmers have not been able to obtain new export licences from the Cocoa Board (CB), which would have enabled them to make international sales and earn higher prices for premium quality cocoa. As the impact of the Family Farm Teams (FFT) approach had not been assessed at the time of this evaluation, it is not clear whether assumptions around outcomes for women and youth will hold true.

Reflecting on assumptions that have not held true, such as the ability to export cocoa and proposals to establish regional hubs and Village Resource Centres (VRCs), it appears that **undertaking more thorough market analysis at the outset of projects, including a focus on political economy factors and potential structural barriers to market access**, would have been useful to inform the project design. In addition, a participatory design process with key stakeholders could have helped to ensure that the establishment of hubs and resource centres were more likely to be feasible in practice.

Key findings (cont.)

2

What outcomes (intended and unintended) has the project achieved or contributed to?

The widespread recognition of the nexus between health and agricultural productivity generated through the livelihoods survey was a significant outcome of the project. The depth and relevance of evidence garnered through the survey and broad dissemination of findings resulted in the survey findings gaining traction on what was a largely invisible area of agricultural policy and practice. It has increased understanding that siloed approaches to improving the viability of cocoa farming are unlikely to be effective or sustainable and has influenced the thinking of both government and other development partners.

The project appeared to be **increasing the knowledge and capacity of many VEWs to implement new cocoa farming practices** that improve the quality and quantity of their yield as well as supplementary production. There were indications that activities such as the Chocolate Festival and demonstration of post-harvest fermentation and drying practices are improving understanding of quality issues, and that some farmers are adopting new practices to increase the quality of their produce. As mentioned above, export barriers currently undermine opportunities to earn additional income through production of premium quality cocoa. Complementary cropping and goat husbandry are being trialled by VEWs in many areas (with some challenges related to goat husbandry) and there are examples of VEWs having registered their family businesses and established small enterprises building on skills gained through the project. However, there is not yet sufficient evidence to assess the breadth of adoption of these activities – by VEWs or other farmers – or their impact on economic outcomes for farmers.

Capacity development of project partners (namely Bougainville Department of Primary Industries (DPI) and the CB) appeared to be strong in terms of **building extension officers' capacity to manage research and support improved agricultural practices**. In addition, capacity-building activities have increased the ability of DPI to monitor and assess cocoa quality and trial chocolate production. **However, government resourcing constraints present significant risks for sustainability of this capacity development**. First, access to land and budget constraints present a risk to the viability of DPI's continued resourcing of regional hubs beyond the project. Without a formal support system linking VEWs to extension services, it is unclear how they will continue to implement new knowledge and practices or act as peer educators at the village level. Second, while capacity developed through the DPI chocolate laboratory is reported to have increased, broader institutional capacity of DPI officers remains low and a more structured approach to capacity development should be considered for future projects. The absorption of the Cocoa Coconut Institute Ltd (CCI) into the CB was a significant setback to capacity building and project outcomes, demonstrating the challenges of working in a context such as Bougainville.

The project pursued community outcomes relating to women and youth by ensuring inclusion of women in program activities, implementation of the FFT approach, as well as health-related outcomes advanced through the CRG pilot. While there were difficulties meeting targets for the number of women VEWs engaged in the project, women were well represented in training and other project activities. Data is not yet available on the outcomes of the FFT approach, and whether women's involvement in the project contributed to their control over income.



How did project activities and outputs contribute to the outcomes achieved?

The project's multidisciplinary approach was a key success factor. The focus on health-related factors influencing agricultural productivity allowed the project to expand knowledge and thinking on profitability, productivity and sustainability of the cocoa industry beyond technical aspects. The depth and credibility of the livelihoods survey, as well as strong relationships built through the process and wide dissemination of findings, were key to its influence on government and development partners.

While the project sought to address supply and demand, **demand-side barriers associated with the restrictive export market proved to be entrenched and have undermined incentives for the supply of premium quality cocoa.** The establishment of the Bougainville Agricultural Commodities Regulatory Authority (BACRA) in coming years may help to address these barriers, at which point international marketing and export support activities will become relevant. In the meantime, while improved marketing knowledge may better position farmers to negotiate with buyers, the inability to earn higher prices from premium quality cocoa exports is likely to limit farmers' uptake of practices to produce premium quality products.

Institutional capacity and resourcing within the CB and DPI are a challenge for uptake of the project's outputs. The absorption of CCI into the CB undermined capacity development and continuity, and budget limitations within DPI pose a risk to their ability to continue implementation of the 'hub and spoke' model beyond the project.



What strategies were adopted to address gender equity and social inclusion and how effective were these?

Promoting gender equity and community wellbeing was a key part of the project's aim. Key strategies to pursue this included setting a 40% target for participation of women as VEWs and in training, and integrating FFT training modules into the project's training approach. Gender disaggregated data obtained by the evaluation team indicated limited involvement of women in VEW roles (3 of 33 VEWs were women) but stronger participation by women was seen in training activities. Beyond participation in project activities, the key approach for pursuing gender equity outcomes was integrating FFT modules into the project's training approach. While this training was reported to have been well received, there is limited information available about whether or how it contributed to gender-related outcomes. Future projects could benefit from a more strategic approach to gender and social inclusion, and additional monitoring of intended and unintended consequences of approaches to women's empowerment throughout implementation.

Key findings (cont.)

5

How did management arrangements impact delivery of the project?

Project partners welcomed the **collaborative and respectful relationships between project team members in PNG and Australia**. Several issues arose relating to the management arrangements between the project team, ACIAR and the Department of Foreign Affairs and Trade (DFAT). In particular, there was a breakdown in relationships associated with the Chocolate Festival, which had significant negative impacts for the project. As key decision-makers, it was critical that DFAT, ACIAR and project teams share expectations of project results, management arrangements and priorities, and all projects put in place mechanisms to ensure these are achieved. One government partner also indicated that the relationship between their staff's existing work and the project objectives and activities needed greater clarity. Although there were indications this was undertaken at the start of the project, investing time to revisit these arrangements as required (particularly following shifts in staffing arrangements) would be valuable.

6

How well did the project align with and contribute to the overall goals of TADEP?

The project aligned well with several goals of TADEP. While the Bougainville cocoa project gained a lot from the FFT project, there is no evidence that other projects are drawing on lessons or findings from the Bougainville cocoa project for their implementation. The value of TADEP for this project was derived from accessing CRGs, which facilitated the FFT approach being applied in this project, and supporting health-related activities that were outside the scope of the original project proposal. Opportunities to share knowledge and learning and build networks are particularly valuable for staff based in PNG. All stakeholders expressed frustration at the high volume of reporting requirements.

Conclusion and lessons learned

The clear success story of this project was the livelihoods survey, which brought to light critical health-related factors underpinning cocoa farming productivity. The survey is consistently highlighted as a major achievement that is already influencing the thinking and practice of the Autonomous Region of Bougainville (ARoB) and development partners. In terms of improved agricultural practices, the project appeared to successfully build knowledge of intensified cocoa farming practices as well as crop diversification approaches, although goat husbandry has been more problematic. These results point to the utility of a 'hub and spoke' model for disseminating knowledge and skills at the village level, where extension services are in short supply. However, the challenges faced in establishing a 'hub and spoke' model and questions over DPI capacity and resourcing mean it is not clear that the model can be sustained beyond the project's life.

In terms of post-harvest processing and translating improved production into sales and income, the project faced greater obstacles. Demonstration of fermentation and new drying practices progressed well, and building capacity of the DPI Chocolate Laboratory appeared to be supporting early efforts to monitor quality and develop new chocolate making technologies. However, there is not yet data available to indicate how widespread or embedded adoption of these post-harvest practices is within target villages. Incentives to pursue high-quality cocoa production appear to be the key barrier, with the current restrictive export market negating the possibility of earning increased income through production of premium quality cocoa.



A farmer in the Autonomous Region of Bougainville inspecting his cocoa crop. Photo: Conor Ashleigh, ACIAR

Lessons learned

Key lessons learned through this project for future ACIAR programming include:

- 1. The multidisciplinary approach to this project and its focus on health-related factors affecting agricultural productivity is a core strength.** This in-depth research demonstrates the value that ACIAR projects can offer in providing a robust and compelling evidence base on the complex social issues that influence agricultural productivity, beyond technical factors, to inform policy and programs.
- 2. Undertaking market analysis at the outset of projects, including a focus on political economy factors and potential structural barriers to market access, would be useful to identify risks to the achievement of project objectives.** This is particularly important when policy change is a prerequisite to achieving project outcomes.
- 3. Time and resources need to be invested at the outset of projects to clarify the expectations, roles and responsibilities, and management and decision-making arrangements for all project partners and stakeholders** and this may need to be revisited throughout implementation if key personnel change. A theory of change process with key partners (such as DFAT, ACIAR, project teams and government stakeholders) could be useful for establishing expected results and timeframes.
- 4. Undertaking gender and social inclusion analysis and putting in place a strategy to advance gender equality and women's empowerment as well as inclusion of diverse groups and people with disability** would drive a more strategic approach to ensuring these groups benefit from projects. While it is positive that this project delivered FFT training at its outset to promote a gender equitable approach, additional ongoing monitoring and analysis on the adoption and outcomes of this approach is required to ensure outcomes related to gender and social inclusion are being progressed as planned, and there are no negative unintended consequences.
- 5. Greater consideration of how approaches developed through projects (models for extension services, marketing, and so on) will be institutionalised,** and how the capacity required to sustain these approaches can be built in relevant institutions, could increase the likelihood of uptake of project outputs by government partners. While it is not expected that all models set up through a research project would continue after the project concludes, it would be valuable for the research to include a focus on what would be required for the model to be sustainable. This will help governments and donors make an informed assessment as to whether the new model should be adopted.
- 6. The value of TADEP CRGs demonstrates both how an umbrella program can facilitate resourced, structured collaboration across projects as well as the need for mechanisms to enable projects to build on emerging findings and adapt to contextual changes** throughout implementation.

Introduction

Purpose, scope and audience

Since 1982, the Australian Centre for International Agricultural Research (ACIAR) has brokered and funded research partnerships between Australian scientists and their counterparts in developing countries. As Australia's specialist international agricultural research-for-development agency, ACIAR articulates its current mission as 'achieving more productive and sustainable agricultural systems, for the benefit of developing countries and Australia, through international agricultural research partnerships'. ACIAR receives a direct funding appropriation from the official development assistance budget, as well as contributions for specific initiatives from external sources including the Department of Foreign Affairs and Trade (DFAT).

From 2015 to 2021, ACIAR managed the Transformative Agriculture and Enterprise Development Program (TADEP) in Papua New Guinea (PNG). The program focused on opportunities to scale up successful innovations from previous ACIAR projects in PNG, with impetus provided by private sector involvement, over larger areas and for more people. It was expected to achieve economic benefits, especially increased employment and incomes in rural areas, and enhanced rural-urban supply chains. It worked in the sectors of greatest benefit to rural communities and had a particular focus on the empowerment of women and commodities that could be brought to market.

ACIAR commissioned project-level evaluations of the TADEP projects shown in Table 7 to identify lessons that will inform the design and implementation of future ACIAR projects and improve the quality of outcomes. These evaluations form Parts 2–6 of Outcome Evaluation 2.

Drawing on these project evaluations, the program-level evaluation (Outcome Evaluation 2, Part 1) includes an analysis of the program structure and the value-add from these management arrangements.

