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Australian Centre for International Agricultural Research

# An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program

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ACIAR OUTCOME EVALUATION SERIES

# An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program

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Alinea International


2022

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Suggested citation: Hanley C and Passfield L (2022) *An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program*, ACIAR Outcome Evaluation No. 2, Australian Centre for International Agricultural Research, Canberra.

ACIAR Outcome Evaluation Series No. 2 (OE002)

ISSN 2653-6811 (print)
ISSN 2653-682X (pdf)
ISBN 978-1-922787-88-0 (print)
ISBN 978-1-922787-87-3 (pdf)

Technical editing by The Write Path
Design by Redtail Graphic Design

# 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

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program

# Abbreviations and acronyms

| | |
|---|---|
| **ACIAR** | Australian Centre for International Agricultural Research |
| **ASLP** | Agriculture Sector Linkages Program |
| **CMFT** | Cocoa Model Farmer Trainer |
| **DFAT** | Department of Foreign Affairs and Trade (Australia) |
| **DPI** | Department of Primary Industries (Autonomous Region of Bougainville) |
| **FFT** | Family Farm Teams |
| **FPDA** | Fresh Produce Development Agency |
| **KEQ** | Key Evaluation Question |
| **MAD4TADEP** | Mobile Acquired Data for TADEP |
| **M&E** | Monitoring and evaluation |
| **NARI** | National Agricultural Research Institute |
| **PGK** | Papua New Guinea kina |
| **PNG** | Papua New Guinea |
| **RPM** | Research Program Manager |
| **TADEP** | Transformative Agriculture and Enterprise Development Program |
| **VCE** | Village Community Educator |
| **VEW** | Village Extension Worker |

# Acknowledgements

The evaluation team would like to thank Australian Centre for International Agricultural Research (ACIAR) staff who supported the evaluation. Particular thanks to Elizabeth Brennan, Bethany Davies and Doreen Iga.

The evaluation team would also like to thank all the project stakeholders who gave their time to be interviewed, to review the evaluation findings and to participate in the validation workshop.

# Part 1 contents

# 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 component research-for-development projects:

- PNG cocoa
- Bougainville cocoa
- Sweetpotato
- Galip nut
- Family Farm Teams.

TADEP was co-funded by the Department of Foreign Affairs and Trade (DFAT) and ACIAR.

ACIAR Outcome Evaluation No. 2 summarises the outcomes of TADEP and identifies lessons that can inform the design and implementation of future ACIAR programs. The evaluation is divided into 7 parts: Part 1 outlines the lessons learned from the TADEP programmatic approach. Parts 2–6 are evaluations of 4 commodity-based projects and the Family Farm Teams project within the program.

A similar evaluation was conducted on the Agriculture Sector Linkages Program (ASLP) and is reported in ACIAR Outcome Evaluation No. 1.

A separate synthesis report, ACIAR Outcome Evaluation No. 3, will summarise lessons from the 2 ACIAR programs, ASLP and TADEP.

## Key findings

1

### What was the process, timing and rationale for bringing projects together under this program?

TADEP was conceptualised during 2014 in response to a request from DFAT, which was seeking to rapidly fund a set of projects that supported agricultural development in PNG. ACIAR saw value in grouping these projects together as a program to maximise opportunities for sharing and learning across projects, and streamline monitoring and evaluation, reporting and capacity development activities. The selection of the 5 otherwise distinct component projects was also influenced by the ability to scale previous research in cocoa, sweetpotato and galip nut (*Canarium* nut), and to generate larger scale development outcomes by actively engaging women's groups and the private sector.

**The rapid development of TADEP meant that it followed an unconventional design process, with the projects designed before full attention could be given to how the program would function.** No overarching program framework or theory of change was developed to which the individual project designs could contribute. Whereas a normal project design process for ACIAR can take up to 18 months and is highly participatory, the design of TADEP projects was condensed, sometimes into as little as 6 months. There is general agreement amongst key stakeholders that this design process and timing was less than ideal but also unavoidable as it arose from a political imperative.

**A key implication of the design process was that project leaders were not fully on board with the concept of TADEP as a program in the beginning, and didn't necessarily see the potential value-add of the program structure**. They also had not budgeted both time and resources for any program-level activities. As a result, TADEP by design had a reasonably slow start, with many of the program-level initiatives not getting underway until well into project implementation.

2

### What is the program's theory of change? To what extent have program goals and outcomes been achieved?

**TADEP was not underpinned by a theory of change, and it was not until after the project designs had been completed that a set of overarching objectives for TADEP were developed**. These objectives were drawn from the commonalities between each of the 5 component projects, broadly articulating how they contribute to the program goal.

Given the theory of change approach was not used within TADEP, the program's achievements have instead been assessed against the 5 TADEP objectives. A 5-point rating scale was used (ranging from none to very high) to rate the contribution of each project towards each TADEP objective, considering the extent of relevant outputs, evidence of adoption amongst next users, and evidence of outcomes. Table 2 on page 18 provides a summary of the assessment.

**Overall, there was good alignment between project-level objectives and the broader TADEP objectives, with all projects contributing to the TADEP objectives to at least some degree**. Greatest outcomes or likely outcomes appear to have been achieved in relation to increasing agricultural production and productive capacity of farmers, and improving individual and institutional capacity building. All projects also produced outcomes in relation to private sector-led development to some degree. While all projects expressed an intent to strengthen gender equality and some outputs were evident in most projects, there was limited evidence of adoption and outcomes in this area, except in the Family Farm Teams project.

## Key findings (*cont.*)

3

## Benefits and challenges of the programmatic approach

This section covers the key evaluation questions:

- What are the main factors that influenced program performance?
- What benefits were realised by adopting a programmatic approach, compared to an individual project approach?
- What challenges arose from the programmatic approach?

To address these questions, the evaluation team, drawing on available literature, identified the potential benefits of adopting a programmatic approach. We also developed a rubric to assess whether ACIAR programs aimed to achieve, and ultimately realised, these benefits. The potential benefits and rubric are summarised in Appendix 1.2.

### Potential benefit 1: Increasing impact

**Low–Medium:** Projects have similar goals but don't align with a theory of change or strongly complement each other

A key dimension of a programmatic approach is that it can increase impact beyond what would be achieved by individual projects. The extent to which TADEP realised this benefit is rated as **low–medium**. This idea was reflected in the narrative of the perceived benefits of TADEP, but not fully realised in practice.

At the heart of TADEP were 5 individual research projects that were implemented largely independently of each other. **While the projects mapped reasonably well to the TADEP overarching objectives, they were not mutually reinforcing or underpinned by an overarching program theory**.

To encourage more meaningful collaboration between projects, the program introduced Collaborative Research Grants following the 2017 Annual Meeting. These had a range of benefits. They provided a tangible mechanism for projects to work together, which strengthened relationships and communication between project teams. They also provided a highly valued mechanism for projects to fund activities that were not identified at the time of the project design, and in some cases enabled projects to have a broader geographic footprint than would have been possible independently. **While the concept of the Collaborative Research Grant certainly holds merit, it is questionable whether the design and selection process adopted led to the most strategic range of grants**. In addition, activities completed through the Collaborative Research Grants weren't always strongly integrated into the broader structure of the TADEP projects they were connected to, which may have reduced their effectiveness.

### Potential benefit 2: Increasing knowledge and learning

**High:** There was strong evidence of sharing and learning between most projects

A second potential benefit of a programmatic approach is that it can increase knowledge and learning between its constituent parts. The extent to which this benefit was realised by TADEP is rated as **high**.

**Sharing knowledge and learning between projects was a key strength of TADEP**. This was achieved through structured sharing and learning events, written communications, and informal opportunities for sharing and collaboration. A key benefit of TADEP was that meaningful relationships could develop and mature over time, to enable discussion of challenges from a position of trust.

**Of particular benefit was the interaction between the Family Farm Teams project and the other projects**, with many stakeholders describing this project as the 'glue' that held TADEP together. The nature of Family Farm Teams as a social science project meant its approach and lessons were relevant across different commodity projects. Multiple project leaders indicated that their exposure to both the Family Farm Teams approach and project team had strongly influenced their approach to agricultural research.

**Annual meetings were the main mechanism for structured sharing and learning within the program and were highly regarded by all who attended them**. Alongside the formal meeting agenda, opportunities for informal networking and sharing, such as dinners and field tours, were also seen as a critical component of what made these meetings successful. A key limitation was the relatively restricted attendance, which was necessary due to budget constraints but meant that many project team members were not able to participate. In addition, some stakeholders indicated these meetings were somewhat 'Australian-centric', which should be addressed in future programs.

Other communication products, such as the TADEP updates (written newsletters), also contributed to sharing and learning between projects. For project team members who did not attend the annual meetings, this was the main avenue through which they had visibility of the other projects. In addition, many stakeholders emphasised how valuable the informal sharing and learning was, particularly as the project teams got to know each other better.

### Potential benefit 3: Increasing influence and adoption

**Medium:** Some evidence of the program structure being used to promote the program or influence stakeholders

A further dimension of a programmatic approach is that it can assist with increasing influence and adoption. The extent to which TADEP realised this benefit is rated as **medium**. Benefits were mostly realised in relation to communicating research activities and program outcomes. Fewer benefits are evident in relation to enhancing leverage through joint action, and building relationships.

**It is clear that TADEP was able to harness resources for communications beyond what would typically be expected in a standalone research project**. The program produced a range of communication materials to showcase program achievements to different audiences, which were distributed widely. Interviewees also felt that the program structure enabled ACIAR to gain greater traction with DFAT and key PNG research partners, as the TADEP brand was widely recognised and had more weight as a larger program than individual research projects would have. TADEP communications could have been strengthened through further development of a communications strategy to ensure products met the needs of key stakeholders such as DFAT.

While communications were a substantial focus of the program, **less attention was given to using the program structure to leverage influence with key stakeholders to encourage awareness or adoption of research outputs**. Communications instead appeared to focus on what TADEP projects had been doing and individual success stories, rather than key research findings and what this meant for agricultural development in PNG. This is a key missed opportunity.

### Potential benefit 4: Streamlining management

**Medium:** Streamlined reporting and communications with funders, monitoring, evaluation and learning and cross-cutting issues could be improved

A final dimension of a programmatic approach is that it can streamline management. The extent to which TADEP realised this benefit is rated as **medium**.

**ACIAR engaged a part-time program coordinator to manage program-level initiatives and reporting, and this is widely seen as central in achieving the benefits of TADEP**. The coordinator's ability to bring stakeholders together, build momentum around shared initiatives and encourage collaboration was particularly critical. Further clarity in roles and responsibilities between the program coordinator, ACIAR Country Manager and ACIAR research program managers (RPMs) would further enhance the effectiveness of this position.

**TADEP was able to streamline reporting requirements and some interactions with DFAT through the program coordinator role**. This helped to shield project leaders from frequent requests from DFAT for information although this was still a cause of frustration for project teams.

**A shared monitoring and evaluation (M&E) framework was also developed, however challenges with mapping project-level achievements against this framework impacted its effectiveness**. While this could have been partially addressed by developing project-level M&E frameworks, the nature of the way the program and projects were initially designed meant that it was always going to be challenging to tell a coherent program story.

Some capacity building support was provided on themes of common interest, such as electronic data collection platforms and communications, but this could have been enhanced to cover a broader range of topics. In particular, additional technical support on developing gender and social inclusion strategies, and strengthening approaches to monitoring outcomes would have strengthened project implementation.

Program governance is also an area that could have been strengthened. A program steering committee was introduced midway through implementation, involving the 5 project leaders, program coordinator and key ACIAR staff. This was valuable for enhancing communication between the projects and planning program-level events, but focused more on operational concerns than the strategic direction of the program. **There could have been value in a more strategic governance arrangement for the program, involving external stakeholders such as DFAT, PNG government and key partner organisations**.

Overall, there were very few reported challenges or negative aspects to the program approach. The main challenge reported by project teams was the additional time taken to engage in program-level learning events and reporting. Streamlining reporting requirements further, and budgeting for time associated with major program events, would help to manage these transaction costs in future programs. The COVID-19 pandemic also presented a challenge, both for the projects and at the program-level. While efforts were made to adapt activities to utilise online platforms, many of the larger program-level learning events for 2020 and 2021 were cancelled. This reduced the realisation of potential benefits around sharing and learning.

## Conclusion and lessons learned

TADEP and its component projects were rapidly designed in response to a funding opportunity from DFAT. This design process was not ideal and limited the extent to which the projects could be complementary. That said, the projects did have enough commonality to contribute towards common objectives and provide useful opportunities for sharing and learning. **All projects contributed meaningfully towards the 5 TADEP objectives with some examples of strong outcomes, particularly in relation to improving agricultural productivity, building capacity and gender equality**. Unfortunately, the lack of systematic data for some projects means it is difficult to draw conclusions on the achievement of outcomes.

This evaluation outlined a framework of the potential benefits of a programmatic approach, which was then used to assess how well these benefits were realised in TADEP. **The main benefits came from sharing and learning between project teams, shared communications, and streamlining some management functions**, although fewer benefits were realised in this last area. The influencing of stakeholders could have been improved by a more thorough communications strategy and collaborative approach between projects.

Overall, there were substantial benefits realised through the programmatic approach used in TADEP, and very limited disadvantages of taking this approach. Given that there is potential for even greater benefits to be achieved, the associated costs appear to be a worthwhile investment.

### Lessons learned

The TADEP programmatic approach highlights several lessons for ACIAR to consider in future programming. **A key overarching lesson is that there is value in intentionally identifying the type of benefits ACIAR wishes to achieve through the programmatic approach, and structuring the program with appropriate resourcing to help realise these benefits**.

The rubric at Appendix 1.2 could provide a useful starting point for such an exercise. A consolidated list of lessons is provided at the end of the report. In summary, these are:

1. To maximise development impacts, the overall program framework should be developed first, ideally utilising a theory of change approach to identify what individual activities are required to contribute towards the desired outcomes. Projects should then be complementary to achieve these outcomes.
2. Collaborative Research Grants were a useful addition to the program structure. Ensuring these are used strategically and linked into their 'parent' projects will help maximise their effectiveness.
3. ACIAR should consider alternative mechanisms that provide greater flexibility for adaptive planning at the project level.
4. Sharing and learning between projects was a key strength of TADEP. These could be further enhanced by considering additional informal mechanisms to reach a wider audience than can attend international face-to-face meetings.
5. Programs should have a well-developed communications strategy that focuses not just on sharing outcomes from project activities but also on seeking to influence in-country stakeholders to encourage adoption of research outputs.
6. Dedicated staffing, such as a program coordinator, is critical to realise the potential benefits of a programmatic approach. The particular resourcing profile should consider the type of benefits that ACIAR aims to achieve, and the staffing and technical assistance needed to realise these.
7. Program-level monitoring frameworks are critical to enable the program to tell a coherent performance story, but are only useful if projects systematically collect data and report against a set of common indicators. In addition, more emphasis must be given to monitoring the outcomes of project activities, rather than just outputs.
8. It is important to clearly define the roles and responsibilities of ACIAR staff and dedicated program staff when establishing the program structure, and clearly communicate these to all parties.
9. Future programs would benefit from more strategic, high-level governance arrangements that include DFAT (if a funding partner), partner government representatives, and key partner organisations.

# 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 a program-level evaluation to identify lessons that will inform the design and implementation of future ACIAR investments and improve the quality of outcomes.

### Purpose

The program-level evaluation has 5 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.
3. Summarise the contribution to outcomes of each program, with a particular focus on differential effects for women and men.
4. Establish how the different approaches to programmatic management adopted by each program influenced the achievement of outcomes.
5. Identify lessons related to programmatic management of agricultural research-for-development to inform future ACIAR investments.

### Scope

This program-level evaluation focuses on the whole TADEP and its constituent projects. Five project-level evaluations were undertaken of projects (or groups of projects) within TADEP and these form Parts 2–6 of Outcome Evaluation 2. Drawing on these project evaluations, this program-level evaluation 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 TADEP program-level evaluation was guided by the following key evaluation questions:

1. What was the process, timing (vis-à-vis constituent projects) and rationale for bringing projects together under this program?
   - How is the program structured?
2. What is the program's theory of change? To what extent have the intended program goal and outcomes been achieved?
   - What was the contribution of each project?
3. What were the main factors that influenced program performance?
   - To what extent were the program's scope, scale, structure and management arrangements appropriate?
   - How did the program's particular structure and management arrangements influence program achievements?
   - What external factors arose, for example, budgetary, natural hazards, policy settings?
4. What benefits were realised by adopting a programmatic approach, compared to an individual project approach?
   - What evidence is there of learning or cross-collaboration between projects within a program?
   - To what extent were project-level outcomes mutually reinforcing within the program?
   - Did the programmatic approach result in improved implementation strategies and/or additional resourcing, for example, on gender equality?
5. What challenges arose from the programmatic approach?
   - To what extent did the benefits outweigh the challenges?

## Audiences

The primary audience for this program-level evaluation is ACIAR staff with direct responsibilities for programs and/or their constituent projects. This includes Canberra-based research program managers (RPMs) and any future field-based program managers and coordinators. The ACIAR Executive and senior managers, and DFAT fund managers, are also important audiences particularly for the program-level assessments and synthesis report.

# Methodology

## Data collection and analysis

The evaluation team developed a Program Evaluation Framework (see Appendix 1.3), which details the data and process used for addressing each of the key evaluation questions. Data for the Transformative Agriculture and Development Enterprise Program (TADEP) evaluation was collected through:

- Reviewing project-level evaluation reports and programmatic documentation, including TADEP annual reports, design documents, the mid-term review, and other program updates and reporting.
- Semi-structured interviews with Department of Foreign Affairs and Trade (DFAT) and Australian Centre for International Agricultural Research (ACIAR) staff, conducted online using Zoom and WhatsApp. Six interviews were conducted with 9 stakeholders in total. Stakeholders were intentionally selected in consultation with ACIAR. Appendix 1.4 provides a list of stakeholders consulted.

Systematic analysis of data was undertaken using NVivo qualitative data analysis software to distil findings.

The evaluation team developed 2 data analysis tools to support synthesis of evaluation findings. The first tool was a 5-point rating scale (ranging from none to very high) to rate the contribution of each project towards each TADEP objective, taking into account the extent of relevant outputs, evidence of adoption amongst next users, and available evidence of outcomes (see Appendix 1.6).

The second was a framework outlining the potential benefits of a programmatic approach (see Appendix 1.2). This framework was developed drawing on literature, particularly Buffardi and Hearn (2015), as well as the evaluation team's expertise. This framework:

- Outlines the potential benefits of a programmatic approach under 4 topic areas:
  - increasing impact
  - knowledge and learning
  - influence and adoption
  - streamlining management.
- Provides a rubric to assess the extent to which an ACIAR program achieved the potential benefits. The 3 possible rubric ratings are low, medium and high.

The data analysis phase specifically focused on understanding whether TADEP aimed to achieve a potential benefit, and the extent to which it did (or didn't) achieve this benefit. The Agriculture Sector Linkages Program (ASLP) evaluation also uses this framework. This will allow for the identification of common themes and program comparison in the final synthesis report.

Preliminary findings were shared and tested in a validation workshop involving the stakeholders previously consulted, ACIAR staff and project-level staff. Stakeholders were also given the opportunity to provide written comments on a draft executive summary. These activities 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 team relied heavily on pre-existing documentation provided by ACIAR and the project-level review reports. Significant data gaps remain in relation to assessing the outcomes from the TADEP projects, given 3 of these projects had not finished at the time of the evaluation and therefore final project reports were not available. In addition, there were insufficient evaluation resources to explore project-level data beyond that which was reported in the project annual reports to ACIAR. The summary of contribution towards TADEP objectives should therefore be considered as preliminary. Additional data collection and analysis of project-level data should be undertaken, including in-country consultations, to fully assess project-level achievements.

Stakeholder consultations were also quite limited in this phase, although the evaluation team drew strongly on interviews conducted early in the program implementation. As primary data collection was restricted to online interviews, the evaluators had limited ability to build rapport with participants and interpret non-verbal communication. Interviewees for the project were intentionally chosen by ACIAR and the evaluation team, and were predominantly ACIAR staff. This means they were not a representative sample of program stakeholders.

## 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 were being consulted, how the information would be used and that their participation was voluntary prior to the consultation. Consultations were only undertaken once verbal consent was obtained.
- **Privacy and confidentiality:** The identities of any project stakeholders involved in the evaluation have been 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.

# Overview of program

## Context

Poverty is a significant issue for all Papua New Guinea (PNG) provinces, including the Autonomous Region of Bougainville, with over 80% of the nation's population being rural-based subsistence smallholder farmers (ACIAR 2020). About half of the labour force work in agriculture, which generates 15% of gross domestic product (ACIAR 2020). While an estimated 30% of the land is suitable for agriculture, only 2.2% is used for commercial agriculture (ACIAR 2020). Enhancing the livelihoods of rural men and women in PNG will enable the nation to reduce poverty and promote sustainable economic development. Increasing agricultural productivity and supply-chain efficiency for both domestic and export commodities is essential to promote economic growth in the rural sector. Long-term commitment and holistic approaches are needed to address these complex challenges and generate sustainable solutions.

The Australian Centre for International Agricultural Research (ACIAR) has a long history working in PNG to address these issues, including in partnership with the Department of Foreign Affairs and Trade (DFAT). This partnership is a key component of Australia's involvement in the PNG agriculture sector and reflects Australia's interests in enhancing the lives of rural people and promoting stability in PNG. There is a strong focus on Australia's development cooperation programs on economic development as a pathway out of poverty and on empowering women and girls. These objectives are reflected in the PNG development priorities articulated by both the PNG and Australian governments, and as such are central to ACIAR and DFAT collaborative efforts in PNG.

Previously, ACIAR and DFAT have predominantly worked together to co-fund specific projects or to provide financial investment to support country budgets. The Transformative Agriculture and Enterprise Development Program (TADEP) represents the first programmatic intervention cofunded by ACIAR and DFAT in PNG.

## The program

TADEP is a multidisciplinary research program that aims to improve the livelihoods of rural men and women in PNG through 5 component research-for-development projects. TADEP is co-funded by DFAT and ACIAR. The program commenced in July 2015 and concluded in December 2021.

The overall aim of TADEP is to **improve livelihoods of rural men and women in PNG**. TADEP has 5 specific objectives:

- To stimulate and strengthen inclusive partner-led development in agriculture.
- To sustainably increase agricultural productivity, quality and value.
- To improve access to markets and strengthen value chains.
- To promote gender equity and women's empowerment in rural communities.
- To build individual and institutional capacity.

The 5 projects under TADEP are outlined in Table 1. Each of the projects has a legacy of successful research and innovation in PNG which TADEP seeks to scale up, including through increasing private-sector involvement, working over a larger area and with more people.

**Table 1** Projects in TADEP

| Program / Project | Project full name | Duration |
|---|---|---|
| **PNG cocoa** | Enterprise-driven transformation of family Cocoa production in East Sepik, Madang, New Ireland and Chimbu provinces of Papua New Guinea | March 2016 to March 2021 |
| **Bougainville cocoa** | Developing the Cocoa value chain in Bougainville | Feb 2016 to Dec 2022 |
| **Galip nut** | Enhancing private sector-led development of the *Canarium* industry in Papua New Guinea | June 2015 to Dec 2018 |
| **Sweetpotato** | Supporting commercial sweetpotato production and marketing in the Papua New Guinea highlands | Feb 2016 to Feb 2021 |
| **Family Farm Teams** | Improving opportunities for economic development for women smallholders in rural Papua New Guinea | July 2015 to Dec 2018 |

The role of TADEP as a program was to facilitate opportunities for cross-program collaboration, to build capacity among projects, and deliver a communications strategy to enhance value beyond the sum of the component projects. In addition, TADEP developed and maintained a program-wide monitoring and evaluation framework and sought to ensure the guiding principles of gender equity and private-sector led development were embedded across all program-level activities. A part-time program coordinator oversaw program-level logistics and communications.

Smallholders selling sweetpotato at a market in Papua New Guinea. Photo: Conor Ashleigh, ACIAR

# Findings

## 1. What was the process, timing and rationale for bringing projects together under this program?

The Transformative Agriculture and Development Enterprise Program (TADEP) was conceptualised during 2014. At this time, the Australian Centre for International Agricultural Research (ACIAR) was approached by the Department of Foreign Affairs and Trade (DFAT), which was seeking to rapidly fund a set of projects that supported agricultural development in Papua New Guinea (PNG) due to a political imperative. These projects were to have a particular focus on women smallholders and engaging the private sector. While DFAT was prepared to fund individual research projects, ACIAR saw value in grouping these projects together as a program to maximise opportunities for sharing and learning across projects, and streamline monitoring and evaluation (M&E), reporting and capacity development activities.

**The rapid development of TADEP meant that it followed an unconventional design process, with the projects designed before full attention could be given to how the program would function**. To streamline the design process, all the projects selected to be part of TADEP built strongly on previous ACIAR projects. The researchers had existing relationships with in-country counterparts and were able to scale-up or scale-out agricultural practices or innovations resulting from previous work, whilst also furthering the research agenda. While limited attention was given at this stage as to how TADEP would function, ACIAR did have the foresight to ensure a social science project (the Family Farm Teams project) was included from the beginning, which had been a key learning from previous ACIAR programs.

**Whereas the normal ACIAR project design process can take up to 18 months and is highly participatory, the design of TADEP projects was condensed**. This had several implications:

- It led to projects within TADEP having staggered start and end times (see Table 1) as not all projects were ready to commence in July 2015. This had ongoing repercussions for the program as it was implemented, as projects were then at different stages throughout implementation.
- It resulted in fewer in-country consultations and less engagement with in-country partners than would normally be undertaken during a design process. For some projects, this led to a lack of clarity in roles and responsibilities between implementing partners, and a sense that in-country stakeholders had not had adequate voice in the design process.
- For some projects it appeared insufficient preparatory analysis was undertaken during the design phase. For example, the Bougainville cocoa project (and to some extent the PNG cocoa project) would have benefited from additional market analysis; the sweetpotato project would have been strengthened by additional analysis of partner capacity; and multiple projects would have benefited from additional gender analysis. While there isn't clear evidence that time constraints were the key factor limiting this analysis, it is plausible that rushing the design process may have contributed to this.
- Project teams were not able to budget for program-level activities – this meant any time spent on collaboration, learning or reporting were additional responsibilities on top of planned workloads.

**A key implication of the design process was that project leaders were not fully on board with the concept of TADEP as a program in the beginning, and didn't necessarily see the potential value-add of the program structure**. They also had not budgeted time or resources for any program-level activities. ACIAR was acutely aware of this when developing the programmatic approach, as it needed to maximise the potential benefits while also being palatable to the project teams. As a result, TADEP by design had a reasonably slow start, with many of the program-level initiatives not getting underway until well into project implementation.