A similar evaluation has been undertaken for the ACIAR Agriculture Sector Linkages Program (ASLP) in Pakistan (Outcome Evaluation 1), and the ASLP and TADEP evaluations will be synthesised into a final report to outline common lessons from ACIAR programs (Outcome Evaluation 3).

This evaluation focuses on the commodity-specific Bougainville Cocoa project.

Purpose

The project-level evaluation has 2 key purposes:

1. Compile performance information from each project under a program and investigate the contribution to specific project outcomes, with a particular focus on differential effects for women and men.
2. Generate project-level case studies for use in a qualitative cross-case analysis.

Table 7 Projects in TADEP

| Program / Project | Project full name |
|--------------------|---|
| PNG cocoa | Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland and Chimbu provinces of Papua New Guinea |
| Bougainville cocoa | Developing the cocoa value chain in Bougainville |
| Sweetpotato | Supporting commercial sweetpotato production and marketing in the Papua New Guinea highlands |
| Galip Nut | Enhancing private sector-led development of the <i>Canarium</i> industry in Papua New Guinea |
| Family Farm Teams | Improving opportunities for economic development for women smallholders in rural Papua New Guinea |

Scope

This project-level evaluation assesses 'Developing the cocoa value chain in Bougainville' (HORT/2014/094), known as the Bougainville cocoa project. It provides an assessment against the following key evaluation questions:

1. What was the project's theory of change and how did this evolve during implementation?
 - Was the theory of change appropriate to the project context and desired results?
2. What outcomes (intended and unintended) has the project achieved or contributed to?
 - What was the unique knowledge contribution of the project/cluster that was/is expected to influence practice/policy?
 - To what extent is there evidence of adoption of new practices based on research process and findings?
3. How did project activities and outputs contribute to the outcomes achieved?
 - To what extent and how did they differ from what was planned?
4. What strategies were adopted to address gender equity and social inclusion and how effective were these?
 - How did the project impact men and women differently?
5. How did management arrangements impact delivery of the project?
 - What other factors influenced project performance?
6. How well did the project align with and contribute to the overall goals of its umbrella program?
 - To what extent has the programmatic approach added value at project level?

Audiences

The primary audience for this evaluation is ACIAR staff with direct responsibilities for programs and/or their constituent projects. This includes Canberra-based research program managers (RPMs) and country network managers and coordinators.

Methodology

Data collection and analysis

Data was primarily drawn from existing project reports and reviews, supplemented by 9 semi-structured interviews with stakeholders. Stakeholders were intentionally selected in consultation with Australian Centre for International Agricultural Research (ACIAR) and the project leader (see Appendix 3.1). Interviews were conducted online using Zoom and WhatsApp, and via telephone. Thematic analysis of data collected through these processes was undertaken using NVivo qualitative data analysis software to distil findings.

ACIAR working definitions and assessment frameworks for project outputs, outcomes and 'next users' were used to analyse, categorise and summarise findings (see Table 8). In addition, the report assesses economic outcomes which are a core expectation of the project. Preliminary findings were shared and tested in a project validation workshop involving the stakeholders previously consulted. These workshops provided the opportunity to 'ground-truth' the assessments, identify any key issues not addressed, clarify any areas of uncertainty, and correct any misinterpretations. A draft evaluation report was then prepared for review by ACIAR and finalised in accordance with feedback received.

Limitations

The evaluation relied heavily on data produced through project analysis and reporting. This was a limitation because ongoing monitoring of adoption and outcomes was limited during implementation, and the end-of-project data was not available to provide substantive data on project outcomes. In addition, some data collected by the project team has not yet been analysed. Therefore, assessments made in this report often rely on stakeholders' reflections or anecdotal reports.

Conducting online and telephone interviews presented a series of limitations. During phone and Zoom interviews, the connection was sometimes poor, making it difficult to clearly hear all that the interviewee said. Interviews were conducted in English, which may have led to communication barriers, although these were not perceived to have been significant. The evaluator had limited ability to build rapport with participants and interpret non-verbal communication.

Consultations mostly focused on implementing partners and project staff. The evaluator was unable to visit project sites or speak with direct beneficiaries of the project. Interviewees for the project were intentionally selected by ACIAR and the project leader (so they were not a representative sample). Given the selection process, it is also likely that respondent experiences fall at the positive end of the spectrum, meaning data from interviews is likely positively biased.

Table 8 ACIAR project outcome assessment terminology

| Outputs | Next users | Outcomes |
|---|--|---|
| Scientific knowledge: New knowledge or current knowledge tested in other conditions, locations, etc. | <ul style="list-style-type: none"> Individual scientists/researchers/ agricultural professionals Individuals responsible for the management of research or a government institution | Scientific achievement: Researchers use scientific knowledge outputs to make new discoveries or do their work differently |
| Technologies: New or adapted technologies and products that offer added value to intended end users | <ul style="list-style-type: none"> Producers that the project engages directly or influences outside its immediate zone of operation (for instance, at scale), including crop and livestock producers as well as fisherfolk | Capacity built: Project partners or stakeholders use enhanced capacity to do something differently |
| Practices: New practices and processes | <ul style="list-style-type: none"> Public and private extension service providers | Innovation enabled: Includes the adoption of improved technologies, systems or processes, access to new markets, or changes in the opinions or practices of policymakers and advocates |
| Policy: Evidence for policy formulation | <ul style="list-style-type: none"> Public policy actors | |
| Capacity building: Short courses, academic training, coaching and mentoring | <ul style="list-style-type: none"> Public and private value chain operators Consumers | |

Ethical considerations

The evaluation was conducted in accordance with the *DFAT Monitoring and Evaluation Standards (2017)*. This included considering:

- **Informed consent:** All participants in consultations were provided with a verbal overview of why they are being consulted, how the information will be used and that their participation is voluntary prior to the consultation. Consultations were only undertaken once verbal consent was obtained.
- **Privacy and confidentiality:** The identity of any program beneficiaries involved in the evaluation is protected. Key informants in professional roles may be referred to by their position title in the report where explicit consent has been obtained; otherwise they are referred to as a representative of the organisation they work with.



Bougainville farmer Rodney Panaki in his cocoa block just outside Buka town. Photo: Aaron English

Overview of project

| | |
|-----------------------------------|---|
| Project number | HORT/2014/094 |
| Project title | Developing the cocoa value chain in Bougainville |
| Collaborating institutions | University of Sydney Autonomous Bougainville Government (ABG) Department of Primary Industries and Marine Resources Cocoa Board of PNG (CB) University of Natural Resources and Environment, Vudal |
| Project leaders | Professor David Guest AM, University of Sydney Professor Merrilyn Walton AM, University of Sydney |
| Project duration | February 2016 to December 2022 |
| Funding | A\$5,994,982 |
| Countries involved | Australia and Papua New Guinea (Autonomous Region of Bougainville) |
| Commodities involved | Cocoa |
| Related projects | ASEM/2014/094 Family Farm Teams HORT/2014/096 PNG cocoa |

Context

Cocoa production directly supports about two-thirds of the population in the Autonomous Region of Bougainville (ARoB) (Guest et al. n.d.).

Arising from the post-conflict environment, many cocoa farming communities in Bougainville have formed themselves into cohesive communities with clear goals and objectives. These communities have specifically requested assistance to better their circumstances in the major areas impacting their lives – profitable crops and better access to healthcare. However, the potential benefits of improved cocoa management have not yet been realised because of poor access to extension support, limited labour availability and inefficient cocoa supply chains. Indeed, cocoa production in ARoB has been falling since 2009, with reduced productivity and profitability associated with ageing trees and increasing damage from the invasive cocoa pod borer. While farmers grow most of their own food, cocoa farming has long been the main source of cash income for education and healthcare for rural communities, with returns hampered by pest and diseases losses, poor crop management, improper fermentation and drying, and difficulties in labour supply and market access.

During the Bougainville conflict (1988–1998), **the large cocoa plantations that produced around a quarter of Bougainville's cocoa were abandoned and smallholder production collapsed**. In the early 2000s, efforts were made to revitalise the industry through distribution of seeds and recovery of processing capacity. However, **yield losses caused by the poor management of ageing trees and the incursion of cocoa pod borer** in 2009 led many farmers, particularly in the south of Bougainville, to abandon their cocoa, causing production to fall. In addition, there has been continuing frustration caused by the **limited availability of new planting materials, lack of extension support, labour shortages, variable bean quality and poor market linkages**.

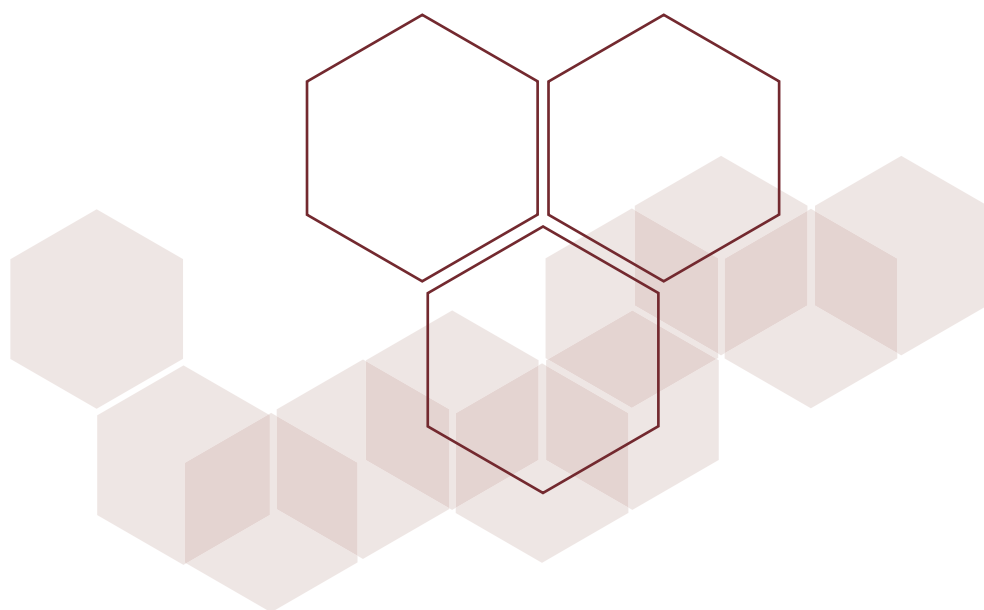
The cocoa industry in Bougainville has proven resilient and able to recover relatively quickly from periods of crisis. However, poor productivity and profitability of cocoa farming under current agricultural practices is a key challenge to the sustainability of cocoa farming in Bougainville. **Intensification of cocoa production relies on improved varieties and management practices of cocoa, improved post-harvest processing, engaging with farming communities to address health, education and food security issues which affect labour capacity and allocation, and access to profitable markets**.

The project

Within the broader development goal of contributing to the sustainable and socially equitable economic development of Bougainville, the specific aim of this project (HORT/2014/094) is **to improve the profitability and vitality of smallholder cocoa farming families and communities in Bougainville**. This is to be achieved by fostering and strengthening public and private sector partnerships, and facilitating the development of enterprises that enhance productivity and access to premium markets, while promoting gender equity as well as community wellbeing.