## 2. What is the program's theory of change? To what extent have the intended program goal and outcomes been achieved?

**TADEP was not underpinned by a theory of change, and it was not until after the project designs had been completed that a set of overarching objectives for TADEP were developed**. TADEP engaged an M&E specialist in 2016 to help develop an impact pathway and performance framework for the program. Through this process a generic impact pathway diagram was developed which provided a theoretical overview of how research projects contribute to development outcomes (see Appendix 1.5). However, this impact pathway did not provide any specific detail on how outputs from the 5 TADEP research projects would contribute to the TADEP objectives. Similarly, the performance framework for the program provided a narrative of 'what success looked like' and identified indicators for each objective, but was not structured using a theory of change or logic model approach (for example, identifying immediate, intermediate and end-of-program outcomes).

Drawing on program documents and discussion with stakeholders, **the evaluation team developed a suggested theory of change** for TADEP. A visual representation of the theory of change is at Appendix 1.1. The essence of the theory of change is that identification and adoption of new approaches to agricultural production, increased engagement with the private sector and support for farmers to commence or expand agricultural business activities, would result in improved productive capacity of men and women farmers and increased private sector-led development in agriculture. Emphasis was also placed on ensuring women were actively engaged in project activities and taking a leading role in agricultural production and enterprise development to improve gender equality and women's empowerment.

### Contribution towards TADEP objectives

Given a theory of change approach was not used within TADEP, the program's achievements have instead been assessed against the 5 TADEP objectives, as this formed the basis of the monitoring framework. The evaluation team used a 5-point rating scale (ranging from none to very high) to rate the contribution of each project towards each TADEP objective, taking into account the extent of relevant outputs, evidence of adoption amongst next users and available evidence of outcomes.

**The contribution of each project towards the TADEP objectives is summarised in** Table 2. The rating scale and further examples of evidence of each project's contribution is outlined in detail at Appendix 1.6. It should be noted that not all TADEP projects had finished at the time this report was completed[1], and the evaluation team was also unable to review primary data beyond the project annual reports. This therefore should not be seen as a definitive assessment of the final program outcomes. Furthermore, in some cases outcomes may have been achieved but a lack of systematic evidence has restricted the ability of the evaluation team to determine their extent. Investing additional resources in building monitoring systems which focus on measuring outcomes rather than outputs would strengthen the performance story of future programs.

Overall, there was good alignment between project-level objectives and the broader TADEP objectives, with all projects contributing to the TADEP objectives to at least some degree. **Greatest outcomes or likely outcomes appear to have been achieved in relation to increasing agricultural production and productive capacity of farmers, and improving individual and institutional capacity building**. Substantial outputs were also achieved in relation to private sector-led development, although it is less clear whether this will result in long-term outcomes.

1 Bougainville cocoa project was extended to December 2022. The PNG cocoa project and sweetpotato project concluded during the evaluation, but final data was not available to the evaluation team at the time of report writing.

**Table 2** Contribution of each project towards TADEP objectives

| Project | TADEP Objectives | | | | |
|---|---|---|---|---|---|
| | Private sector-led development | Agricultural production | Access to markets | Capacity building | Gender equality |
| PNG cocoa | Medium | High | Medium | High | Low |
| Bougainville cocoa | Medium | High | Low | High | Medium |
| Galip nut | Very high | High | Very high | Medium | Medium |
| Sweetpotato | High | High | High | High | Low |
| Family Farm Teams | High | Medium | Low | High | Very high |

All TADEP projects included a focus on **building or utilising the private sector as a vehicle for development**. For some projects, such as Family Farm Teams, PNG cocoa and Bougainville cocoa, this targeted individual farming families to encourage more business-oriented agricultural production or related services. Others such as the galip nut and sweetpotato projects, had a greater focus on influencing larger-scale commercial production. The galip nut project took a particularly strong private sector-led approach, establishing a demonstration factory at the National Agricultural Research Institute (NARI) in East New Britain, and market testing galip nut products in PNG supermarkets. This contributed to 4 private sector processors entering the industry, which is now also providing opportunities for smallholder farmers to sell galip nut for processing.

**Agricultural production** was increased through introduction of new planting materials, such as the sweetpotato clean seed scheme and new cocoa varieties; new, more intensive farming practices; and improved post-harvest processing. This resulted in higher, better-quality yields amongst the target commodities, which in some cases contributed to higher incomes for farmers and more food available for consumption. The PNG cocoa project successfully introduced cocoa production into new areas of PNG, while the galip nut project was able to more than double production at the NARI demonstration factory through refining processing techniques. Results from the Islands Hub of the Family Farm Teams project indicate that most households now 'always' or 'mostly' have enough food to feed their families as a result of the project.

**Improvements in individual and institutional capacity** were closely related to improvements in agricultural production. At an individual level, farmers received a raft of training on agricultural techniques, business skills, and post-harvest processing. All projects reported good levels of adoption of these new skills, particularly amongst next users. For example, while rigorous data is not yet available, project coordinators of the PNG cocoa project estimate around 50% of Cocoa Model Farmer Trainers (CMFTs) have applied new agricultural methods learned, with many farmers adapting new practices to suit their local growing conditions. At an institutional level, the program built the capacity of NARI, Fresh Produce Development Agency (FPDA), Department of Primary Industries (DPI) in Bougainville, the Cocoa Board, and university research partners, strengthening research skills and capacity to provide extension services. For example, the sweetpotato project provided extensive staff training for FPDA in community development, which led to a broader institutional commitment to adopt this approach within the organisation.

Efforts were made by some projects to **increase access to markets and strengthen value chains**, but this wasn't a major focus of all projects. The galip nut project was able to demonstrate consumer demand for galip nut products through the commercial sale of products in supermarkets. This was critical in building confidence in the new industry and encouraging private sector investment. The Bougainville cocoa project was able to help facilitate a small number of new commercial arrangements between farmers and PNG-based food manufacturers, and raised awareness of market forces amongst cocoa farmers. Unfortunately, export licence restrictions limited further outcomes in this area. Through supporting production of higher quality produce, the sweetpotato project enabled sales to new markets such as supermarkets.

While all projects expressed an intent to strengthen **gender equality and women's empowerment** and some outputs were evident in relation to this in most projects, there was limited evidence of adoption and outcomes in this area, except in the Family Farm Teams project. This project was successful in influencing communication and decision-making within families to be more equitable, and resulted in some women taking on greater leadership roles within their communities.

**The COVID-19 pandemic and associated travel restrictions also impacted on the delivery of projects during 2020–21**. While in-country teams were able to progress delivery of most activities, technical support from Australian team members was more limited. This interrupted delivery of some activities, including end line data collection for the PNG cocoa project, and contributed to a one-year extension to the Bougainville cocoa project.

## 3. Benefits and challenges of the programmatic approach

This section discusses the factors that influenced TADEP performance and the benefits and challenges of the programmatic approach as it was applied to TADEP. It covers the key evaluation questions of:

- What are the main factors that influenced program performance?
- What benefits were realised by adopting a programmatic approach, compared to an individual project approach?
- What challenges arose from the programmatic approach?

As discussed in the methodology section of the report, to address these evaluation questions the evaluation team developed a framework outlining the potential benefits of a programmatic approach (see Appendix 1.2). The framework identifies 4 potential ways in which a programmatic approach can add value beyond what individual projects can achieve:

- by increasing impact
- by increasing knowledge and learning
- by increasing influence and adoption
- by streamlining management.

The framework also outlines criteria to determine whether an ACIAR program realised these program benefits to a low, medium or high extent.

### Potential benefit 1: Increasing impact

**Low–Medium:** Projects have similar goals but don't align with a theory of change or strongly complement each other

A key potential benefit of a programmatic approach is that **it can increase impact beyond what would be achieved by individual projects**. Specific ways that increased impact can be achieved include:

- projects work collaboratively towards a program theory of change, combining results for greater impact
- a program extends the reach of interventions to multiple geographic areas
- a program broadens the diversity of perspectives and strategies to provide a holistic response to a common problem.

This idea was reflected in the narrative of the perceived benefits of TADEP, but was not fully realised in practice.

The 5 TADEP projects were designed prior to development of a coherent set of program objectives and were therefore essentially independent research projects. That said, all the projects did have key points of similarity which enabled development of the TADEP objectives. These were:

- the focus on improving agricultural production within PNG and the Autonomous Region of Bougainville
- seeking to actively engage women farmers
- engaging the private sector to stimulate development
- building individual and institutional capacity.

Key points of difference were that the projects were operating in different locations within PNG and focusing on different commodity crops.

**While the projects mapped reasonably well to TADEP overarching objectives, they were not mutually reinforcing or held together by an overarching program theory**. This indicates that the benefits of the programmatic approach were not fully realised on this dimension. This was reflected in stakeholder interviews where there was a mixed sense of the value of grouping the projects together under the TADEP umbrella.

> *'On a high level we can all see how they [the projects] relate to each other but more closely it started to become more difficult to see how they were complementary.'*
>
> – Galip nut project representative

**To achieve additional benefits on this dimension, a program-level design process would need to have preceded the project-level designs**. This could have involved taking a systems-based or theory of change approach, identifying a few key challenges within the PNG agricultural sector to focus on, and identifying specific research topics / projects that were required to address these challenges. This would have enabled much clearer aggregation of outcomes across the individual projects and allowed for a stronger program-level performance story. However, this process would also have taken additional time, and substantially delayed the start date of individual research projects. **Given the political pressure to get the projects underway quickly, this is unlikely to have been feasible in this instance**.

Another alternative would have been to develop a program-level theory of change early in implementation. While this may not have influenced the design of the projects, it would have made more explicit the ways or extent to which the projects were complementary, which may have stimulated additional collaboration, sharing and learning.

### *Collaboration between projects*

At the heart of TADEP were 5 individual research projects that were implemented largely independently of each other. Each project had its own goals and objectives, and could have been completed without the involvement of the other projects.

To encourage more meaningful collaboration the program introduced **Collaborative Research Grants** following the 2017 Annual Meeting. This was a small, competitive grant scheme that funded research activities which involved collaboration with at least 2 TADEP projects. Four research grants were funded, all involving the Family Farm Teams project (see Figure 1). The sweetpotato project did not participate in any of the collaborative grants. The sweetpotato project-level review report indicates, 'the different focus of projects, dispersed geographies and differing challenges faced by the projects were raised as possible reasons given for this lack of collaboration.'

**The Collaborative Research Grants had a range of benefits:**

- They provided a tangible mechanism for projects to work together, which strengthened working relationships and communication between project teams. This is likely to have stimulated sharing and learning beyond the specific Collaborative Research Grant project focus.
- They provided a highly valued mechanism for projects to fund activities that may not have been identified or budgeted for at the time of the original project design. For the Bougainville cocoa project, this provided an avenue to trial interventions aimed to improve nutrition as a direct response to findings from the project's Livelihoods Survey.
- In some cases, they enabled projects to have a broader geographic footprint than would have been possible independently. For example, through a Collaborative Research Grant with the Family Farm Teams project, the galip nut project was able to extend awareness of galip nut as a newly emerging industry into New Ireland, Bougainville and new areas of East New Britain.
- The Collaborative Research Grants were seen as a useful way to role model collaboration between organisations for PNG stakeholders.

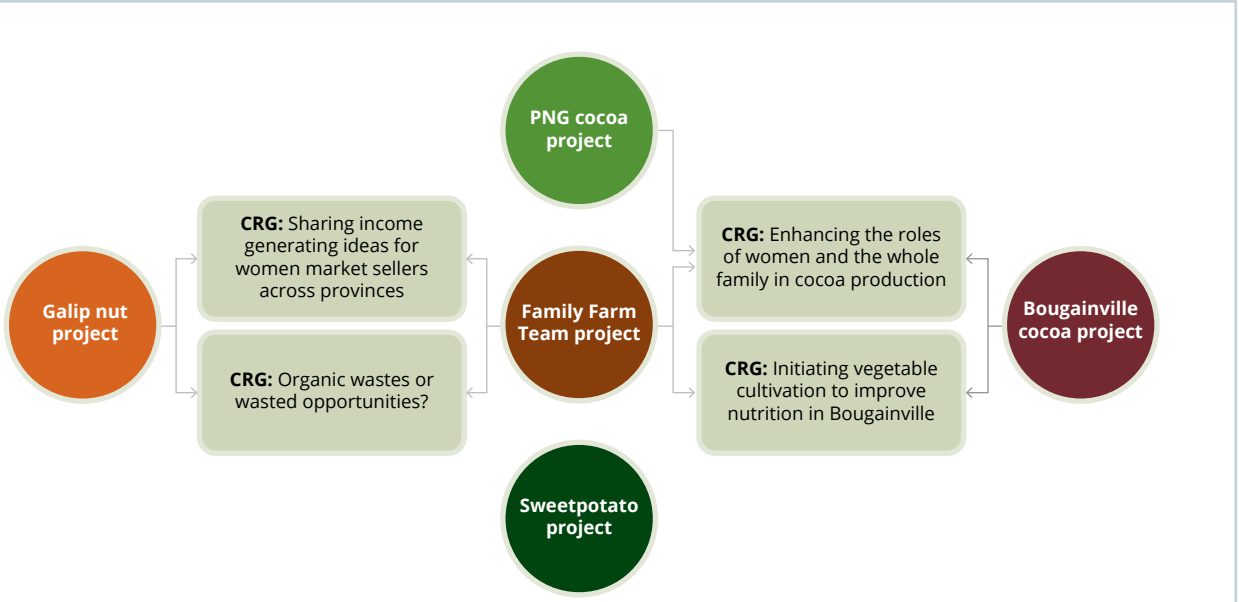


**Figure 1** The 4 TADEP Collaborative Research Grants and their connections between the TADEP projects

While the concept of the Collaborative Research Grants certainly holds merit, it is questionable whether the design and selection process adopted led to the most strategic range of grants. **The Collaborative Research Grant projects appeared to be borne from a brainstorm of what additional activities could be funded, rather than looking strategically at gaps in knowledge across TADEP and how Collaborative Research Grants could be used to address these**. Existence of a program-level theory of change would have aided the program in identifying gaps in existing activities or assumptions that needed testing. In addition, activities completed through the Collaborative Research Grants weren't always strongly integrated into the structure of broader TADEP projects, which may have reduced their effectiveness. For example, in both the PNG cocoa project and Bougainville cocoa project, Collaborative Research Grants were used to enable the Family Farm Teams project to provide training on the Family Farm Teams approach to project stakeholders. In Bougainville, this involved conducting a training of the trainer activity with project staff, DPI staff and the Bougainville Women's Federation, with the intention that participants would integrate the Family Farm Teams training in their own agency work and with their families. However, it does not appear that any follow-up support or mentoring was undertaken to support this outcome.