The project addressed the following objectives and research questions:

1. To improve the productivity, profitability and sustainability of cocoa farming and related enterprises.
Key research question: Among the many technologies available for intensification of cocoa production, which options and combinations are most appropriate to the social and biophysical context of Bougainville?
2. To understand and raise awareness of the opportunities for improved nutrition and health to contribute to agricultural productivity and livelihoods.
Key research question: To what extent is poor health and nutrition a barrier to improved agricultural labour capacity and living standards?
3. To foster innovation and enterprise development at community level.
Key research question: Can public sector research and development (R&D) investment catalyse enterprise development leading to diversified and stable incomes and improved social outcomes for cocoa farming families?
4. To strengthen value chains for cocoa and associated horticultural products.
Key research question: How can market access and value chain efficiency for cocoa and other farm and garden outputs of Bougainville be enhanced to improve farm family livelihoods?





Findings

1. What was the project's theory of change and how did this evolve during implementation?

Project theory of change

The project **goal** is to contribute to the sustainable and socially equitable economic development of Bougainville. The **aim** is to improve the profitability and vitality of smallholder cocoa farming families and communities. The project sought to achieve this by fostering and strengthening public and private sector partnerships, and facilitating the development of enterprises that enhance productivity and access to premium markets, while promoting gender equity as well as community wellbeing.

While the project did not explicitly develop a theory of change, the project team did document impact pathways, which linked various research activities with higher-level outcomes or impacts. The theory of change diagram at Appendix 3.2 draws on this impact pathway and stakeholder consultations, and depicts the theory of change as understood by the evaluation team. Importantly, this theory of change describes the project's logic and assumptions at its outset, rather than in light of what has been learned through implementation. It also describes impacts that are expected beyond the life of the project itself, as a result of the utilisation and adoption of the research outputs.

- If farmers adopt new cocoa genotypes and production practices and reduce losses due to pests and diseases, this will lead to higher yields and sustainable increases in cocoa block productivity, which will in turn lead to increased sales and incomes from cocoa farming. This requires:
 - Development of more productive, profitable and sustainable technologies and practices for cocoa farming.
 - Extension service providers to transfer these technologies and practices to farmers through a network of village-level extension workers, and knowledge-sharing events.
 - Market demand to be sufficiently high that farmers can sell additional cocoa beans produced.
- If government agencies, extension workers and farming families better understand the link between health, agricultural productivity and livelihoods, they will integrate these considerations more holistically in their policy and practices. This requires:
 - Evidence on health-related constraints to labour productivity and health to be developed and communicated to relevant government agencies and extension workers.
 - Village-level extension workers to provide information to villagers on opportunities for improved nutrition and health.
- If farming families diversify their non-cocoa crops and livestock production, they will increase food production for household consumption and be able to sell excess produce. This will help mitigate risks associated with volatile cocoa revenue and in turn lead to improved health and nutrition as well as increased incomes. In particular, complementarity of cocoa and other crops and livestock will maximise cost savings and income generation. This requires:
 - Demonstrating new vegetable cropping practices.
 - Introduction and demonstration of complementary livestock husbandry practices.
- If farmers (particularly women and youth) establish profitable small enterprises to provide value-addition services at the village level, they can support production of improved quality cocoa as well as generating increased income for business owners. This requires:
 - Seed funding and capacity development for village extension workers to establish and manage profitable and sustainable businesses.
 - Greater understanding by village-level extension workers of market demands and quality standards.
- By investing in practices, technologies and quality assurance to produce premium quality cocoa in addition to standard quality, cocoa farmers will be able to export premium cocoa to niche markets and increase their incomes. This requires:
 - Farmers having greater knowledge of international pricing trends and marketing approaches.
 - Farmers being able to produce cocoa that meets premium quality standards.
 - Better marketing to be undertaken and linkages established to build downstream demand for premium Bougainville cocoa.

Analysis of the theory of change

There are strong indications that introducing new farming practices through demonstration approaches, providing training to village-level extension workers, and promoting farmers' exposure to new practices and quality requirements through the Chocolate Festival are increasing farmers' knowledge of more productive and pest-resilient cocoa farming practices. There is also evidence that training and greater exposure to buyers are increasing farmers' understanding of quality issues associated with cocoa production. Combined with knowledge of cost-effective practices to improve post-harvest practices, such as solar dryers and fermentation approaches, there are indications that post-harvest practices are improving.

It is too early to assess whether increased knowledge and improved farming practices will result in higher income for farmers. Certainly, the assumption that farmers could increase their income by exporting premium, bean-to-bar cocoa at higher prices has been undermined by the inability to secure new export licences⁴ or to earn higher prices for better quality cocoa from the main existing exporters.

There is evidence that training is leading to diversification practices in some areas and small enterprise development for some value-add services. Further exploration is required of the introduction of livestock husbandry practices, with the success of this component hampered in 2 regions due to health issues with goats and the lack of available support services. While the project has sourced medicines and expertise to address these issues, the sustainability of goat husbandry in some areas appears questionable. In addition, while diversification and small enterprise development are assumed to build income-generating roles for women and youth from cocoa farming, there is no evidence as to whether this has happened in practice.

The assumption that robust data on the health-related factors that influence agricultural productivity will influence government and development partners' policies and programs also held true, with the data generated through the livelihoods survey widely referenced. The limited scope of health-related aspects of the project meant that support for implementation of the Cocoa Farming Health Framework (CFHF) and other health-related interventions were not included within the project. Once available, results from the Transformative Agriculture and Enterprise Development Program (TADEP) Collaborative Research Grant (CRG) that focused on health, nutrition and agricultural practices will provide some evidence of how this knowledge can be applied in practice at the village level.

There are a number of assumptions underpinning the project that have not held true to date. Establishing village resource centres was challenging in some areas due to different expectations of what these should constitute, and also mixed levels of local government support. Land availability issues prevented 2 regional hubs from being established, and alternative locations have been identified. Barriers to export licences are undermining demand for premium quality cocoa.

Undertaking more thorough market analysis at the outset of projects, including a focus on political economy factors and potential structural barriers to market access would have been useful to inform the project design. In addition, a participative design process with key stakeholders could have helped to ensure that the establishment of hubs and resource centres were more likely to be feasible in practice.

⁴ The CB requires export of a minimum of 1000 metric tonnes per annum to gain an export licence (Wheaton 2017).

2. What outcomes (intended and unintended) has the project achieved or contributed to?

Outputs

Scientific knowledge

A key output of the project was the *Livelihood Survey of Cocoa Farmers in Bougainville and associated knowledge of health-related aspects of cocoa farming productivity*. The survey findings demonstrated that poor education, the lack of financial incentives and planning, poor health, sanitation and nutrition are major constraints to improving the livelihoods of cocoa farmers in Bougainville (Walton et al. 2018). The clearest correlations with smallholder cocoa production related to farmer health, including correlations between physical limitations to labour, chronic illness and poverty. Conversely, healthier farmers were found to be wealthier, independent of other biological, geographical or socioeconomic factors. This study has provided strong evidence that improving farmer health will increase cocoa production and the wealth of rural smallholder communities in Bougainville, and that without addressing health issues, it is unlikely productivity levels will change. All stakeholders consulted recognised the value of the livelihoods survey in raising awareness of health and nutritional issues, enabling programs to target areas of particular need and providing a baseline for work on health-related aspects of farming. The survey also underpinned co-development of a CFHF with the Department of Health (DoH).

'There is a real awakening around the importance of health.'

– Project partner

Project reports indicated that progress was being made on building **scientific knowledge on multiple aspects of cocoa and livelihoods farming**. This included knowledge on attributes of clones, the response to Integrated Pest and Disease Management (IPDM) inputs and the effectiveness of low-cost bud grafting techniques yields relating to budwood gardens. In addition, soil sampling and trials are leading to greater understanding of the soil, composting and fertiliser requirements to increase crop growth. Twenty-three (out of the anticipated 33) IPDM demonstration plots have been established to demonstrate IPDM practices. The project also trialled the use of different soil management, composting and fertiliser practices. The use of goat manure as compost and directly applied to food crops appeared to be promising at trials in the northern region, and more advanced trials are underway.

Technologies

The project introduced **combination solar dryers to improve post-harvest processing of cocoa** in order to improve the quality of beans for sale. In addition, through support for the Department of Primary Industries (DPI) Chocolate Laboratory in Buka, **new technologies for making chocolate and other cocoa-based products** were being developed. This also involved monitoring power consumption in roasting and nib grinding to assess the viability of small-scale production of chocolate and other cocoa-based products. Results of these trials are not yet available.

Agricultural practices

The project **demonstrated practices for sustainable, profitable and more productive cocoa farming**. Trials were undertaken on cocoa yields under different **cocoa rehabilitation approaches** (such as different percentages of canopy removal). These have demonstrated that rehabilitation of existing cocoa plantings provides greater continuity and security of farmer incomes than cutting and replanting, as profitable production resumes within 18 months rather than several years. Propagation of clones was demonstrated and trialled, although continuous rainfall was reported to have resulted in high mortality rates of some plantings.

The project demonstrated how new **complementary food cropping and livestock husbandry can diversify farming incomes as well as better meet families' nutritional requirements**. Village Extension Workers (VEWs) were provided with vegetables and rice seeds to demonstrate new complementary cropping techniques that could diversify income and meet families' nutritional requirements. Twenty goats were distributed and goat breeding trials have commenced. In the south hub, goats were affected by internal parasites, exposing a lack of husbandry knowledge and services. Project reports indicated that extension officers from the PNG University of Natural Resources and Environment (UNRE) would provide goat husbandry, disease and parasite treatment training for farmers, but it is unclear whether this has happened.

In **9 villages, a pilot project supported households over one year to adopt new techniques to improve health, nutrition and farming outcomes.**⁵ The project, funded through a CRG, involved providing information sessions on nutrition, water and sanitation, and vegetable cultivation, followed by monthly monitoring and support visits by staff from the Autonomous Bougainville Government (ABG) Health and Primary Industries departments. In addition, Family Farm Teams (FFT) training was provided to all villages involved in the pilot during 2020. An evaluation will be conducted at the end of the project to establish the effectiveness of the pilot.

Policy

Drawing on the results of the livelihoods survey, the project worked with DoH to support development of a **CFHF**. This included curriculum for health and agriculture volunteers at the village level. The project also supported presentations at DoH to raise awareness and support uptake of the findings of the livelihoods survey, including providing input into the health strategy and collaborating with key staff on research papers. No activities were undertaken to support implementation of this framework as health activities were outside the scope of the project.

Policy engagement by the project to influence the **Cocoa Board (CB) policy on exports** was curtailed by a directive from Department of Foreign Affairs and Trade (DFAT) and Australian Centre for International Agricultural Research (ACIAR) that the project should not engage further on export policy due to the sensitivities involved. There remains a lack of clarity among project staff as to the type of policy-influencing activities that they can undertake and those that are outside their remit, which has led to frustrations and limited work in this space. However, the project engaged with the CB to influence its **policy on solar dryers and new fermenting processes** so these practices may be endorsed by the CB for use in cocoa production.

The project sought to **integrate the CB cocoa curriculum into several schools in cocoa farming areas** and link schools with VEWs. The project established linkages with 3 schools and provided budget for the curriculum to be implemented. Sample textbooks were distributed on request by schools. Pilot training for teachers in these schools is expected to be delivered once the Curriculum Committee approves the training to proceed.

Capacity building

Village Extension Workers

Thirty-three VEWs and some farmers were provided with **training on IPDM and cocoa pod borer management, propagating clones, budwood garden and nursery set-up, and livestock husbandry**. They also received training on the FFT approach and sustainable livelihoods, as well as small enterprise management, recordkeeping and decision-making. Many VEWs were supported to establish nurseries at their Village Resource Centre (VRC) to raise vegetable and cocoa seedlings. By establishing VRCs, the project **aimed to build a sustainable link between VEWs and extension services**, such as those run by the CB, UNRE, DPI and DoH, for continued capacity development. Of the 33 VRCs anticipated to be established, 10 were completed, 22 were partially completed, and there is no data on the status of one. Reports indicate that diverging expectations of what constitutes a VRC and variable levels of support from their local government and ward steering committees presented challenges in this space (Guest et al. 2020).

The project also sought to increase VEW knowledge of cocoa pricing and capacity to market cocoa products. Initially this involved visits to negotiate sales with international buyers (for instance, in Singapore). However, once licensing issues became apparent, the project adapted to focus on providing training to farmers on international pricing mechanisms and to increase their capacity to engage with buyers.

Annual Chocolate Festival

The project instigated an Annual Chocolate Festival, which was held 4 times to date since 2016 with support from the Bougainville Partnership.⁶ This became a key event in the Bougainville calendar as both a celebration of Bougainville culture and an opportunity to build capacity in new farming techniques and post-harvest practices. At the festival, farmers from across Bougainville received demonstrations of a range of farming practices, including IPDM, composting and crop diversification. Through cocoa bean and chocolate competitions, the festival also built awareness of the link between high-quality cocoa beans, post-harvesting practices and quality chocolate products.

'You see a lot of farmers that are involved and interested in being part of the festival – they want to know how well they are processing their cocoa. This is helping to create incentives to make quality products.'

– Project partner

5 This CRG project was initially implemented in 10 villages but one of the villages in the north (Sing) was excluded from the project for safety reasons.

6 The 2020 Chocolate Festival was cancelled due to COVID-19.

Government extension service officers

The project supported capacity building of DPI and CB staff on improved cocoa farming research and practices, as well as post-harvest production and diversification of cropping.

Ten DPI staff undertook training at the Mars Cocoa Academy in Indonesia, and one DPI staff member was trained in food crop production in Thailand. Reports indicate that DPI extension officers were also trained on new cocoa farming practices and are now supporting VEWs to run training programs for cocoa farmers (Guest et al. 2020). However, stakeholders reported that greater levels of formal training for DPI officers are required as significant gaps remain. They felt that capacity building was overly focused on the village level, and that while DPI staff work alongside ACIAR staff, they are not sufficiently upskilled through the process. In contrast, a stakeholder from the CB reported that the 3 CB extension officers funded by the project have built very strong skills and knowledge around cocoa management and research, and as a result the CB is trying to employ them on an ongoing basis.

To support DPI to trial and demonstrate new practices, the project anticipated establishing DPI-led research hubs in each of the north, south and central regions.

A south hub station was established with a nursery with capacity for 10,000 seedlings, a budwood garden, a new clone block, a shed to store tools and chemicals as well as serve as a compost house. The south hub station was supported to establish a vegetable nursery and 5,000 seedling capacity cocoa nursery, cocoa demonstration plot, and plots to trial goat manure and compost application. In the central and north hubs, it has not proven possible to establish a research hub due to the inability to secure land. Stakeholders indicated that land was seized during the Bougainville crisis and is therefore no longer available for use by the government. In the central region, the project worked with VEWs to establish demonstration plots on farmers' land as an alternative to the hub rather than waiting for the establishment of regional hub stations. In the north hub, the Kubu DPI station was supported to establish goat trials, cocoa and vegetable nurseries, composting boxes, and trial and demonstration plots for vegetables, cocoa and integrated farming systems, as well as to trial and demonstrate cocoa rehabilitation.

Through training and support for the DPI Chocolate Laboratory, the project is building capacity for monitoring and testing the quality of cocoa beans as well as the capacity to carry out research and development on post-harvest processing.

The project supplied equipment required by the Chocolate Laboratory. It also supported continuous training and awareness raising activities to be delivered by a DPI staff member, who made chocolate and tested farmers' cocoa bean samples when they were brought to the laboratory to determine whether the cocoa was of a high quality. Stakeholders reported that this training was valuable. Sixteen farmers' cocoa bean samples were tested for their processing characteristics and the facilities continue to be used for further quality improvement.

Project reports indicate that training is being provided to DPI on price reporting and evaluating the economics of different forms for exporting Bougainville cocoa and cocoa value-added products.

Bougainville DPI is expected to take over the collection, analysis and communication of cocoa price trends after the project conclusion.

Project reports also indicate that some DoH and DPI staff were upskilled in nutrition and vegetable garden cultivation through the TADEP CRG.

This included support to conduct monthly monitoring and visits to the 10 villages involved in the CRG. It is unclear whether training was being provided to the staff or whether they were being upskilled through collaboration on monitoring visits. Master training on the FFT approach was also provided for some DoH and DPI staff through the CRG.

Marketing

The project delivered a series of market reports and events to support international marketing of Bougainville cocoa. This included 29 Cocoa Market Reports that were distributed to over 170 recipients, a photo book and other analysis on the formation of world cocoa prices. Marketing capacity development activities were also provided to VEWs. In addition, events such as the Taste and Tell event in Melbourne were held to bring together leading Bougainville cocoa producers with chocolate makers. The Chocolate Festival has also been used to connect potential cocoa buyers to farmers, including Queen Emma Chocolates in Port Moresby, whose staff have been judges at the festival.

Adoption

New technologies or practical approaches

There is not yet a strong body of evidence to demonstrate adoption of new approaches. However, project reports and stakeholders interviewed for this evaluation indicate that **many farmers are adopting new cocoa farming management approaches** and that improvements in their yield due to these approaches are providing incentives and interest in re-engaging with cocoa farming. The main example provided is use of ice block plastics and kiwi knives for budding, which were introduced by the project and according to project reports are now used widely in Bougainville.

There are also **reports that new cropping practices and enterprises are being introduced by some farmers to diversify their incomes**, although it is not clear how widespread uptake has been. For example, Mamaro Village Assembly established a cocoa and food crop nursery, food gardens, a waste composting facility, goats, ducks, poultry and an aquaculture set-up farming Tilapia fish. Reports indicate that several VEWs have also registered their farm businesses and are undertaking activities such as cocoa nursery and seedling sales, cocoa wet bean buying, fermentation and drying, budwood gardening, poultry and vegetables. Goat farming is reported to have progressed well in the north region, although has had challenges in the south.

There is evidence of **some adoption of post-harvest quality testing and processing practices**. For example, 16 farmers' cocoa bean samples were tested for their processing characteristics and the facilities were used to further improve quality. In addition, stakeholders indicated that the laboratory is now operating across Bougainville's markets and that chocolates are being produced and sold across PNG.

'What is happening in Bougainville has a ripple effect. Other provinces are also interested and they want to copy the model into their provinces. Some came asking for processing facilities, like the Buka Chocolate Lab.'

– Project partner

Monitoring of the CRG nutrition project recorded **self-reported changes within communities to improve their health, nutrition and vegetable cultivation practices as a result of the project**. This includes adding gates on kitchens to keep animals out, improving preparation and storage of food and water, adding more variety into diets and building compost bins. It is not clear how widespread this adoption of new practices has been.

Interviewees indicated that DPI is progressively taking a greater role in coordination and implementation of the Chocolate Festival, and will eventually take over its management. This is a positive sign and suggests its benefits are likely to continue beyond the duration of the project.

New scientific knowledge

The livelihoods survey is providing the evidence base to support policy settings within the ABG, including influencing a new DoH preventative health policy to take a stronger focus on reducing stunting and prioritising nutrition (Guest et al. 2018). Stakeholders also indicated that a policy shift has been evident within DPI towards a greater recognition of One Health⁷ principles, and that subsequent DPI policies recognise the importance of health and poverty on farming production. In terms of influencing other development partners' work, Bougainville Partnership (a DFAT-funded governance program) indicated that it is **advising implementing partners to consider the survey findings and build in nutrition and diversification into their program designs**.

Project reports indicate that **some villagers who were involved in the livelihoods survey are implementing activities in response to the findings in their own villages**, though this appeared to be anecdotal only and was not able to be assessed for this evaluation.

Knowledge or models for policy and policymakers

Beyond the CRG pilot, implementation of health activities was outside the scope of the project and so no activities were undertaken to support adoption and implementation of the CFHF into government policy. One stakeholder indicated that the ABG was interested in the VEW model given its apparent effectiveness. This evaluation did not have any evidence to assess or support this claim.

ACIAR uses a 4-level classification scheme to indicate the level of uptake of key outputs. This has been used by the evaluation team to summarise output adoption for the projects reviewed under each program, as illustrated in Table 9.

⁷ One Health is an approach that recognises that the health of people, animals and the environment are interconnected.



Table 9 Levels of adoption of key project outputs

| Category | Output | Users | Level of adoption |
|---|--|--|-------------------|
| New technologies or practical approaches | Intensified cocoa farming practices | <ul style="list-style-type: none"> • VEWs are initial users • Other farmers are final users | N* |
| | Diversification of food cropping and livestock husbandry | <ul style="list-style-type: none"> • VEWs are initial users • Other farmers are final users | N* |
| | Post-harvest processing practices | <ul style="list-style-type: none"> • VEWs are initial users • Other farmers are final users | N* |
| New scientific knowledge | Livelihoods survey | <ul style="list-style-type: none"> • Government agencies (DoH and DPI) and development partners directly exposed to the results of the livelihoods survey are initial users • People/organisations that they have influenced to use the findings are final users | Nf/F |
| | Chocolate production knowledge | <ul style="list-style-type: none"> • Chocolate laboratory staff are initial users • Any other users are final users | N |
| Knowledge or models for policy and policymakers | Cocoa Farming Health Framework | <ul style="list-style-type: none"> • Government agency (DoH or DPI) staff are initial and final users | O |
| | Hub and spoke model of agricultural extension | <ul style="list-style-type: none"> • Those directly involved in the hub and spoke model are initial users • Extension agencies (DPI, CB) are final users | N* |

Notes:

* There is insufficient data to determine the level of uptake by final users

O No uptake by either initial or final users

N Some use of results by the initial users but no uptake by the final users

Nf Demonstrated and considerable use of results by the initial users but only minimal uptake by the final users

NF Demonstrated and considerable use of results by the initial and final users

Outcomes

Scientific achievement

The livelihoods survey is filling a data gap on health-related factors of agricultural productivity and was widely reported to be the most significant achievement of the project. It has resulted in widespread recognition of the nexus between health and agricultural productivity, and that a siloed approach to improving the viability of cocoa farming is unlikely to be effective or sustainable. Several papers have been published on the findings of the survey.

‘This study opened our eyes to see how health impacts on farming. If want to grow the cocoa sector, you need to have healthy farmers.’

– Project partner

Beyond the project context, several ACIAR stakeholders noted that the outcomes of the livelihoods survey have contributed to a broader shift within the ACIAR approach and acceptance of One Health principles. This is a substantial achievement of which the project should be proud.

Capacity built

Data on capacity development achieved through this project remains anecdotal, as systematic assessment of capacity built has not yet been undertaken, or data collected not yet analysed by the research team.