### Lessons for ACIAR

1. To maximise development impacts, the overall program framework should be developed first, ideally utilising a theory of change approach before projects are designed. Projects should be designed to be complementary to work towards the broader program goal.
2. CRGs were a useful addition to the program structure. Ensuring these are used strategically and link into their 'parent' projects will help maximise their effectiveness.
3. In some cases CRGs were used to enable projects to adapt to changes in context, or fund activities not identified in the design. ACIAR should consider additional mechanisms for adaptive planning within projects to better enable projects to adapt throughout implementation. For example, projects could undergo an annual planning process, through which ACIAR could approve research activities based on findings from the previous year. Reporting would then be against the annual plan rather than the original design. Alternatively, ACIAR could consider having competitive small grants available (similar to CRGs) to support projects to fund new ideas that align with project objectives, but don't necessarily require collaboration.

## Potential benefit 2: Increasing knowledge and learning

**High:** There was strong evidence of sharing and learning between most projects

A second potential benefit of a programmatic approach is that it can increase knowledge and learning between its constituent projects and areas of work. This can be achieved by:

- sharing information between projects to build knowledge and strengthen outcomes
- comparing intervention approaches across different contexts.

The extent to which this benefit was realised is rated as high. **Sharing knowledge and learning between projects was a key strength of TADEP**, and is widely regarded as one of the main benefits of grouping the projects under a program structure. This was achieved through structured sharing and learning events, written communications, and informal opportunities for sharing and collaboration.

Unlike a standalone networking event or conference, a key benefit of TADEP was that meaningful relationships could develop over time, and mature from initial sharing of ideas and success stories to really being able to discuss challenges from a position of trust. Multiple stakeholders referred to the level of collegiality which developed, particularly between the Australian project leaders, which would not have developed otherwise.

> *'You can get everyone in the room into a meeting, but it takes time to really trust and start sharing and not feeling defensive. The program provides that opportunity to get to know each other over a longer period of time.'*
>
> – ACIAR representative

**Of particular benefit was the interaction between the Family Farm Teams project and the other projects**, with many stakeholders describing this project as the 'glue' that held TADEP together. The nature of Family Farm Teams as a social science project meant its approach and lessons were relevant across different commodity projects, and multiple project leaders indicated that their exposure to both the Family Farm Teams approach and project team had strongly influenced their approach to agricultural research. The interest and uptake of the Family Farm Teams approach through the Collaborative Research Grants is an indication of the extent to which project leaders recognised the value of the approach. While ACIAR had the foresight to include a social science project within TADEP to encourage cross-fertilisation of ideas, the extent to which this would influence the other projects was not fully anticipated. This aspect of programs providing space for unexpected outcomes was highlighted by some interviewees as particularly important for ACIAR.

The Family Farm Teams project was also able to share a range of practical skills and approaches which supported implementation of the other projects. Some examples include:

- developing culturally appropriate surveys
- participatory research, monitoring and evaluation techniques
- the importance of working with husband/wife teams as community extension workers, rather than just individuals
- the importance of engaging men in initiatives to progress gender equality, rather than only working with women.

### *Annual project meetings*

Annual project meetings provided the main avenue for structured sharing and learning within the program. These were held over 2 days and involved 50–60 people coming together from across the projects, along with representatives from ACIAR, DFAT and key partner organisations. **These meetings were highly regarded by all who attended them**. They provided an opportunity for project members to share key achievements, discuss common challenges, and identify and undertake program-level activities such as development of the impact pathway and capacity building.

Alongside the formal meeting agenda, opportunities for informal networking and sharing, such as dinners, were also seen as a critical component of what made these meetings successful. Importantly, this provided opportunities for researchers from different academic backgrounds and sectors, at different stages of their careers and from different areas of PNG, to meet and learn from each other.

While there were clear benefits to the annual meetings, there were a few limitations which should be acknowledged. **A key limitation was the relatively restricted attendance, which was necessary given the budget implications of hosting an international face-to-face event**. Many of the project-level stakeholders consulted for this evaluation had not attended the annual meetings, or had only attended one. For people who attended only one meeting, the potential benefits discussed above in terms of allowing development of longer-term relationships were not realised. Some stakeholders also indicated that the meetings were somewhat 'Australian-centric' – not just related to their participation, but also in terms of agenda setting and identification of participants.

> *'One thing I'll always remember, there was a cocoa researcher in PNG who would never have had the confidence to approach [one of the Australian team leaders] – having the space where we could brainstorm, meet, have dinner – it broke down some of the hierarchy and enabled collaboration.'*
>
> – ACIAR representative

It is worth noting that with the onset of the COVID-19 pandemic, face-to-face annual meetings have not been possible due to travel restrictions and social distancing requirements in 2020 and 2021. This has limited the realisation of potential benefits in relation to sharing and learning in the latter years of the program.

### *Other sharing and learning*

**TADEP updates, which were written newsletters providing an update on project activities, relevant ideas and lessons learned, were another key communication product which contributed to sharing and learning between projects**. These updates were originally provided monthly, and then shifted to bimonthly to reduce the administrative burden following the mid-term review. The newsletters reached a much broader range of stakeholders than could attend the annual meetings and for some people this was the main engagement they had with the program. Most stakeholders indicated these updates were very useful and informative, with a few indicating they helped to build a healthy competitive tension between the projects. The main drawback of these updates was the heavy administrative burden that they placed on project leaders, who were required to prepare a project-level update to feed into the newsletter. While some project leaders found this helpful for preparation of the annual project reports, most indicated the reporting load was too high.

While the updates were revised to be bimonthly following a recommendation from the mid-term review, other recommendations from that review about changing the format of the updates to focus on a few key highlights, with possibly a spotlight (in-depth focus) on one project, were not fully implemented. This may have helped to lessen the reporting burden while still maintaining the benefits.

**Many stakeholders also emphasised that the informal sharing and learning throughout TADEP was valuable, particularly as the project teams got to know each other better**. Project team leaders would cross paths during in-country visits, sometimes staying at the same accommodation and informally checking in with each other to discuss issues as they arose. For example, the 2 cocoa projects regularly communicated on issues relevant to cocoa farming, while the galip nut project and PNG cocoa project had ongoing discussion and engagement on cocoa-*canarium* intercropping systems. While this occurred between the project leaders, it does not appear there was as much informal collaboration between PNG stakeholders.

The introduction of the project steering committee also encouraged regular communication and interaction between the project team leaders.

> *'One of the key strengths of the program is what happens outside the formal program activities. It provides an organic space for meaningful connections, networking and communication between participants.'*
>
> – ACIAR Mid-term review

#### Lessons for ACIAR

1. Sharing and learning between projects was a key strength of TADEP. Many of the features of the TADEP approach, such as annual meetings, TADEP updates and the steering committee should be taken forward in other programs. Sharing and learning could be further enhanced by considering additional informal mechanisms to reach a wider audience than can attend international face-to-face meetings. This could include, for example, smaller, more frequent in-country meetings, virtual meetings or discussion groups.

## Potential benefit 3: Increasing influence and adoption

**Medium:** Some evidence of the program structure being used to promote the program or influence stakeholders

A further dimension of a programmatic approach is that it can assist with increasing influence and adoption. This can be done by:

- enhancing leverage through joint action with government, market institutions or other stakeholders
- fostering sustainability by building relationships
- strengthening communication of research findings.

**The extent to which this benefit was realised is rated as medium**. Benefits were mostly realised in relation to communicating research activities and program outcomes. Less benefits are evident in relation to enhancing leverage through joint action, and building relationships.

TADEP produced a range of communication materials to showcase program achievements to different audiences. These included:

- the monthly / bimonthly TADEP update
- short videos aligned with the TADEP objectives
- media releases
- impact stories
- program- and project-level fact sheets.

These were distributed widely to interested stakeholders and available on a targeted website at **https://research.aciar.gov.au/tadep**. TADEP also funded a professional photographer to capture images of each project to use in communications and program reports, and provided capacity building on communications to project teams.

**It is clear that TADEP was able to harness resources for communications beyond what would typically be expected by an individual research project**. The TADEP website ensured these communications were widely available, and also provided a central repository for key project-level resources such as extension manuals and training materials.

Interviewees also felt that the program structure enabled ACIAR to get greater traction with DFAT and other stakeholders, as the TADEP brand was widely recognised and had more weight as a larger program than individual research projects would typically have.

> *'…being part of the broader TADEP program meant that the project had greater prominence. This assisted the project garner traction and political leverage with the key PNG partners, FPDA and NARI.'*
>
> – Sweetpotato project-level review

TADEP prepared a communications plan which provided a useful starting point for thinking through the different potential audiences and communication strategies suited to each one. This could have been further developed to identify the key purpose of communications and the information needs of each key stakeholder to ensure communications were more tailored for particular purposes. A similar recommendation was also provided in the mid-term review but does not appear to have been fully implemented. One consequence of not fully developing a communications strategy is that in some cases TADEP communications were not always fit for purpose. For example, DFAT noted that it was often very difficult to understand the performance story of TADEP in a way that could be shared with DFAT stakeholders. This contributed to frequent additional requests for information from DFAT, which was a source of frustration for project teams.

While communications were a substantial focus of the program, **less attention was given to using the program structure to leverage influence with key stakeholders to encourage awareness or adoption of research outputs**. Communications instead focused on what TADEP projects had been doing and individual success stories, rather than key research findings and what this meant for agricultural development in PNG. This is a key missed opportunity. For example, TADEP trialled 2 different community-based extension models for cocoa production through the PNG cocoa and Bougainville cocoa projects. TADEP could potentially have developed communications to compile the key findings from these to influence the Cocoa Board, DPI and other stakeholders. Similarly, TADEP resources could have helped amplify project-level dissemination of findings from the Livelihoods Survey (conducted by the Bougainville cocoa project) with national-level stakeholders in PNG. With regards to DFAT, a key focus of ACIAR engagement could have been to assist DFAT to identify how key research findings could be adopted or integrated into other Australian aid investments – this would have substantially amplified the impact of TADEP as a program.

### Lessons for ACIAR

1. Programs should have a well-developed communications strategy that focuses not just on sharing outcomes from project activities but also seeking to influence in-country stakeholders to encourage adoption of research outputs.

## Potential benefit 4: Streamlining management

**Medium:** Streamlined reporting and communications with funders, monitoring, evaluation and learning, and cross-cutting issues could be improved

A final potential benefit of a programmatic approach is that it can streamline management. This can be achieved by:

- coordinating implementing entities and interactions with funders
- standardising management and specialised support (for example, monitoring and evaluation (M&E) and reporting processes, approach to cross-cutting issues, capacity development support)
- shared governance arrangements.

TADEP sought to achieve most of these benefits through its programmatic approach. **The extent to which these benefits were realised is rated as medium**.

About 6 months into implementation, **ACIAR engaged a part-time program coordinator to manage program-level initiatives and reporting for TADEP. The existence of this role is widely seen as central to achieving the benefits of TADEP**. The coordinator's ability to bring stakeholders together, build momentum around shared initiatives and encourage collaboration across projects was particularly critical. The level of collaboration and shared learning achieved is unlikely to have occurred without this dedicated role.

The program coordinator role was undertaken by an external contractor, which had benefits and limitations. On the one hand, this made it easier for the coordinator to remain focused at the program-level, as the role was not responsible for overseeing project-level implementation. It also helped to bridge the divide between ACIAR and DFAT, as somewhat of a neutral player. One limitation was that the coordinator had a steep learning curve to understand ACIAR approaches and processes, and in some cases became a 'go-between' for ACIAR decision-making processes and the project teams. **While there were good working relationships between all parties, in some cases there was uncertainty over who was responsible for various support roles**. For example, project leaders would approach the program coordinator about contractual issues which were most appropriately dealt with through ACIAR research program managers (RPMs), or there was uncertainty over who should lead program-level engagement with PNG partners – the program coordinator or ACIAR country manager. Further clarity in roles and responsibilities between the program coordinator, ACIAR country manager and ACIAR RPMs would further enhance the effectiveness of this position.

**TADEP was able to streamline reporting requirements and some interactions with DFAT through the program coordinator role**. The coordinator collected data regularly from each project and compiled this into program-level reports and newsletters. The reporting could have been streamlined further if there was greater consistency between ACIAR project-level reporting requirements and the program-level reporting. The coordinator also managed requests for information from DFAT, and in some cases was able to shield the project teams from these requests, although such requests were still a cause of frustration for some project leaders.

### *Monitoring and evaluation*

As noted earlier, a shared M&E framework was developed early in program implementation to support collation of evidence on progress towards the TADEP objectives. This had potential, however **challenges with mapping project-level achievements against the M&E framework impacted its effectiveness**. The M&E framework could have been strengthened by developing complementary M&E frameworks at the project level, so that project teams were consistently collecting and reporting information up to the program, whilst also capturing evidence unique to project-level objectives.