Capacity development outcomes reported in project reports and by stakeholders interviewed for this evaluation include:

- Most stakeholders reported that training on cocoa farm management, soil nutrition and composting has **enabled many VEWs to implement new practices and increase the quality and quantity of their yield**. Their capacity to produce premium quality cocoa was demonstrated through the higher quality cocoa showcased at the Chocolate Festival and the ability of several VEWs to sell higher quality beans across PNG. Around two-thirds of VEWs are now reported to be managing nurseries and demonstration plots for IPDM, though there were also some indications that VEWs do not always follow recommended practices in their nurseries. **The improved skills of some VEWs as facilitators** are also evidenced by reports that some training programs are now run by VEWs with support from DPI extension officers. Finally, **several VEWs have registered their family businesses and their enterprise activities build on skills gained through the project**, such as cocoa nursery and seedling sales, cocoa wet bean buying, fermentation and drying, budwood gardening, poultry and vegetable production. As market research was outside the scope of the project, monitoring of the extent to which VEWs used their marketing knowledge to negotiate better deals with buyers was not assessed.

- There were **mixed assessments of the capacity built within DPI through project activities**. Several stakeholders felt that DPI extension workers had built their capacity in managing research and improved agricultural practices through the project. However, beyond extension workers, stakeholders highlighted the need for more formal training for DPI officers (as opposed to on-the-job training when accompanying ACIAR officers) in order to better build their capacity.
- **Training and coaching of CB staff was reported to be highly effective in building their skills in cocoa management and research**. Stakeholders indicated that they were building deep knowledge in these areas and that the CB was trying to engage them as ongoing staff after project completion. In addition, staff referenced having learned how to collect data, conduct research trials and other core skills.

To the extent possible, capacities built by the project are summarised in Table 10.

Economic outcomes

There is not yet substantive evidence available of the impact of the project on economic outcomes for farmers in target locations. This is to be expected given the project has only recently concluded, and these type of outcomes are often more apparent years after project implementation.

Table 10 Capacity built relevant to project objectives

| Who | Skills and knowledge |
|--|--|
| Village Extension Workers (VEWs) | <ul style="list-style-type: none"> • New skills in cocoa farm management, soil nutrition and composting • Integrated pest disease management practices • Post-harvesting practices • Facilitation skills • Business development and marketing skills • Greater understanding of quality issues |
| Government extension service officers (DPI and CB) | <ul style="list-style-type: none"> • Research skills – collecting data and conducting research trials • Improved cocoa production and rehabilitation • Post-harvest processing • Crop diversification • Monitoring and testing quality • Nutrition and vegetable garden cultivation |
| Central government agencies (DPI and DoH) | <ul style="list-style-type: none"> • Knowledge of the link between health and agricultural production |



The **impact of the project on increased yields (and subsequently income generation) of cocoa farms will take several years to eventuate.** For example, results of rehabilitation and planting new seedlings take 2 to 3 years to become visible. However, project reports indicate that observations of new rehabilitation pruning practices are promising in terms of increased flowering pod production of cocoa trees. Reports suggest that **some VEWs are generating increased income through diversification of farming and establishment of small enterprises.** For example, project reports indicate that vegetable production and sales by some farmers, especially women, is proving to be a viable diversification option as demonstrated by high local market demand for produce. They also indicated that some crops such as cabbages are generating additional income. Small enterprise development appears to be focused on niche skills associated with cocoa farming gained through the project. Several VEWs have established and registered small enterprises to undertake a range of cocoa, complementary farming and value addition activities. Reports also indicate that some budders trained through this project have been intermittently contracted to do budding in other commercial nurseries.

This evaluation did not have any data to assess whether sales of standard grade cocoa have increased due to the project. While anecdotal evidence suggests that farmers' yields of standard grade cocoa increased, data is not yet available on whether this led to increased sales. The project has been able to help facilitate a small number of new commercial arrangements between farmers and PNG-based food manufacturers, including Queen Emma Chocolates and Paradise Foods in Port Moresby.

Export licensing issues meant that very minimal additional income was able to be generated through exports of premium quality cocoa. The unforeseen barriers to having new export licences issued by the CB was a significant setback to this aspect of the project and prevented sales that had been agreed with international buyers from proceeding. The one exception to this was a partnership between a Bougainville cocoa farming family and Canberra-based premium chocolate maker, Jasper and Myrtle, which was able to occur through an existing export licence. This connection came about through the Chocolate Festival and is a good indication of what is possible when export issues can be overcome. However, it should be noted that niche premium chocolate makers generally require only small quantities of cocoa meaning these arrangements are unlikely to produce economic impacts at scale. They can however play an important role in building awareness of Bougainville cocoa internationally.

Community outcomes

While data has been collected on the outcomes of FFT and other training in these villages, it was not available to inform this evaluation. Several stakeholders interviewed and project reports indicate that the FFT program was developing community capacity in planning and goal setting, financial literacy, respectful relationships, anger management, conflict resolution and gender equity.

In terms of improved health practices, project documents indicate that several self-reported changes are being implemented by communities to improve their health, nutrition and vegetable cultivation practices. Examples included putting gates on kitchens to keep animals out, improving preparation and storage of food, improving how drinking water is collected and stored, eating a balanced diet and building compost bins (ACIAR 2020).

Community outcomes are also expected to be delivered through activities associated with the TADEP CRG, which delivered health, nutrition and FFT training in 10 villages. It should be noted that these were not the same villages where VEW activities were delivered, as CRG villages were selected on the basis of need in accordance with findings from the livelihoods survey.

Environmental outcomes

Environmental outcomes reported include reducing the incentive for forest clearing by increasing productivity of old and existing blocks, improving soil health through the use of composted fertilisers, and improving quality of drinking water in some villages involved in the CRG through implementation of water, sanitation and hygiene measures.

3. How did project activities and outputs contribute to the outcomes achieved?

Factors influencing adoption and outcomes

The **multidisciplinary team and collaborative approach** taken to the livelihoods survey led to the production of groundbreaking knowledge that is highly valuable and relevant across the cocoa industry. The depth of evidence generated through the survey means it is perceived to be very credible and is valued by stakeholders across sectors. Its interdisciplinary approach enabled it to inform a more holistic understanding of agricultural productivity and influence thinking across multiple sectors. The wide dissemination of findings has also been key to raising awareness of the evidence base developed by the survey.

The 'hub and spoke' model did not appear to be an effective mechanism for building VEW awareness of new agricultural practices, in light of limited resourcing and staffing for DPI to provide extension services to farmers. However, **the 'hub and spoke' model did require significant modification in practice and its viability needs to be further explored in light of DPI resourcing.** Only one hub was established as planned and, due to issues accessing land, the other 2 were established on a VEW's land and on a government research station in an urban area. Despite DPI recognising the value of the hubs, stakeholders were unsure of their sustainability given DPI budget and staffing limitations and the need to resource implementation of the Bougainville Agricultural Commodities Regulatory Authority (BACRA) once established. Further, it remains to be seen whether VEWs will continue to play an extension-type role after the project completion and when project resourcing is no longer available to support them.

The **restrictive export environment has been a significant setback to the project.** The existing bulk cocoa export market is strongly dominated by a small number of large buyers with limited competition. These buyers are known to offer discounted prices to Bougainville cocoa farmers. This reduces the incentive for farmers to produce better quality cocoa beans, as existing exporters are not willing to pay higher rates for better quality beans. The inability to obtain new export licences from the CB due to restrictions on small-scale exports, and **logistical challenges with transporting small quantities of cocoa from Bougainville,** make it prohibitive for small businesses (such as premium chocolate makers) to enter the market. The project was not able to gain traction on having the licensing policy amended. Stakeholders indicated that anticipated changes to the Cocoa Act and establishment of BACRA may rectify this situation in coming years – allowing for more licences and different prices for different categories of beans. However even with improved export licensing, the logistical challenges of exporting small quantities of cocoa will continue to be a substantial barrier for smaller boutique chocolate makers seeking to buy Bougainville cocoa.

The limited operating budget of DPI has ongoing impacts on the capacity and availability of staff to fulfil their functions. For example, low numbers of extension officers and the lack of funding available for them to travel to rural areas limit farmers' access to extension services. The lack of operating funds is also expected to impact the department's ability to carry forward the 'hub and spoke' model by limiting its ability to perform core functions such as training VEWs, coordinating the hubs, and research and development activities.

Frequent personnel changes within DPI, and **the absorption of Cocoa and Coconut Research Institute Limited (CCI) into the CB in 2017, has undermined continuity and capacity development.** There were delays in paying the salaries of former CCI staff once they transitioned into the CB and many key staff were not employed by the CB and lost their jobs, though some were able to be employed in various ways by the project.

Table 11 provides key findings against the categories and factors influencing adoption and outcomes as part of the ACIAR evaluation framework.



Table 11 Factors influencing adoption and outcomes

| | Factor | Key findings |
|------------|---|---|
| Knowledge | Do potential users know about the outputs? | <ul style="list-style-type: none"> Widespread awareness of the livelihoods survey findings led to its influence on the thinking of key government and development partners. The training and demonstration approach appears to have been effective in building VEW adoption of new practices. DPI is aware of the 'hub and spoke' model as a potential avenue for delivering extension services at the village level, but resource and potential systems constraints will influence uptake. |
| | Is there continuity of staff in organisations associated with adoption? | <ul style="list-style-type: none"> Turnover of staff at DPI (including the DPI project coordinator) and loss of key staff during the absorption of CCI into the CB was a challenge for the project. |
| | Are outputs complex in comparison with the capability of users? | <ul style="list-style-type: none"> There was no evidence that this was a barrier to adoption. |
| Incentives | Are there sufficient incentives to adopt the outputs? | <ul style="list-style-type: none"> Several reports indicate that payments made to VEWs were an incentive for them to participate in the program. This has implications for the sustainability of their role as VEWs. Increased profitability of cocoa farming and related enterprises was reported to be creating incentives to adopt improved cocoa farming practices and diversification of farming activities, however the restrictive export environment reduces incentives for production of better-quality cocoa. While chocolate production capacity appears to have led to samples being distributed across PNG, it is unclear whether these products are sufficiently profitable to underpin a viable chocolate industry. |
| | Does adoption increase risk or uncertainty? | <ul style="list-style-type: none"> Committing time and resources to producing better quality cocoa is a risk if higher prices cannot be sought for this cocoa. |
| | Is adoption compulsory or effectively prohibited? | <ul style="list-style-type: none"> The project was unable to obtain new export licences which would enable farmers to sell premium quality cocoa at a higher price. |
| Barriers | Do potential users face capital or infrastructure constraints? | <ul style="list-style-type: none"> The cost and availability of resources for improved farming and post-harvest practices was a factor. Using local materials have been key. |
| | Are there cultural or social barriers to adoption? | <ul style="list-style-type: none"> There is no evidence available to assess cultural or social barriers to adoption. |

4. What strategies were adopted to address gender equity and social inclusion and how effective were these?

Promoting gender equity and community wellbeing was a key part of the project's aim. Key strategies to pursue this outlined in the project proposal included setting a 40% target for participation of women as VEWs and in training, and integrating FFT training modules into the project's training approach. In addition, it was thought that diversification of farming and establishment of small enterprises would empower women and youth by increasing the amount of income within women's control. To engage young people, the cocoa-based farming curriculum component of the project was anticipated to engage students in cocoa farming during their schooling. Chocolate Festival activities also engaged school students in chocolate-making competitions. One stakeholder reported that they had attempted to secure funding to explore disability inclusion and mental health aspects of the project but were not successful in obtaining funds.

Gender disaggregated data obtained by the evaluation team indicates limited involvement of women in VEW roles but stronger participation in training activities. Overall, as of December 2020, 3 of 33 VEWs engaged in the project were women (equivalent to 9%), including 2 in the central region and one in the north. This is substantially less than the target of 40%. The project team reported that initially there were 2 more VEWs engaged in the central region, but they both left the role due to tensions it caused with their husbands. In the south, the patrilineal culture is thought to have impacted on the extent to which women were chosen as VEWs by their communities, as men traditionally have greater influence and authority. Although a limited number of VEWs were women, data on training activities undertaken from September to December 2020 indicated that women farmers comprise between 30% and 40% of training participants. This is positive and is an important precursor to women benefiting from the outputs of the project.

Beyond participation in project activities, the key approach for pursuing gender equity outcomes was integrating FFT modules into the project's training approach. This was facilitated through a TADEP CRG, 'Enhancing the roles of women and the whole family in cocoa production'. Six female and 16 male farmers involved in the main project sites and villages participated in the CRG were trained as trainers of the FFT approach. The trainers reported that they plan to implement the FFT activities in their own families as well as integrating the training in their own agency and work, but as yet it is not clear how or whether they have done this. The CRG report indicates that the implementation of the FFT approach and the impacts of this approach will be assessed through the Bougainville cocoa end of project review. In addition, FFT training was integrated into the CRG nutrition pilot and rolled out in 9 target villages during 2020. While initial feedback suggests the training was well received, it is too early to know whether it has contributed to any shifts in gender roles.

Project reports and stakeholder consultations also include several examples of women's participation and benefits gained through the project. These include:

- Reports that vegetable production and sales by some farmers, especially women, were proving to be a viable diversification alternative to cocoa farming.
- Malassang Women's Resource Centre was linked to a VEW and assisted with funds to register the VEW's farming business.
- Women were employed in a range of key roles in the project, including:
 - the south regional hub coordinator
 - the north field extension officer, previously employed by CCI
 - the south UNRE crops/livestock officer
 - an assistant in a small-scale chocolate lab.

While the project clearly made efforts to ensure women participated in project activities, there was no specific gender or social inclusion strategy to ensure that appropriate measures were in place to drive empowerment or manage risks for women and marginalised groups through the project. **It is recommended that future projects include up-front gender and social inclusion analysis to guide a more strategic approach. Outcomes of participation (including unintended outcomes) should also be monitored throughout implementation.**

Challenging gender norms in cocoa farming

Elizabeth Pisiai is the coordinator of the South Bougainville Hub established through the ACIAR Bougainville cocoa project. Elizabeth was a DPI field officer in relatively isolated South Bougainville. Under the ACIAR project, Elizabeth was the only woman on the tour of cocoa farming activities and training at the Mars Cocoa Academy in 2017 in Sulawesi, an experience she described as rewarding from her perspective as an 'honorary male'. Elizabeth learned to drive and now crosses rivers – driving project vehicles confidently. Elizabeth also undertook ACIAR-sponsored training at the World Vegetable Centre in Thailand in 2018 where she was proud to be there as a leader in her own right, rather than just an 'honorary male'. One of the failures of traditional extension programs is the lack of engagement of women. Elizabeth's leadership role in the project has shown that women make a significant contribution to cocoa farming in Bougainville, as well as being primarily responsible for food and childcare. Elizabeth has a key role in engaging women cocoa farmers in this project. Her evolution as a widely respected female leader in her community reflects the support of her family and has been a significant achievement in what has often been a male-dominated field.

Source: Adapted from Guest et al. 2019




Farmers inspecting a cocoa seedling.
Photo: Conor Ashleigh, ACIAR

5. How did management arrangements impact delivery of the project?

While the evaluation had limited insight into management arrangements, staff spoke positively about the **collaborative and respectful team approach between project team members in Australia and Bougainville**. In particular, opportunities to come together as a team in Bougainville (including implementing partners) were valued for the relationships built and knowledge shared. Reports that local staff were able to continue driving the project in the absence of Australian staff due to COVID-19 travel restrictions indicate that their confidence and skills in managing these types of projects had grown.

During consultations, some stakeholders noted that it would have been valuable to spend more time **clearly articulating roles and responsibilities with DPI at the outset of the project**. This related primarily to delineation of roles between DPI and the project team. Stakeholders felt that a familiarisation workshop with DPI would have been useful to build understanding of the project and avoid confusion or duplication of responsibilities. The project team indicated that time was spent at the commencement of the project to build a shared understanding of roles and responsibilities, but the frequent changing of staff within DPI may have meant that those consulted were not involved in these discussions. Further consideration could be given as to how to maintain or rebuild relationships within this context – possibly through a project induction process or similar for new staff.

Clarifying expectations and management arrangements between the project team, DFAT and ACIAR at the beginning of the project, and having mechanisms in place to resolve emerging issues would potentially help to avoid tensions which arose during the project's implementation. There were clear differences in expectations of the project between the project team and DFAT. First, tensions arose due to management of the Chocolate Festival, which grew from a tightly focused event to share cocoa farming practices among farmers and expose farmers to buyers, to an event delivering on larger peace-building objectives of the Australian High Commission. Conflicting expectations of funding arrangements for the larger scope of the festival led to the project having to delay research activities for 6 months after the festival due to over-expenditure on the festival and lack of DFAT supplementary funding. This was an unsatisfactory outcome from all perspectives. Project staff reported that better articulation of expectations by DFAT and ACIAR and any changes to strategic priorities is required so that stakeholders fully understand what is expected. Second, more needed to be done to **build a common understanding between ACIAR, DFAT and project teams on expected progress and results**, particularly the timeframes in which results were expected to materialise, to avoid tensions around project performance. As suggested above, this may need to be revisited following rotation of ACIAR/DFAT or project staff. Having a theory of change or impact pathway set out for each project, linked to clear project outcomes, and strengthening monitoring and evaluation throughout implementation would also help to build a shared understanding of performance. This is particularly the case in contexts like Bougainville where data is generally poor and assessing progress can be challenging. While project reports have been shared with DFAT, more regular scheduled and ad hoc in-person meetings are recommended to improve engagement. On a positive note, engagement with DFAT is reported to have improved throughout the project.



Several issues of project scope arose during the project's implementation, highlighting both the need to clarify the boundaries of 'research-for-development' as well as the need for clear mechanisms to enable projects to adapt to changes in context throughout implementation.

These issues arose in relation to the scope of health-related interventions, the revised scope of marketing activities once barriers to exports became evident, and policy engagement around export licensing. There appeared to be a shift in the ACIAR approach to health-related interventions towards a greater focus on One Health during the project's duration, but this shift was not reflected in the scope of the project's activities. This limitation on pursuing health-related activities is a missed opportunity for the project and resulted in a clear gap in relation to pursuing opportunities to advance implementation of the CFHF, which was developed following the livelihoods survey. In terms of marketing activities, the project needed to shift its approach away from facilitating exports once it became clear that export licences would not be granted. The focus of activities under this objective did shift somewhat to building farmers' knowledge of marketing and pricing, but the project team remained constrained by how far they could adapt activities away from the original project proposal. Finally, the lack of clarity around the scope of appropriate policy engagement was a source of frustration for several stakeholders. It is important to note that in this instance there were particular political sensitivities at play about the cocoa export licensing policy (and the DFAT position that Australian projects should not interfere with PNG–Bougainville decision-making on this). Nonetheless, communication with the project team on this was suboptimal, and **ACIAR and DFAT need to work towards developing a shared understanding of the level of policy engagement that is appropriate and expected for project teams in each context and ensure this is clearly communicated.**

While development partners such as the Bougainville Partnership indicated that coordination with ACIAR in Bougainville was working relatively well, **greater collaboration by all cocoa-oriented projects across the cocoa sector was highlighted as a priority.** The project team indicated that coordination with the CB and the World Bank's Productive Partnerships in Agriculture Project (PPAP) were challenging throughout the project.

6. How well did the project align with and contribute to the overall goals of its umbrella program?

There were mixed perspectives on the value of being under the TADEP umbrella. Several stakeholders questioned the value-add of the umbrella program on the basis that the project would have collaborated with other relevant projects even without TADEP in place. Others saw clear value in the TADEP approach, primarily relating to cross-project learning, which led to collaboration across projects, opportunities to build networks and confidence of local staff, and access to CRGs to enable projects to explore emerging research priorities. Stakeholders welcomed the approach of the TADEP coordinator in trying to reduce reporting requirements and focusing on the relevance and value-add of TADEP for projects.

Alignment with TADEP objectives and projects

The project aligned with and contributed to 3 of the TADEP objectives:

- **To enhance rural livelihoods by increasing agricultural productivity and access to markets for farmers in PNG.** The project made significant contributions to increasing agricultural productivity of cocoa farming, but there is not yet evidence to indicate how it impacted farmers' access to markets.
- **To build individual and institutional capacity in agricultural research, development and extension.** The project built the capacity of DPI, CB and UNRE staff as well as VEWs.
- **To promote gender equality and women's empowerment in rural communities.** The project aimed to achieve this through inclusion of women in project activities and implementation of the FFT approach, but there is limited evidence available to assess results achieved.

Collaboration with other projects

The project collaborated with 3 other TADEP projects:

- 'Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland and Chimbu provinces of PNG' (PNG cocoa) (HORT/2014/096). The Bougainville cocoa project was part of a joint CRG along with the FFT project, and also collaborated informally throughout implementation (for example, a member of the PNG cocoa project was part of the mid-term review team for this project).
- 'Improving opportunities for economic development for women smallholders in rural Papua New Guinea' (Family Farm Teams) (ASEM/2014/095). The FFT project provided training to VEWs involved in the Bougainville cocoa project through 2 CRGs.
- 'Supporting commercial sweetpotato production and marketing in the PNG highlands' (sweetpotato) (HORT/2014/097). Knowledge gained through the sweetpotato project was used in demonstrations of complementary food cropping to diversify farm production in the Bougainville cocoa project.

This project benefited from 2 TADEP CRGs. First, a CRG enabled FFT training to be delivered to 6 women and 16 men involved in the Bougainville cocoa project at its outset to support use of the FFT model (ACIAR n.d.). A second CRG enabled the project to build on findings from the livelihoods survey to undertake a pilot project in 9 villages on integrated approaches to address health, nutrition and farming practices. Stakeholders indicated that these research grants were highly valuable because project designs cannot easily be changed after being approved, so without the TADEP CRG, the pilot on integrating approaches to health, nutrition and farming could not have gone ahead. In effect, the CRGs allowed the project team to adapt the scope of projects based on emerging learnings and new directions.

Given the commonality of many project partners engaged in capacity building under this project as well as other TADEP projects (for instance, DPI, UNRE, CB), it could be useful to consider how a program-level capacity-building strategy could drive a more strategic approach to capacity development for these partners. In addition, comparing models tested across different projects, for example approaches to establishing village-level extension services, could be a valuable function of any future program.

Knowledge transfer and learning

Stakeholders agreed that the key value-add of TADEP was knowledge sharing. **Annual in-person meetings were the most effective mechanism for sharing knowledge and learning.** The importance of including local staff in these meetings was highlighted. This provides opportunities for local staff to build relationships across projects, share learnings and discuss collaboration, and build their confidence in presenting project results.