To maximise efficiencies, project-level M&E frameworks should also have formed the basis of the project annual reports so that project teams were capturing one set of data that could meet both project and program reporting requirements. This would have required some flexibility by ACIAR on variation to the standard structure of annual reports. It is worth highlighting that these types of multi-layer M&E systems are complex and often very difficult to implement effectively. **Additional M&E technical support to both develop a whole M&E system for TADEP and support its implementation throughout the program would have been beneficial**.

### *Capacity building*

Another intended benefit of the program structure was provision of capacity building to project teams on common issues. This was provided on a range of topics, such as electronic data collection, communications and most recently the Family Farm Teams approach. A strong example of capacity building was the Mobile Acquired Data for TADEP (MAD4TADEP) project, which provided projects with access to electronic data collection software (CommCare) as well as training and support to project teams to use it. As the leading agricultural research institute in PNG, NARI staff were also provided with training to ensure the capacity didn't only sit with ACIAR research teams. Project teams were then able to support each other with using the software.

**While the opportunities provided for building capacity were valuable, additional capacity building on gender equality would have been beneficial**, particularly early in project implementation to support projects to develop a project-level gender equality and social inclusion strategy. In addition, additional ongoing support to projects on M&E would have been beneficial.

### *Program governance*

A program steering committee was introduced midway through implementation in response to a recommendation from the mid-term review. The steering committee included the 5 project leaders, the TADEP program coordinator, ACIAR PNG country manager and ACIAR general manager, country programs. Originally meetings were held face-to-face biannually, and then shifted to more regular online meetings. **The steering committee was highly valued by all who participated in it**. Some stakeholders suggested that it was really after this committee formed that the program started to get better traction with the project leaders. It is credited with enhancing communication between the projects, and also supporting operational planning, such as organising program-level meetings or events.

There were mixed perspectives on the membership of the steering committee and whether this was appropriate. Some stakeholders appreciated the internal, modest size of the committee as it enabled honest, open discussion that might have been stifled by a more formal, larger committee. Others noted that it was only Australian members from the projects that were in the committee, and there may have been value in widening membership to senior PNG project members. Finally, some stakeholders indicated that there may have been value in bringing DFAT into the steering committee to encourage greater engagement with the program and strengthen communication with the program's co-funder.

**While there were clearly benefits in keeping the steering committee internal, there does appear to be an aspect of more strategic oversight and engagement with both PNG government stakeholders and DFAT that was missing from the arrangement**. One option in future projects could be to supplement the operational-level steering committee with a higher-level strategic committee that meets annually. This may also have helped to strengthen influencing and adoption of research outcomes.

## Lessons for ACIAR

1. Dedicated staffing, such as a program coordinator, is critical to realise the potential benefits of the programmatic approach. The particular resourcing profile should take into account the type of benefits that ACIAR aims to achieve, and the staffing and technical assistance needed to realise these.
2. Program-level monitoring frameworks are critical to enable the program to tell a coherent performance story but are only useful if projects systematically collect data and report against a set of common indicators. In addition, more emphasis must be given to monitoring the outcomes of project activities, rather than just outputs.
3. It is important to clearly define the roles and responsibilities between ACIAR staff and dedicated program staff when establishing the program structure, and clearly communicate these to all parties. This will help to prevent confusion amongst program teams and external stakeholders about who to contact, and also ensure staff are empowered to take forward initiatives without concerns about encroaching on others' roles.
4. Future programs would benefit from more strategic, high-level governance arrangements that include DFAT (if a funding partner), partner government representatives, and key partner organisations. This could be kept separate from a more operational, internal coordination committee involving ACIAR and the project leaders. Sufficient representation from in-country partners is critical in these committees. This type of governance arrangement would also assist with maximising influence and adoption by building interest and buy-in from key in-country stakeholders.

# Conclusions and lessons learned

The Transformative Agriculture and Enterprise Development Program (TADEP) and its component projects were rapidly designed in response to a funding opportunity from the Department of Foreign Affairs and Trade (DFAT). This design process was not ideal and limited the extent to which the projects could be strongly complementary. That said, the projects did have enough commonality to contribute towards common objectives and provide useful opportunities for sharing and learning. **All projects contributed meaningfully towards the 5 TADEP objectives with some examples of strong outcomes, particularly in relation to improving agricultural productivity, building capacity and gender equality**. Unfortunately, the lack of systematic data for some projects means it is difficult to draw conclusions on the achievement of outcomes.

The evaluation has outlined a framework of the potential benefits of a programmatic approach, and this has been used to assess the extent to which these benefits were realised in TADEP. **For TADEP, the main benefits were in relation to sharing and learning between project teams, shared communications, and streamlining some management functions**, although further benefits could have been realised in this last area. Further benefits could have also been realised in relation to influencing stakeholders through a more thorough communications strategy and collaborative approach between projects. To really strengthen benefits in relation to achieving impact, the initial design process for TADEP would need to have been sequenced differently to enable development of a strong program framework which could inform the project designs. While this was not feasible for TADEP, it is an important learning for future programs.

Overall, there were substantial benefits realised through the programmatic approach used in TADEP, and very limited disadvantages of taking this approach. Given that there is potential for even greater benefits to be achieved, the associated costs appear to be a worthwhile investment.

Award-winning cocoa beans produced by TADEP participants Steven and Elizabeth Saveke. Photo: ACIAR

## Lessons learned

The TADEP programmatic approach highlights several lessons for ACIAR to consider in future programming. **A key overarching lesson is that there is value in intentionally identifying the type of benefits ACIAR wishes to achieve through the programmatic approach, and structuring the program with appropriate resourcing to help realise these benefits**. The rubric at Appendix 1.2 could provide a useful starting point for such an exercise.

Other lessons include:

1. To maximise the potential development impacts, the overall program framework should be developed first, ideally utilising a theory of change approach to unpack what activities are required to contribute towards the desired outcomes. Complementary projects can then be designed within this broader framework. Designing the program first also allows projects to factor in the resources required for monitoring, attendance at learning events and reporting.
2. Collaborative Research Grants were a useful addition to the program structure. Ensuring these are used strategically and linked into their 'parent' projects will help maximise their effectiveness.
3. Some projects used Collaborative Research Grants as an adaptive planning mechanism to fund activities not initially identified in the design. Other project teams noted that the ACIAR systems did not sufficiently allow for changes in context. ACIAR should consider mechanisms that provide greater flexibility for adaptive planning at the project level.

   For example, projects could undergo an annual planning process, through which ACIAR could approve research activities based on findings from the previous year. Reporting would then be against the annual plan rather than the original design. Alternatively, ACIAR could consider having competitive small grants available (similar to Collaborative Research Grants) to support projects to fund new ideas that align with project objectives, but don't necessarily require collaboration.
4. Sharing and learning between projects was a key strength of TADEP. Many of the features of the TADEP approach, such as annual meetings, updates and the steering committee should be taken forward in other programs. Sharing and learning could be further enhanced by considering additional informal mechanisms to reach a wider audience than can attend international face-to-face such as, smaller, more frequent in-country meetings, virtual meetings or discussion groups.
5. Programs should have a well-developed communications strategy that focuses not just on sharing outcomes from project activities but also seeks to influence in-country stakeholders to encourage adoption of research outputs.
6. Dedicated staffing, such as a program coordinator, is critical to realise the potential benefits of the programmatic approach. The particular resourcing profile should take into account the type of benefits that ACIAR aims to achieve as well as the staffing and technical assistance needed to realise these.
7. Program-level monitoring frameworks are critical to enable the program to tell a coherent performance story but are only useful if projects systematically collect data and report against a set of common indicators. In addition, more emphasis must be given to monitoring the outcomes of project activities, rather than just outputs.
8. It is important to clearly define the roles and responsibilities between ACIAR staff and dedicated program staff when establishing the program structure, and clearly communicate these to all parties. This will help to prevent confusion amongst program teams and external stakeholders about who to contact, and also ensure staff are empowered to take forward initiatives without concerns about encroaching on others' roles.
9. Future programs would benefit from more strategic, high-level governance arrangements that include DFAT (if a funding partner), partner government representatives, and key partner organisations. This could be kept separate from a more operational, internal coordination committee involving ACIAR and the project leaders. Sufficient representation from in-country partners is critical in these committees. This type of governance arrangement would also assist with maximising influence and adoption by building interest and buy-in from key in-country stakeholders.

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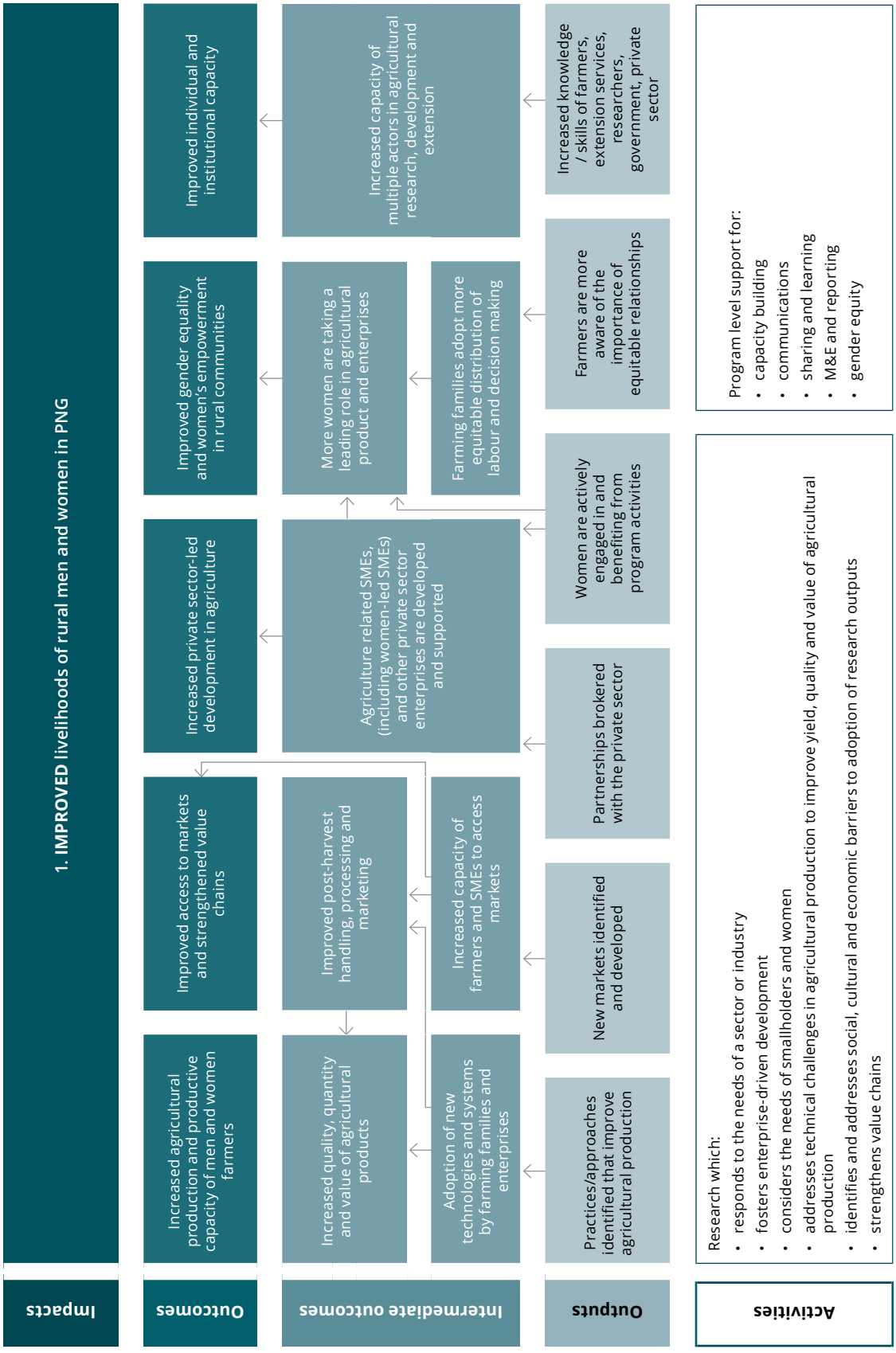
CMFTs inspecting cocoa trees. Photo: Conor Ashleigh, ACIAR

# Appendices

## Appendix 1.1: Theory of change



| | | Extent to which benefits were realised | | |
|---|---|---|---|---|
| **Dimension** | **Description of potential benefits from a programmatic approach** | **Low** | **Medium** | **High** |
| **Increasing impact** | • Projects work collaboratively towards a program theory of change, combining results for greater impact.<br>• Extending the reach of interventions to multiple geographic areas.<br>• Broadening the diversity of perspectives and strategies to provide a holistic response to a common problem. | • Projects are loosely related to program goal/objectives but operate independently.<br>• No program level theory of change.<br>• Geographic locations of projects are not strategic. | • Projects are closely connected to a program goal / objectives but without a strong theory of change.<br>• Projects operate largely independently but collaborate on some activities. | • Projects are highly interdependent and complementary.<br>• A combination of project outcomes is required to meet program goals.<br>• A strong overarching theory of change drives selection of projects.<br>• Projects may address different aspects of a common problem or operate in different locations to strategically broaden outcomes. |
| **Increasing knowledge and learning** | • Sharing information between projects to build knowledge and strengthen outcomes.<br>• Comparing intervention approaches across different contexts. | • No or limited evidence of sharing and learning between projects. | • Some evidence of sharing and learning between projects.<br>• Examples of where learning has influenced project implementation. | • Strong evidence of sharing and learning between projects with clear evidence of how this learning has strengthened project implementation. |
| **Increasing influence and adoption** | • Enhancing leverage through joint action with government, market institutions or other stakeholders.<br>• Fostering sustainability by building relationships.<br>• Strengthening communication of research findings. | • No or limited evidence that the program structure is being used to promote the program, or influence stakeholders. | • Some examples or evidence of the program enhancing leverage or influence with stakeholders and communicating results (over what could have been achieved by individual projects). | • The program routinely works to influence stakeholders to raise awareness of program outcomes, and increase adoption and sustainability of results.<br>• There is evidence that this has had a positive effect. |

| | | Extent to which benefits were realised | | |
|---|---|---|---|---|
| **Dimension** | **Description of potential benefits from a programmatic approach** | **Low** | **Medium** | **High** |
| **Streamlining management** | • Coordinating implementing entities and interactions with funders.<br>• Shared governance arrangements.<br>• Standardising management and specialised support (M&E and reporting processes, approach to cross-cutting issues, capacity development support). | • No or minimal benefits in relation to streamlining reporting or communication with funders and other stakeholders.<br>• No or minimal support for M&E, cross-cutting issues, or capacity development.<br>• Governance provides oversight of projects, without significant value-add to the program. | • Some benefits in relation to streamlining communication with funders and reporting.<br>• Shared M&E Framework.<br>• Some examples of shared capacity building to projects.<br>• Governance provides oversight of projects, with some value-add to the program. | • Clear benefits achieved by streamlining communication and reporting.<br>• Shared M&E Framework effectively used to aggregate program results.<br>• Program structure supports projects to strengthen approach to cross-cutting themes and build capacity on common issues.<br>• Governance contributes strongly to achievement of program-level outcomes. |



## Appendix 1.3: Program evaluation framework

The data and process used for addressing each of the key evaluation questions (KEQs) is summarised in this 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 process, timing (vis-à-vis constituent projects) and rationale for bringing projects together under this program?**<br>– How is the program structured? | • Documentation on discussion and decision processes<br>• Perspectives of key stakeholders<br>• Program structure documentation | • Program concept / design documents, ROUs, file notes etc.<br>• Key program-level stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation |
| 2. **What is the program's theory of change? To what extent have the intended program goal and outcomes been achieved?**<br>– What was the contribution of each project? | • Documented theory of change at program commencement and/or subsequently<br>• Documented evidence of program progress and achievements<br>• Assessments of project-level achievements<br>• Perspectives of key stakeholders | • Program concept / design documents, ROUs, variations<br>• Program-level progress reporting and reviews<br>• Project-level evaluations<br>• Key program-level stakeholders (for example, program manager/ coordinator, ACIAR country managers, RPMs, country network managers; DFAT; government partners) | • Documentation review, stakeholder interviews, triangulation<br>• ACIAR Outcomes Framework (as relevant)<br>• Quantitative assessments (where feasible) |
| 3. What were the main factors that influenced program performance?<br>– To what extent were the program's scope, scale, structure and management arrangements appropriate?<br>– How did the program's particular structure and management arrangements influence program achievements?<br>– What external factors arose, for example, budgetary, natural hazards, policy settings, etc.? | • Existing analyses of program achievements and contextual factors<br>• Project-level assessments<br>• Information on program structure and management<br>• Perspectives of key stakeholders | • Project-level evaluations<br>• Program documentation, for example, operational guidance, annual reports, reviews, aid quality checks<br>• Key program-level stakeholders (for example, program manager/ coordinator, ACIAR country managers, RPMs, country network managers; DFAT; government partners) | • Documentation review, stakeholder interviews, triangulation |

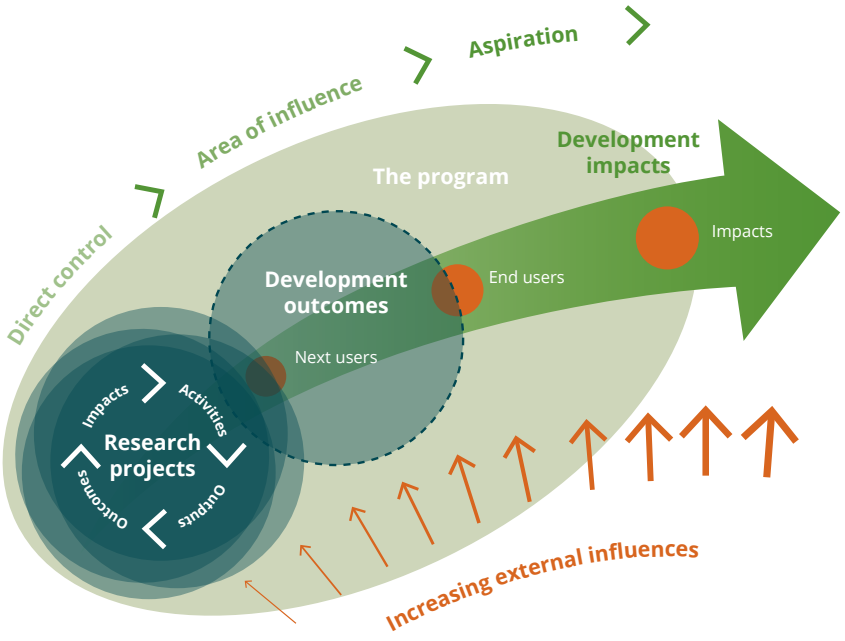
| Key Evaluation Question | Evidence/information required | Data sources | Data collection and analysis approach |
|---|---|---|---|
| 4. **What benefits were realised by adopting a programmatic approach, compared to an individual project approach?**<br>– What evidence is there of learning or cross-collaboration between projects within a program?<br>– To what extent were project level outcomes mutually reinforcing within the program?<br>– Did the programmatic approach result in improved implementation strategies and/or additional resourcing, for example, on gender equality? | • Documented evidence of cross-project interactions (learning events etc.)<br>• Project-level assessments<br>• Information on program structure and management<br>• Perspectives of key stakeholders | • Program-level progress reporting and reviews (including aid quality checks)<br>• Project-level evaluations<br>• Assessments of KEQs 1–3<br>• Key program-level stakeholders | • Documentation review, stakeholder interviews, triangulation |
| 5. **What challenges arose from the programmatic approach?**<br>– To what extent did the benefits outweigh the challenges? | • Documentation on challenges<br>• Perspectives of key stakeholders | • Program-level progress reporting and reviews (including aid quality checks)<br>• Project-level evaluations<br>• Assessments of KEQs 1–4<br>• Key program-level stakeholders | • Documentation review, stakeholder interviews, triangulation<br>• Verification workshops for each program (pertinent for all program KEQs) |



## Appendix 1.4: Stakeholders consulted

| Name | Title | Organisation or location |
|---|---|---|
| Dr Jayne Curnow | Research Program Manager, Social Sciences | ACIAR |
| Ms Irene Kernot | Research Program Manager, Horticulture | ACIAR |
| Dr Peter Horne | General Manager Country Programs | ACIAR |
| Maree Livermore | Coordinator of Country Partnerships | ACIAR |
| Ms Doreen Iga | PNG In-country Manager | ACIAR |
| Ms Elizabeth Brennan | TADEP Program Coordinator | ACIAR |
| Ms Nina Eliseo | Second Secretary, Economic Development | DFAT – PNG Post |
| Ms Julienne Leka-Maliaki | Senior Program Manager, Economic Section | DFAT – PNG Post |
| Mr Joshua Kaile | Program Manager, Economic Section | DFAT – PNG Post |

## Appendix 1.5: Impact pathway for TADEP



# Appendix 1.6: Summary of project contributions to TADEP objectives

### Rating scale used to identify contribution to TADEP objectives

| Level of contribution | Definition of rating |
|---|---|
| **None** | No or very minimal outputs focused on this objective. |
| **Low** | Some outputs that contribute towards this objective, limited evidence of adoption by next users and limited evidence of outcomes. |
| **Medium** | Considerable outputs that contribute towards the objective, some evidence of adoption by next users. Limited evidence or outcomes or primarily anecdotal evidence. Positive outcomes are seen as likely. |
| **High** | Considerable outputs that contribute towards the objective, evidence of widespread adoption by next users. Good evidence of outcomes, moving beyond individual examples. |
| **Very High** | Extensive outputs – achieving this objective is a key focus of the program. Evidence of widespread adoption by next users and strong evidence of outcomes from multiple sources. |

# Appendix 1.6: Summary of project contributions to TADEP objectives (*cont.*)

## Ratings for each TADEP project and summary of evidence

| Project | Contribution | Summary of evidence |
|---|---|---|
| **1. Increased private sector-led development** | | |
| **PNG cocoa** | Medium | • Reports indicate that many Cocoa Model Farmer Trainers (CMFTs) have begun establishing self-sustaining cocoa-related businesses as a result of the project, with several having been formally registered, including nurseries, budwood gardens and drying businesses.<br>• CMFT businesses appear to primarily be supporting other donor programs or government initiatives rather than farmers directly, given limitations in the ability of farmers to pay for cocoa advisory services and planting materials. |
| **Bougainville cocoa** | Medium | • Reports suggest that some Village Extension Workers (VEWs) were generating increased income through diversification of farming and establishment of small enterprises focused on cocoa nursery and seedling sales, cocoa wet bean buying, fermentation and drying, and budwood gardening.<br>• Reports also indicate that some budders trained through the project have been intermittently contracted to do budding in other commercial nurseries. |
| **Galip nut** | Very high | • Building private sector involvement in processing and selling galip nut was a substantial focus of the project.<br>• By the project's conclusion, 4 private sector processors were actively engaged in the industry, and numerous smallholder farmers were selling galip nut to private processors.<br>• Due to the project, commercial sale of premium galip nut products had commenced at supermarkets in East New Britain, Port Moresby and Prouds duty free, with demand exceeding supply. |
| **Sweetpotato** | High | • The project worked with 14 commercial growers to establish secondary multiplication sites for the newly established clean seed scheme. This has provided growers with a new product (in the form of clean vines) that they can sell to other farmers, with monthly sales of clean vines averaging PGK500–1000 for commercial growers.<br>• Training and support to growing groups and community members has led to the emergence of new sweetpotato-related businesses for post-harvest processing and value-added product sales. |
| **Family Farm Teams (FFT)** | High | • Business skills were an aspect of the FFT training, which resulted in farmers diversifying their crops and growing new crops specifically for sale.<br>• Between 40% and 60% of farmers reported changing marketing practices as a result of the project.<br>• A majority of Highlands Village Community Educators (VCEs) indicated they had increased their usual income from selling food crops and this was statistically significant. Almost all households surveyed in this hub had increased the amount of crops they grew for sale, but income increases were lowest in Western Highlands where there was more limited access to markets than in Eastern Highlands and Jiwaka. |

| Project | Contribution | Summary of evidence |
|---|---|---|
| **2. Increased agricultural production and productive capacity of men and women farmers** | | |
| **PNG cocoa** | High | • The project successfully introduced cocoa production in new areas, including the highlands and East Sepik grasslands.<br>• Stakeholders estimate around 50% of CMFTs have adopted new agricultural practices through the project, including field grafting, central and field nurseries and budwood garden establishment, and solar drying techniques. Evidence suggests this has had a positive effect on enhancing cocoa production and renewing interest in cocoa. |
| **Bougainville cocoa** | High | • Training on cocoa farm management, soil nutrition and composting enabled many VEWs to implement new practices and increase the quality and quantity of their yield.<br>• The Livelihoods Survey resulted in widespread recognition of the nexus between health and agricultural productivity. This has influenced stakeholders to place greater attention on improving the nutrition and health of farmers. |
| **Galip nut** | High | • The project investigated how to improve key stages of galip nut processing to improve efficiency and maximise quality within a medium- to large-scale factory setting. This led to the National Agricultural Research Institute (NARI) demonstration factory more than doubling production of processed galip nut products each year, to a total of over 2.4 million tonnes in the project's final year.<br>• The project was able to increase farmers' awareness of the type and quality of unprocessed galip nuts that could be sold to private sector processors, increasing the productive capacity of farmers through sales of unprocessed nuts. |
| **Sweetpotato** | High | • The clean seed scheme and improved agricultural practices have resulted in higher yields and higher quality produce, with these sweetpotatoes reported to have superior taste and improved appearance. This has provided growers with access to new, higher value markets including direct sales to supermarkets in urban centres. |
| **Family Farm Teams (FFT)** | Medium | • Encouraging farming families to grow separate crops for subsistence and sale was a key part of the FFT approach. As a result, the majority of farmer's households (both VCEs and farmers trained by them) reported that they had diversified their crops and farming practices.<br>• In the Island Hub, VCEs reported that 'nearly everyone' now has a FAITH garden which produces nutritious food for home consumption.[2] As a result, the majority of households now report they 'always' or 'mostly' have enough food to feed the family. |