Reporting

The volume and target audience for TADEP reporting could be reviewed to better integrate this with project reporting and ensure it is used by relevant stakeholders. The volume of reporting associated with TADEP, and duplication with other project-level reporting, was a frustration for stakeholders. Stakeholders felt that the reports were not used by their intended audience (primarily stakeholders felt this audience was DFAT) and that additional briefing should be requested when information is required. DFAT indicated that it does review the quarterly TADEP reports but felt that in-person discussion of progress was more valuable than reporting alone.



Farmers laying out cocoa beans on a drying rack.
Photo: Conor Ashleigh, ACIAR

Conclusions and lessons learned

The Bougainville cocoa project has been highly successful in providing an evidence base on health-related factors that impact cocoa farming productivity. The livelihoods survey was widely endorsed as a key achievement of the project that is influencing both stakeholder understanding of agricultural development programs, and the policy of government and development partners (including ACIAR).

There are good indications that **production approaches trialled and demonstrated with Village Extension Workers (VEWs), as well as momentum gained and information shared through the Chocolate Festival, are building the knowledge of smallholder farmers of improved cocoa farming practices** and are reinvigorating interest in cocoa farming. There are also early indications that these practices will lead to improved yields and that new post-harvest processing practices are likely to improve the quality of cocoa products where these are adopted. In addition, quality monitoring and the development of new chocolate making capacities at the Department of Primary Industries (DPI) Chocolate Laboratory are contributing to greater understanding of quality issues and chocolate production needs. **The demand side has been more challenging, due to Bougainville's restrictive export environment and the inability to obtain new export licences.**

While multiple stakeholders felt that the **'hub and spoke' model of extension service delivery could fill the gap of extension services at the village level, there were questions over the sustainability of this model.** There is insufficient evidence that this model could be sustained without provision of project-funded allowances for VEWs. The capacity of DPI to maintain the hubs is limited on many fronts, including a lack of access to land, and limited staffing and funds. The sustainability of the approach should be a key research priority in developing and testing agricultural extension models.

The project had an explicit focus on benefiting women and youth by ensuring their participation in project activities through farm diversification and small enterprise development activities. This was primarily pursued through training on the Family Farm Teams (FFT) approach through a TADEP Collaborative Research Grant (CRG) at the outset of the project. It is not yet evident whether these initiatives contributed to meaningful changes for women and youth, beyond the limited examples provided in project reports.

The evaluation had little insight into program management arrangements; however, issues that emerged during implementation highlight **the need for clear expectations and management arrangements between project teams, Department of Foreign Affairs and Trade (DFAT) and ACIAR from the outset of projects, as well as mechanisms to resolve issues that arise.** There were conflicting understandings with DFAT about expenditure arrangements for one chocolate festival, which reduced the project's operating budget for activities for 6 months – this is a stark example of the need to improve decision-making processes. Using a theory of change process to build common understanding between ACIAR, DFAT and project teams on expected progress and results would provide a stronger foundation for shared expectations throughout implementation.

Implementation of this project also highlights the need for further **consideration of the scope of what constitutes research-for-development, and how mechanisms to adapt a project's scope to contextual changes and blockages that arise can be built into project designs.** Even with strong upfront contextual analysis, it is impossible to predict all the issues that may arise during implementation of a project over a 6-year timespan. If projects are anticipated to respond to opportunities and challenges during implementation, mechanisms need to be in place to adapt the objectives and scope of project activities.

This project **benefited significantly from availability of TADEP CRGs,** which have provided a mechanism for the project to receive FFT training and also to pilot health-related agricultural activities building on the results of the livelihoods survey. Beyond grants, there were mixed views on whether a programmatic approach added value or not.

A greater focus on knowledge sharing, as well as focusing on carving out and resourcing areas of strategic value-add of any future umbrella programs (for instance, capacity development of core partners, comparison of different approaches to village-level extension services) is key to ensuring the programmatic approach has impact.



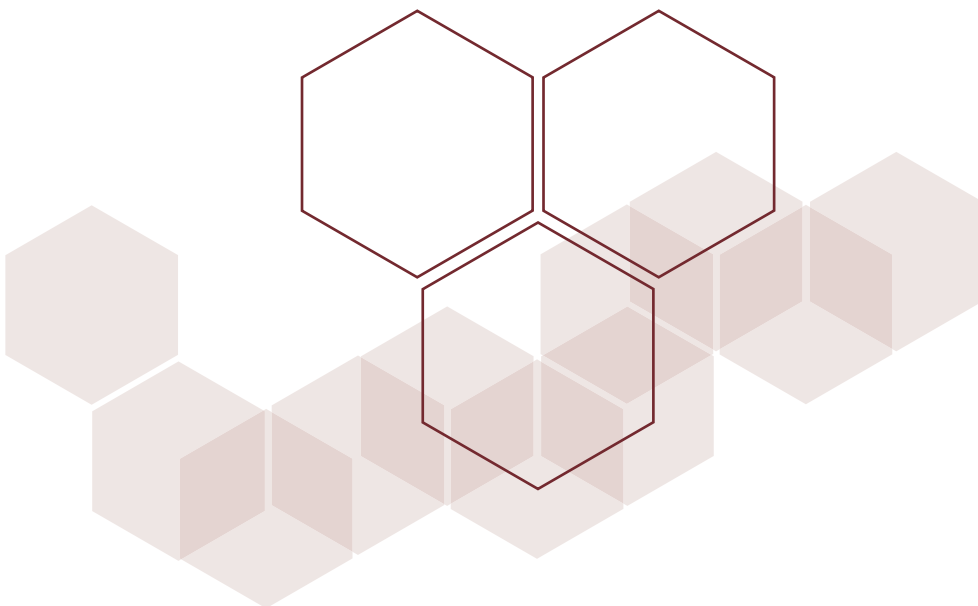
Lessons learned

Key lessons learned through the project for consideration during future ACIAR programming include:

1. **The multidisciplinary approach to this project and its focus on health-related factors affecting agricultural productivity is a core strength.** This in-depth research demonstrates the value that ACIAR projects can offer in providing a robust and compelling evidence base on the complex social issues that influence agricultural productivity, beyond technical factors, to inform policy and programs.
2. **Undertaking market analysis at the outset of projects, including a focus on political economy factors and potential structural barriers to market access, would be useful to identify risks to the achievement of project objectives.** This is particularly important when policy change is a prerequisite to achieving project outcomes.
3. **Time and resources need to be invested at the outset of projects to clarify the expectations, roles and responsibilities, and management and decision-making arrangements for all project partners and stakeholders** and this may need to be revisited throughout implementation if key personnel change. A theory of change process with key partners (for instance, DFAT, ACIAR, project teams and government stakeholders) could be useful for establishing expected results and timeframes.
4. **Undertaking gender and social inclusion analysis and putting in place a strategy to advance gender equality and women's empowerment as well as inclusion of diverse groups and people with disabilities** would drive a more strategic approach to ensuring these groups benefit from projects. While it is positive that this project delivered FFT training at its outset to promote a gender equitable approach, additional ongoing monitoring and analysis on the adoption and outcomes of this approach is required to ensure gender- and social inclusion-related outcomes are being progressed as planned, and there are no negative unintended consequences.
5. **Greater consideration of how approaches developed through projects (models for extension services, marketing, and so on) will be institutionalised,** and how the capacity required to sustain these approaches can be built in relevant institutions, could increase the likelihood of uptake of project outputs by government partners. While it is not expected that all models set up through a research project would continue after the project concludes, it would be valuable for the research to include a focus on what would be required for the model to be sustainable. This will help governments and donors make an informed assessment as to whether the new model should be adopted.
6. The value of TADEP CRGs demonstrates both how **an umbrella program can facilitate resourced, structured collaboration across projects** as well as the **need for mechanisms to enable projects to build on emerging findings and adapt to contextual changes** throughout implementation.

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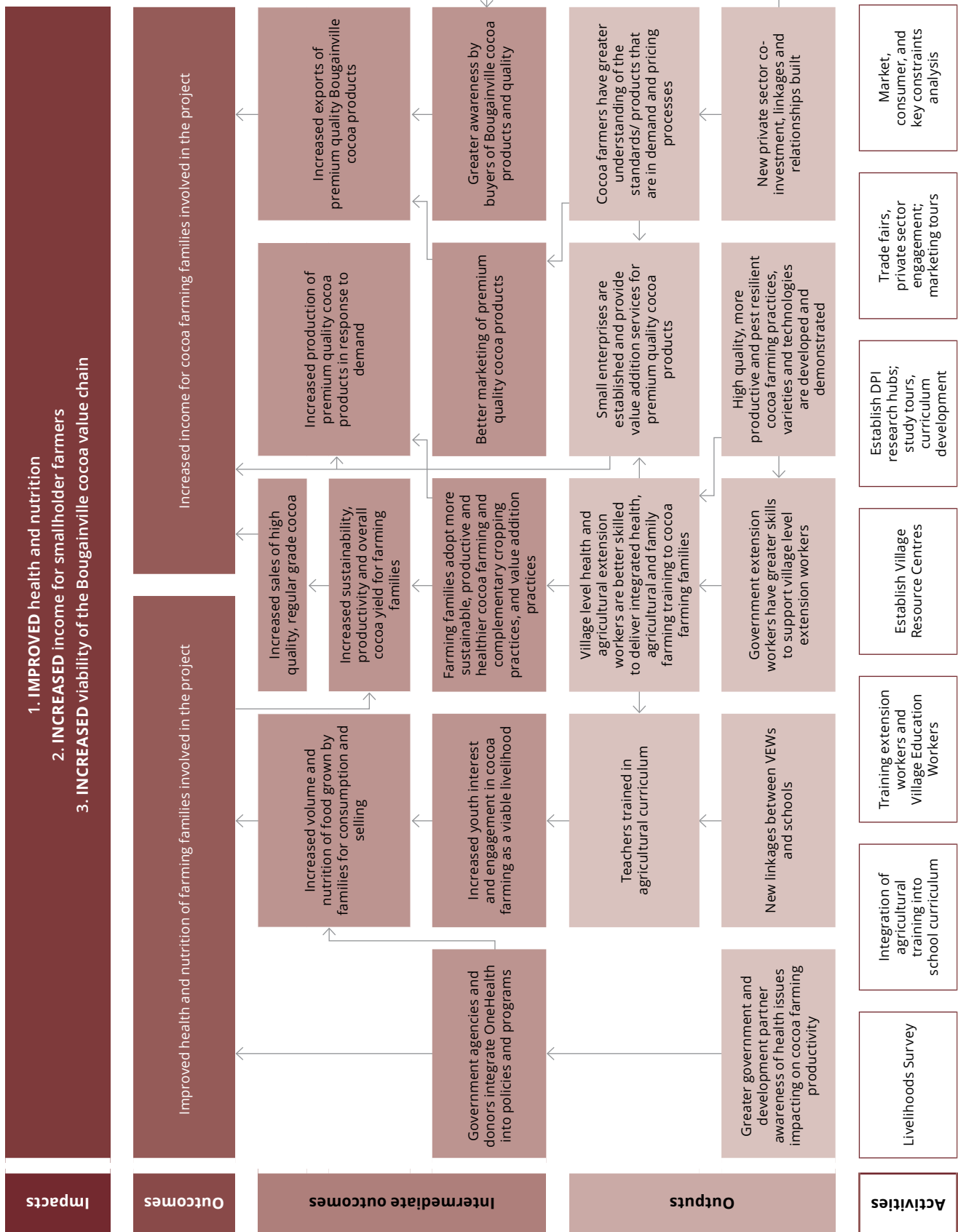
Appendices

Appendix 3.1: Stakeholders consulted

| Name | Role | Organisation |
|-------------------------------------|-------------------------------------|----------------------------------|
| David Guest | Project Leader | University of Sydney |
| James Butubu | Project Coordinator | Department of Primary Industries |
| Wendy Pihau | Director, Agriculture and Livestock | Department of Primary Industries |
| Paul Bedggood | Team Leader | Bougainville Partnership |
| Edmond Benny | Bougainville High Commission staff | DFAT |
| Joe Yabom | Extension Liaison Coordinator | Cocoa Board |
| Merrilyn Walton | One Health Coordinator | University of Sydney |
| Mr Grant Vinning | Marketing Specialist | Private consultant |
| Petter Channells and Li Peng Monroe | Owners | Jasper and Myrtle |

Note: Contacts from the Bougainville Department of Health were unavailable for interview.