2 A FAITH garden stands for 'Food Always In The Home'. This was a central concept of FFT training.

## Appendix 1.6: Summary of project contributions to TADEP objectives (*cont.*)

| Project | Contribution | Summary of evidence |
|---|---|---|
| **3. Improved access to markets and strengthened value chains** | | |
| **PNG cocoa** | Low | • Improving access to markets and strengthening value chains was not a major focus of this project, as market linkages were thought to be well established in project areas.<br>• Some activities were undertaken to increase access to markets in New Ireland towards the end of the project, however this proved challenging. |
| **Bougainville cocoa** | Medium | • 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.<br>• Capacity development activities with farmers increased their awareness of cocoa prices and marketing strategies.<br>• Annual chocolate festivals and other marketing events and reports helped to raise awareness of Bougainville chocolate with potential buyers, but export licensing issues restricted outcomes in this area. |
| **Galip nut** | Very high | • This project worked at multiple levels to strengthen the value chain for galip nut and galip nut products within Papua New Guinea (PNG).<br>• Prior to the project there were limited opportunities for local smallholders to sell unprocessed galip nut to private processors. This increased substantially as production at the NARI factory increased and other private sector processors entered the market in 2019.<br>• The project established a partnership with a local supermarket in East New Britain, and PNG company City Pharmacy Limited to distribute and sell galip nut products in its retail stores in Port Moresby. This secured a market for products produced by the NARI demonstration factory and tested the market for other private sector processors. |
| **Sweetpotato** | High | • The project conducted a number of studies to understand the sweetpotato value chain and identify market opportunities.<br>• Introduction of the clean seed scheme and new farming practices resulted in production of higher quality sweetpotato, which increased the value of sweetpotato commercial production. This is encouraging more market-oriented production and sales to new markets such as supermarkets. |
| **Family Farm Teams (FFT)** | Low | • This wasn't a major focus of the project and limited outputs were evident.<br>• Changes in VCE marketing practices were evident in households who participated in the project. In the Highlands Hub, many households had changed where they sold their produce and all areas reported selling more often. |

| Project | Contribution | Summary of evidence |
|---|---|---|
| **4. Improved individual and institutional capacity** | | |
| **PNG cocoa** | High | • The project has significantly contributed to building the capacity of CMFTs to manage improved cocoa farming and viable small enterprises. Model farms are operating successfully and driving the rollout of new practices.<br>• CMFTs have been active in building the capacity of farmers within their groups, with several CMFTs also establishing satellite groups in other villages to share advice and resources.<br>• Cocoa Board staff within the project team have strengthened their capacity to provide extension services. |
| **Bougainville cocoa** | High | • Through the project, VEWs and other cocoa farmers improved their knowledge of the link between high-quality cocoa beans, post-harvest practices and quality chocolate products – this is driving improved production practices.<br>• Department of Primary Industries (DPI) and Cocoa Board extension staff have improved research skills, and knowledge of post-harvest cocoa production and diversification of cropping.<br>• Through support for the DPI Chocolate Laboratory there is now additional capacity to conduct quality testing of beans and chocolate products. |
| **Galip nut** | Medium | • The project built the capacity of NARI staff in galip nut processing and value-adding, and shared the knowledge gained through the project with other private sector processors.<br>• Extensive training was also provided to women smallholder farmers on post-harvest processing and value-adding techniques, but there is limited evidence of widespread adoption of new practices from this training. |
| **Sweetpotato** | High | • The project was instrumental in building Fresh Produce Development Agency (FPDA) staff capacity in community development, after recognising that this was critical to support achievement of project objectives. This also led to a broader institutional commitment to community-led engagement by FPDA.<br>• The project built technical capacity of NARI and commercial sweetpotato farmers in the clean seed scheme, and shared skills with sweetpotato farmers and grower groups on enhanced production and post-harvest practices, business planning and management. |
| **Family Farm Teams (FFT)** | High | • VCEs developed skills as peer educators to deliver the FFT approach in their villages.<br>• Approximately 100 women also completed leadership training and commenced in leadership roles to provide ongoing support to small teams of VCEs.<br>• Partner organisations (particularly local universities) have improved capacity in participatory research and designing and delivering training in low-literacy contexts. These skills are being applied in other training settings.<br>• Ninety-eight people (45 female and 53 male) from FPDA, Oxfam and other organisations received training on the FFT approach to build buy-in for the approach and enable the model to be replicated in other settings. |

## Appendix 1.6: Summary of project contributions to TADEP objectives (*cont.*)

| Project | Contribution | Summary of evidence |
|---|---|---|
| **5. Improved gender equality and women's empowerment in rural communities** | | |
| **PNG cocoa** | Low | • The project integrated concepts around equity and involvement of women into CMFT training, and encouraged husband/wife teams to be CMFTs. Participation of women early in the project was disappointing but this improved over time and by the end there were multiple examples of women actively contributing to and benefiting from the project.<br>• Project stakeholders observed that while women were more active as cocoa farmers they were still largely excluded from decision-making, although discussions are beginning to take place around more equitable financial decision-making through the FFT training. |
| **Bougainville cocoa** | Medium | • Promoting gender equity and community wellbeing was a key part of the project's aim. Strategies to achieve this included setting targets of 40% for women's participation as VEWs and integrating FFT training into the project's training approach. However, the project faced challenges in reaching the targets around women VEWs, with women only comprising 9% of VEWs as of December 2020.<br>• Twenty-two farmers (6 female and 16 male) engaged in the main project sites were trained in the FFT approach. These farmers plan to implement the approach within their own families, however there is no evidence as to whether this occurred. |
| **Galip nut** | Medium | • The project completed a range of activities to contribute to this goal, targeting women smallholders for training, and supporting female-owned enterprises. Adoption and outcomes from these activities were limited.<br>• The project contributed to a steady increase in the number of smallholder farmers selling galip nut to the NARI factory, many of whom were women. It is unclear whether women had control of this income. |
| **Sweetpotato** | Low | • Women were actively involved in project activities and through this, experienced some benefits such as improved income from sweetpotato sales. However, beyond this participation, no targeted activities were undertaken to ensure the project contributed to gender equality and empowerment.<br>• A lack of gender analysis and monitoring of gender outcomes meant there was no evidence of how the project impacted on women's empowerment and control over income. |
| **Family Farm Teams (FFT)** | Very high | • Many farming families trained in the FFT approach noted that they had implemented new ways of communicating as well as greater shared planning and decision-making within the family.<br>• Some women have taken on greater leadership roles within their communities, for example, being represented on school boards or ward committees. Women in all areas reported that they gained increased respect in their village.<br>• There were some indications the project improved family cohesion and led to a reduction in family violence. |

# Part 2: PNG cocoa project

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program Papua New Guinea cocoa project

# Abbreviations and acronyms

| | |
|---|---|
| **ACIAR** | Australian Centre for International Agricultural Research |
| **ASLP** | Agriculture Sector Linkages Program |
| **CB** | Cocoa Board |
| **CCI** | Cocoa Coconut Institute Limited |
| **CMFT** | Cocoa Model Farmer Trainer |
| **CRG** | Collaborative Research Grant |
| **DAL** | Department of Agriculture and Livestock |
| **DFAT** | Department of Foreign Affairs and Trade (Australia) |
| **DPI** | Divisions of Primary Industries |
| **FFT** | Family Farm Teams |
| **PNG** | Papua New Guinea |
| **REDS** | Research, Extension and Development Services (within PNG Cocoa Board) |
| **TADEP** | Transformative Agriculture and Enterprise Development Program |
| **UNRE** | University of Natural Resources and Environment |

# Acknowledgements

The evaluation team would like to thank Dr Philip Keane, Project Leader, and Mr Trevor Clarke, Project Coordinator, for their time and effort in supporting the evaluation. Their efforts to link the evaluation team with stakeholders in Papua New Guinea (PNG) were particularly appreciated.

The evaluation team would also like to thank Australian Centre for International Agricultural Research (ACIAR) staff who supported the evaluation, including Bethany Davies, Elizabeth Brennan and Irene Kernot.

The evaluation team would like to express its appreciation of all the project stakeholders who gave their time to be interviewed and to review the evaluation findings.

# Part 2 contents

# 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 project evaluation focuses on 'Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland, and Chimbu provinces of Papua New Guinea' (HORT/2014/096), commonly known as the PNG cocoa project. The project ran from March 2016 to March 2021.

The overarching aim of the PNG cocoa project was to foster enterprise-driven transformation and increased production and profitability of smallholder cocoa farmers in East Sepik, Madang, New Ireland, and Chimbu provinces of PNG, working with families through village extension workers, called Cocoa Model Farmer Trainers (CMFTs). The project aimed to develop a small business model of cocoa farming and related enterprises that is self-sustaining and viable as a livelihood for families, and particularly youth, by supporting farmers to establish themselves as profitable CMFTs who generate income through a mix of cocoa-related enterprises and provision of paid advisory services to farmers.

The project focused on facilitating capacity development of farming families by disseminating knowledge and resources through CMFTs to their networks of farmers, including introducing new cocoa varieties and management practices to increase cocoa yields and profitability.

The project sought to achieve 3 objectives:

1. To foster the development of profitable, self-supporting, village-based cocoa extension and other services as micro-enterprises supported by financial institutions, commercial cocoa buying and supply companies, and existing research and extension services.
2. To introduce and evaluate on farms, with farmer participation led by village extension workers, transformative new cocoa cultivars and cocoa selection, propagation, production and post-harvest methods.
3. To introduce and evaluate on farms, with farmer participation led by village extension workers, options for development of new cocoa farming systems integrating food crops, livestock and high-value shade and other tree crops.

The project also aimed to increase the involvement of women in cocoa and non-cocoa farming, which is intended to both benefit cocoa management as well as improve women's economic empowerment. This has been supported through delivery of training on sustainable livelihoods by the PNG University of Natural Resources and Environment (UNRE), the integration of Family Farm Teams (FFT) training modules promoting family-centred approaches to farming management, and by introducing crop diversification and small livestock husbandry practices alongside cocoa, which are more conducive to women's participation.

The PNG cocoa project was led by LaTrobe University, working in partnership with the Curtin University, the UNRE, and the Cocoa and Coconut Institute Limited (CCI, later the Research, Extension and Development Services (REDS) section of the Cocoa Board of PNG). The budget for the project was A$4,997,863.

This project evaluation is Part 2 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).

A similar evaluation was conducted on the Agriculture Sector Linkages Program (ASLP) and is reported in ACIAR Outcome Evaluation No. 1.

A separate synthesis report, ACIAR Outcome Evaluation No. 3, will summarise lessons from the 2 ACIAR programs, ASLP and TADEP.

## Key findings

1

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

**The project did not fully develop a theory of change; however, it is clear there was an underlying strategy linking project activities with higher-level outcomes**. The core assumption is that increased income from cocoa farming and related enterprises, and improved food security, could be achieved for farming families if farmers adopted improved farming practices and received support through village-based extension services. These village-based extension services would be linked with available government extension support at a provincial level. Given the limitations in availability of extension services provided by government, a further theory was that village-based extension services could become self-sustaining by developing income-generating enterprises based on increased production of cocoa and sale of cocoa-related products and advisory services.

**The CMFT model has been demonstrated to be an appropriate extension model in most contexts in which the project was implemented**, enabling outreach to remote farmers, and filling a gap in areas with limited access to formal extension services. There are indications this is leading to the adoption of improved cocoa farming practices among CMFTs and the farmers they support, and reinvigorating farmers' interest in the cocoa industry as planned. While many CMFTs have established small businesses related to cocoa farming, **the assumption that provision of cocoa-related products and advisory services would be an income-generating activity for CMFTs has not held true in many locations**, as cocoa farmers have often not been willing (or able) to pay for these services. Where nurseries have been successful, they have primarily supplied other government or donor-supported programs (that include funds to purchase planting materials), rather than supplying farmers directly. A number of stakeholders noted that this fee-for-service approach was unlikely to be viable in the PNG context. The project also anticipated developing stronger connections between CMFTs and private enterprise-linked advisory services for ongoing support. This would have helped the model to be more sustainable, but has not eventuated as planned, partly because company extension services are very limited.

Finally, some stakeholders indicated that the project was initially designed for the lowland areas where cocoa was already an established crop, and project approaches could have been further adapted for highlands areas where cocoa farming is new.

## Key findings (*cont.*)

2

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

**The project has contributed to significant scientific achievements in establishing successful cocoa crops in areas previously considered unconducive to growing cocoa**, namely highlands and grasslands regions. Evidence indicates next and final users adopted new knowledge and skills, including identifying seedlings best suited to specific growing conditions, cloning, propagation, and rehabilitating ageing trees. A key outcome was the success of cocoa trials in highlands regions, which demonstrated that cocoa could be grown up to 1,600 m above sea level, more than twice the altitude previously considered suitable for growing cocoa. This has sparked substantial interest from other highlands provinces, leading to the CMFT model being replicated in Western Highlands, Eastern Highlands and Hela province, with support of provincial governments.

The adoption of the CMFT model has achieved notable outcomes in building the capacity of cocoa farmers at the community level. While rigorous data is not yet available on the extent of adoption of new farming methods, nor the overall impact this has had, **project coordinators estimate about 50% of CMFTs have applied new methods learned**, and that farmers are adapting new practices and technologies to suit their specific contexts. Practices including field grafting, central and field nurseries and budwood garden establishment, and drying and fermentary techniques are reported to have been adopted most strongly, with anecdotal evidence from stakeholders suggesting **this has had a positive effect on enhancing cocoa production and renewing interest in cocoa**. Reports suggest some CMFTs have become effective trainers, have assisted the establishment of satellite farming groups, and have provided support to extension worker sites operated by other projects in several regions. However, issues of retention and engagement of CMFTs in some areas have undermined capacity building of cocoa farmers and adoption of new practices promoted through the project.

**The project has shown intercropping cocoa plants with food crops and shade trees, such as galip nut, betel nut, coconut, and other palm and fruit trees, is an effective method for improving cocoa production**. Reports indicate intercropping practices have been taken up by next users in several project sites, however there is limited evidence suggesting adoption by final users at this stage. **Trials of other new practices, namely integrating goat husbandry into cocoa farming systems, have produced mixed results**, with 2 initial goat colonies failing, and a third (in East Sepik) showing good potential. More effort is required to overcome persisting deficits in knowledge of goat husbandry, and to further explore the appropriateness and feasibility of goats and other small livestock husbandry in cocoa farming systems.