Appendix 3.2: Theory of change



Appendix 3.3: Project team members

| # | Team member | Gender | International/National Researchers |
|----|----------------------|--------|------------------------------------|
| 1 | David Guest | M | International |
| 2 | John Konam | M | International |
| 3 | Grant Vinning | M | International |
| 4 | Merrilyn Walton | F | International |
| 5 | Grant Hill-Cawthorne | M | International |
| 6 | Kirsten Black | F | International |
| 7 | Michael Dibley | M | International |
| 8 | Todd Sanderson | M | International |
| 9 | Damien Field | M | International |
| 10 | Richard Seymour | M | International |
| 11 | John Connell | M | International |
| 12 | Peter Nomoreke | M | National |
| 13 | Sam Rangai | M | National |
| 14 | Alfred Nongkas | M | National |
| 15 | Eremas Tade | M | National |
| 16 | Josephine Saul-Maora | F | National |
| 17 | Paul Gende | M | National |
| 18 | David Yinil | M | National |
| 19 | Chris Fidelis | M | National |
| 20 | Frances Kenny | F | National |
| 21 | Joachim Lummani | M | National |
| 22 | Jeffrey Marfu | M | National |
| 23 | Moses Burin | M | National |
| 24 | Samsun Laup | M | National |
| 25 | Charles Maika | M | National |
| 26 | James Aipa | M | National |
| 27 | Horsea Tubarat | M | National |
| 28 | Fen Beed | M | National |
| 29 | Andrew Sale | M | National |
| 30 | Moses Pelomo | M | National |

Appendix 3.4: Research outputs

| Publication | Peer-reviewed | Author (gender, nation) |
|--|-------------------------------------|--|
| Journal articles | | |
| Hall J, Walton M, Van Ogtrop F, Guest D, Black K and Beardsley J (2020) 'Factors influencing undernutrition among children under 5 years from cocoa-growing communities in Bougainville', <i>BMJ Global Health</i> , 5(8). | Yes | Hall (female, Australia) Walton (female, Australia) Van Ogtrop (female, Australia) Guest (male, Australia) Black (female, Australia) Beardsley (male, Australia) |
| Walton M, Hall J, Van Ogtrop F, Guest D, Black K, Beardsley J, Totavun C and Hill-Cawthorne G (2020) 'The extent to which the domestic conditions of cocoa farmers in Bougainville impede livelihoods', <i>One Health</i> , 10, 100142. | Yes | Walton (female, Australia) Hall (female, Australia) Van Ogtrop (female, Australia) Guest (male, Australia) Black (female, Australia) Beardsley (male, Australia) Totavun (male, PNG) Hill-Cawthorne (male, Australia) |
| Walton M, Hall J, Guest DI, Butubu J, Vinning G, Black K and Beardsley J (2020) 'Applying one health methods to improve cocoa production in Bougainville', <i>One Health</i> , 10, 100143. | Yes | Walton (female, Australia) Hall (female, Australia) Guest (male, Australia) Butubu (male, PNG) Vinning (male, Australia) Black (female, Australia) Beardsley (male, Australia) |
| Marelli J-P, Guest DI, Bailey BA, Evans HC, Brown JK, Junaid M, Barreto RW, Lisboa DO and Puig AS (2019) 'Chocolate Under Threat from Old and New Cacao Diseases', <i>Phytopathology</i> , 109:1331-1343, doi:10.1094/PHYTO-12-18-0477-RVW | Yes | Marelli (male, USA) Guest (male, Australia) Bailey (male, USA) Evans (male, UK) Brown (female, USA) Junaid (male, Indonesia) Barreto (male, Brazil) Lisboa (female, Brazil) Puig (female, USA) |
| Guest D, Butubu J, Vinning G, Van Ogtrop F, Hall J, Walton M (2021), 'What Smallholder Farmers Need to Do Is... Food Security', <i>Springer Nature</i> , 2021 (under review). | Under review at time of publication | Guest (male, Australia) Butubu (male, PNG) Vinning (male, Australia) Van Ogtrop (female, Australia) Hall (female, Australia) Walton (female, Australia) |



| Publication | Peer-reviewed | Author (gender, nation) |
|---|---------------|---|
| Books | | |
| Walton M, Guest D, Vinning G, Hill-Cawthorne G, Black K, Betitis T, Totavun C, Butubu J, Hall J and Saul-Maora J (2019) 'Case study 1: Improving the livelihood of farmers in Bougainville', in Walton M (ed), <i>One Planet, One Health</i> , Sydney University Press, Sydney:127-141. | Yes | Walton (female, Australia) Guest (male, Australia) Vinning (male, Australia) Hill-Cawthorne (male, Australia) Black (female, Australia) Betitis (male, PNG) Totavun (male, PNG) Mutubu (male, PNG) Hall (female, Australia) Saul-Maura (female, PNG) |
| Conference papers | | |
| Guest D (July 2018) 'The answer is chocolate: People-Focused Plant Disease Management – Underpinned by Context, Community and Collaboration' [plenary address], <i>11th International Congress of Plant Pathology</i> , Boston, USA. | No | Guest (male, Australia) |
| Guest D (2019) 'Interdependence of health and livelihoods of cocoa farming communities in Sulawesi and Bougainville', <i>Global Health Security Conference</i> , Sydney. | unknown | Guest (male, Australia) |

Appendix 3.5: Evaluation framework

The data and process used for addressing each of the key evaluation questions (KEQs) is summarised in the table. Bold questions are high priority and were explored in more depth.

| Key Evaluation Question | Evidence/Information required | Data sources | Data collection and analysis approach |
|---|---|--|---|
| 1. What was the project's theory of change; and how did this evolve during implementation? <ul style="list-style-type: none"> – Was the theory of change appropriate to the project context and desired results? | <ul style="list-style-type: none"> • Documented theory of change at project commencement • Information on subsequent changes • Information on project context • Perspectives of key stakeholders regarding appropriateness of the theory of change | <ul style="list-style-type: none"> • Project concept / design documents and variations • Project progress reports, annual plans, etc. • Key stakeholders (project managers and collaborating partners, program manager/ coordinator, government authorities, producers, businesses) | <ul style="list-style-type: none"> • Desk review of available documents • Interviews with key stakeholders • Triangulation of findings from different sources • Project verification workshops |
| 2. What outcomes (intended and unintended) has the project achieved or contributed to? <ul style="list-style-type: none"> – What was the unique knowledge contribution of the project/cluster that was/is expected to influence practice/policy? – To what extent is there evidence of adoption of new practices based on research process and findings? | <ul style="list-style-type: none"> • Robust, documented evidence of progress towards planned outputs and outcomes (including progress along adoption pathways), and any unintended consequences • Theory of change assessment from KEQ1 • Perspectives of key stakeholders, to test/validate written reporting, including 'next users' of research outputs | <ul style="list-style-type: none"> • Annual and/or final reports • Mid-term and/or final reviews • Key stakeholders (as above) | <ul style="list-style-type: none"> • Desk review of available documents • Interviews with key stakeholders • Triangulation of findings from different sources • Project verification workshops • ACIAR progress assessment and analysis tools (e.g. Table 8 and Table 9) |
| 3. How did project activities and outputs contribute to the outcomes achieved? <ul style="list-style-type: none"> – To what extent and how did they differ from what was planned? | <ul style="list-style-type: none"> • Theory of change assessment from KEQ1 • Documented evidence of impact pathways, as per KEQ2 • Perspectives of key stakeholders including 'next users' of research outputs | <ul style="list-style-type: none"> • Annual and/or final reports • Mid-term and/or final reviews • Key stakeholders (as above) | <ul style="list-style-type: none"> • Documentation review, stakeholder interviews, triangulation, verification workshops • Analysis of adoption and impact pathways, including 'next users' (e.g. Table 8 and Table 9) |

| Key Evaluation Question | Evidence/information required | Data sources | Data collection and analysis approach |
|---|--|---|---|
| <p>4. What strategies were adopted to address gender equity and social inclusion and how effective were these?</p> <ul style="list-style-type: none"> - How did the project impact men and women differently? | <ul style="list-style-type: none"> • Evidence of analysis/awareness of the potential gender equity issues that may impact on the project • Evidence of steps taken to address the issues identified • Evidence of level of participation of women and men in research activities • Evidence of changes in women's and men's control of assets, resources and decision-making, and gender equity (e.g. through impacts on female researchers; gendered knowledge generation; influence on inclusivity within partner organisations) • Perspectives of key stakeholders | <ul style="list-style-type: none"> • Documented gender strategy or analysis (if available) • Existing reports providing gender-disaggregated data and/or discussion of gender issues, for example, annual and/or final reports, mid-term and/or final reviews • Any existing gender audits or inclusion-focused reviews • Key stakeholders (as above) | <ul style="list-style-type: none"> • Documentation review, stakeholder interviews, triangulation, verification workshops • Gender analysis to explore the level and type of participation of men and women, and influence on positive or harmful gender norms |
| <p>5. How did management arrangements impact delivery of the project?</p> <ul style="list-style-type: none"> - What other factors influenced project performance? | <ul style="list-style-type: none"> • Any existing reporting and commentary on management arrangements • Perspectives of key stakeholders • Evidence of contextual factors external to the project that may have impacted performance | <ul style="list-style-type: none"> • Annual and/or final reports • Mid-term and/or final reviews • Key stakeholders (as above) | <ul style="list-style-type: none"> • Documentation review, stakeholder interviews, triangulation, verification workshops • ACIAR progress assessment tools (e.g. Table 9) |
| <p>6. How well did the project align with and contribute to the overall goals of its umbrella program?</p> <ul style="list-style-type: none"> - To what extent has the programmatic approach added value at project level? | <ul style="list-style-type: none"> • Assessment of KEQs 1-5 • Information on program goal and approach • Relevant existing reporting and commentary • Perspectives of key stakeholders | <ul style="list-style-type: none"> • Annual and/or final reports • Mid-term and/or final reviews • Key stakeholders (as above) | <ul style="list-style-type: none"> • Assessment of consistency and value-add, based on analysis for KEQs 1-5 and supplementary program-level documentation, stakeholder interviews and verification workshops |

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