Reports indicate widespread adoption of cheaper alternatives to typically expensive technologies, for example, farmers using readily available local materials to develop more affordable alternatives to equipment such as budding knives and budding tape. **A key achievement has been the expansion in construction of solar dryers from cheap and locally available materials**, using UV resistant plastic film initially supplied by the project. CMFTs in some regions are reportedly supporting other villages and communities to construct solar dryers and assisting the establishment of successful wet bean buying and fermentary businesses using solar drying technologies. Limited support from the Cocoa Board (CB) to officially register solar dryers is delaying commencement of commercial operations, and further exploration of solar drying methods is required to improve their efficacy in all weather conditions.

While most cocoa farmers in Madang and East Sepik are not constrained by market linkages, the project has struggled to effectively foster market linkages for cocoa farmers in New Ireland. This issue, combined with the need for ongoing support for CMFTs and lack of formal commitment to the continuation of the CMFT model from the CB, mean that **overall sustainability of project achievements is uncertain**.

3

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

A range of factors influenced the adoption of outputs and achievement of outcomes. **Trials of new cocoa hybrids and management practices directly contributed to achievements in demonstrating potential for growing cocoa in regions previously considered inhospitable**, namely in highlands and grasslands areas. Additionally, the participatory approach adopted through the project enabled the co-development of new practices and technologies with CMFTs, for example, solar dryers and cheaper budding equipment alternatives, which are better suited to local contexts and have been conducive to wide adoption among cocoa farmers.

**The process for selecting CMFTs was a critical factor influencing their level of engagement and attrition** and undermined the successful transfer of skills and knowledge in several areas. Although project reports indicate selection criteria were followed, several stakeholders felt this process was not sufficiently robust. In addition, beliefs held by farmers about the direct benefits they would receive for taking on the role of CMFT also influenced retention and success of CMFTs. Notably, the allowance system, and how this was communicated, proved to be problematic.

**The absorption of CCI into the CB was a major challenge for the project,** as many key personnel employed by CCI were not taken up by the CB. While the program transitioned to working with REDS within the CB as best as possible, the lack of resourcing of REDS had an ongoing impact. Within this context, the project played a vital role in bolstering the capacity of REDS to continue to provide extension services, in many cases providing the only source of operating budget for REDS extension staff. While staff within REDS worked hard to advocate internally for funding in this area, it remains to be seen whether this will be forthcoming.

4

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

The project employed 2 key strategies to enhance the engagement of women and youth in cocoa farming. The first was the integration of concepts around equity and involvement of women in CMFT training. This was done initially through the UNRE sustainable livelihoods training, and then through incorporation of the FFT approach through a TADEP Collaborative Research Grant (CRG). This promoted the concept of husband/wife farmer teams as community trainers of cocoa farmers, and introduced ideas on negotiating roles and shared control over resources within family units. Second, the project promoted cocoa management practices focused on 'light' work aimed to encourage greater involvement of women and youth. **Reports indicate an increase in the number of women participating in cocoa farming**, particularly through accompanying their husbands to CMFT training and adopting the FFT model on their cocoa blocks. It is unclear to what extent CMFTs have been sharing key concepts from the FFT training with other farmers. There is anecdotal evidence shared by project coordinators of women-led farming groups and cooperatives in some regions, but the evaluation team has not seen data on the extent of women's participation or the impact of this on women's economic empowerment.

Reports indicate young people have become more involved in cocoa production and this has had a positive impact both on young people and their communities. Increased involvement of youth has predominantly been from young men, and there is no evidence suggesting young women have been able to access the same opportunities to become involved in cocoa farming and related activities. As with other ACIAR projects included in this programmatic evaluation, development of a gender and social inclusion strategy and increased monitoring of outcomes for women and men would be beneficial.

## Key findings (*cont.*)

5

### How did management arrangements impact delivery of the project?

**Management arrangements were reportedly strong overall**. In particular, having a full-time project manager in-country, supported by a team of regional coordinators, was critical to supporting implementation of project activities. This project structure was key to enabling the project to continue operating throughout 2020 despite the impacts of COVID-19. As noted earlier, personnel changes following the absorption of CCI into the CB saw the departure of a number of key staff collaborating with the project, including the PNG country project manager and 3 key research staff. This also resulted in less support offered by CB for ACIAR projects, as well as a loss of expertise and skills available for project implementation. Diversion of project funds to cover operational costs of extension workers within REDS constrained funding available for project activities. Nevertheless, project coordinators were positive about what they had been able to achieve over the life of the project.

6

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

The project contributed to several of the objectives of the TADEP umbrella program, including:

- enhancing rural livelihoods through increasing agricultural productivity
- building individual and institutional capacity in agricultural research, development and extension
- promoting gender equality and women's empowerment in rural communities.

The main value-adds of being a part of the umbrella program for the PNG cocoa project included access to communication products produced by TADEP to help socialise the work of the projects with other stakeholders, and TADEP meetings, which were useful for encouraging collaboration and knowledge sharing across projects. Collaboration with the FFT project, supported by a CRG, was central to the project's approach to promoting greater inclusion of women and youth in project activities.

Stakeholders expressed mixed views about the utility of grouping the different projects under TADEP, with some suggesting greater value would have been derived from being grouped just with other cocoa projects, as this could have facilitated more focused knowledge sharing. Project staff highlighted the reporting load as burdensome and expressed doubts as to whether inputs into program-level reporting provided any value to the project. Having said that, some also found this useful as a precursor to preparing annual project reports.

## Conclusion and lessons learned

The PNG cocoa project has generated important scientific knowledge and tested the viability of an extension services model designed to be largely independent of government support. This is an important achievement in a context where government-led extension continues to be under-resourced. Evidence of project outcomes to date indicate there has been an increase in interest and enthusiasm for cocoa farming in all 4 regions. However, the long-term sustainability of outcomes achieved is less certain, given CMFTs will require ongoing technical support and motivation from extension workers in some form, which cannot be assured beyond the end of the project.

Difficulties in facilitating linkages to markets and access to finance to support establishment of small cocoa-linked enterprises have constrained project impacts in terms of the extent to which improved cocoa yields have led to increased farmer incomes. Aspects of the CMFT model regarding provision of fee-for-service advisory support to farmers has also been problematic, although reports indicate a number of CMFTs have set up nurseries and solar dryers which are beginning to operate commercially.

### Lessons learned

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

1. The CMFT model appears to be effective for supporting uptake of new and improved cocoa farming practices by many farmers. To overcome issues with retention and community tensions experienced in some areas, future projects should aim to better understand community and social structures and follow a more rigorous CMFT selection process.
2. Care should be taken to select appropriate incentives for CMFTs, with preference given to in-kind rather than monetary rewards. Any incentives should be clearly communicated to potential CMFTs and the broader community they will be operating in prior to their selection.
3. The participatory approach central to the project has proven valuable and should be encouraged. New practices and technologies co-developed with CMFTs, such as solar dryers, have proven effective as they are appropriate for local context and able to be adopted widely by farming families.
4. Potential for sustainability should always be a central issue that is assessed and explored as agricultural extension models are trialled and developed. This includes consideration of what level of ongoing support village extension workers require, and where this will come from. Given scepticism around the viability of a fee-for-service model of extension within the PNG context, it is unclear why this was included in the original design.
5. Articulation and implementation of a specific gender equality and social inclusion strategy would help projects improve gender equality outcomes. Monitoring and reporting against this strategy should form part of regular project reports so that there is greater oversight of this area.
6. Undertaking market analysis at the outset of projects, with a focus on potential barriers to market access, would be useful to identify risks to the achievement of project objectives. Conducting this analysis as part of project design processes would enable planning of approaches to address and overcome barriers and facilitate more active private sector engagement and market linkages throughout the project duration.
7. The project management structure for this project, including an in-country manager, and regional coordinators embedded within the CB, appears to be an effective model to support project 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 3 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 PNG cocoa project.

### Purpose

The project-level evaluation has 2 key purposes:

1. Compile performance information from each project under TADEP 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 3** 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 *Canarium* 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 'Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland, and Chimbu provinces of Papua New Guinea' (HORT/2014/096), known as the PNG 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 project-level evaluation is ACIAR staff with direct responsibilities for programs and/or their constituent projects. This includes Canberra-based research program managers, and country network managers and coordinators.

# Methodology

## Data collection and analysis

Data was primarily drawn from existing project reports and reviews, supplemented by 8 semi-structured interviews with 9 key stakeholders. Stakeholders were intentionally selected in consultation with ACIAR and the project leader (see Appendix 2.1). Interviews were conducted online using Zoom, 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 4). In addition, the report assesses economic outcomes as 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. End-of-project data was not available as this evaluation was conducted prior to the end of the project.

Conducting online interviews presented a series of limitations. Interviews were conducted in English, which may have led to communication barriers. During phone and Zoom interviews, the evaluator had limited ability to build rapport with participants and interpret non-verbal communication.

Direct consultations mostly focused on ACIAR staff and implementing partners. The evaluator was unable to visit project sites or speak with direct beneficiaries of the project. This limited the ability to evaluate the impact of the project as experienced by farming families, particularly in relation to enhancing income and food security, which were key focuses 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 4** ACIAR project outcome assessment terminology

| Outputs | Next users | Outcomes |
|---|---|---|
| **Scientific knowledge:** New knowledge or current knowledge tested in other conditions, locations, etc. | • Individual scientists/researchers/ agricultural professionals<br>• Individuals responsible for the management of research or a government institution<br>• 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<br>• Public and private extension service providers<br>• Public policy actors<br>• Public and private value chain operators<br>• Consumers | **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 | | **Capacity built:** Project partners or stakeholders use enhanced capacity to do something differently |
| **Practices:** New practices and processes | | **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 | | |
| **Capacity building:** Short courses, academic training, coaching and mentoring | | |

## 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 would be used and that their participation was 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.

Farmers in PNG spreading cocoa beans out to dry.
Photo: Conor Ashleigh, ACIAR

# Overview of project

| Project number | HORT/2014/096 |
|---|---|
| **Project title** | Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland and Chimbu provinces of Papua New Guinea |
| **Collaborating institutions** | LaTrobe University<br>Curtin University<br>The Divisions of Primary Industries (DPI)<br>The Cocoa and Coconut Institute Ltd (CCI)<br>PNG University of Natural Resources and Environment (UNRE)<br>NGIP-Agmark Pty Ltd<br>Farmset<br>Cocoa Board of PNG (CB) |
| **Project leaders** | Dr Philip Keane, LaTrobe University, Australia<br>Professor George Curry, Curtin University, Australia<br>David Yinil, Cocoa Board, PNG<br>Dr James Yoko, University of Natural Resources and Environment, PNG |
| **Project duration** | March 2016 to March 2021 |
| **Funding** | A$4,997,863 |
| **Countries involved** | Australia and Papua New Guinea |
| **Commodities involved** | Cocoa |
| **Related projects** | ASEM/2014/095 Family Farm Teams<br>HORT/2014/094 Bougainville Cocoa |

## Context

Cocoa is a profitable smallholder crop and export trade commodity in Papua New Guinea (PNG) and an important driver of rural development, now directly involving about 150,000 smallholder farming families and accounting for 18% of agricultural exports. However, old cocoa plantings have become overgrown, resulting in low yields, under-harvesting and heavy losses due to pests and diseases, leading to widespread abandonment of the crop. In particular, the Cocoa Pod Borer incursion in 2006 increased pod losses to 85%, more than 10 times that obtained on well-managed plantings. PNG has also been losing its reputation for high-quality cocoa due to smoking of beans during drying with woodfired kilns.

The PNG Cocoa and Coconut Institute Limited (CCI, which is now part of the Cocoa Board) has developed new cocoa cultivars with high yields and disease resistance, new methods of growing cocoa that can increase productivity, and small-scale post-harvest processing methods that can improve quality. It has also been shown in the previous project, 'Enhancing PNG smallholder cocoa production through greater adoption of disease control practices' (ASEM/2003/015), that farmer participation in managing demonstration blocks can foster adoption of better management methods. In Indonesia, projects have shown that cocoa plantings can be rehabilitated by:

- pruning and field grafting of improved genotypes
- use of composts and incorporation of livestock to improve soil fertility and cocoa management
- involvement of private sector partners in projects to greatly extend farmer training services and project impacts.

Adoption of these developments on farms in PNG has been limited by lack of support for government extension services. However, some progress is being made in East New Britain and Bougainville where factors contributing to success have included family-centred extension services and greater involvement of whole families in cocoa production, and engagement with industry stakeholders to foster the development of self-sustaining, village-level extension enterprises.

## The project

The PNG cocoa project aims to foster enterprise-driven transformation and increased production and profitability of smallholder cocoa in East Sepik, Madang, New Ireland and Chimbu provinces of PNG. It seeks to develop a small business model of cocoa farming and related enterprises that is self-sustaining and viable as a livelihood for families and particularly youth. The project seeks to introduce new cocoa varieties and management practices to increase cocoa yields. It is also supporting farmers to establish themselves as profitable Cocoa Model Farmer Trainers (CMFTs), who generate income through a mix of cocoa-related enterprises and provision of paid advisory services to farmers.

Through promoting more equitable family labour in farming, and diversification of food crops and small livestock production alongside cocoa, the project also aims to increase the involvement of women in cocoa and non-cocoa farming, to the benefit of cocoa management as well as improving women's economic empowerment. Finally, the project seeks to improve linkages between good cocoa growers, post-harvest service providers and relevant markets to enable direct sales into these markets, creating an attractive cocoa business model that provides an incentive for young people to seek employment and livelihoods in cocoa production.

The objectives of the project were:

1. To foster the development of profitable, self-supporting, village-based cocoa extension and other services as micro-enterprises supported by financial institutions, commercial cocoa buying and supply companies, and existing research and extension services.
2. To introduce and evaluate on farms, with farmer participation led by village extension workers, transformative new cocoa cultivars and cocoa selection, propagation, production and post-harvest methods.
3. To introduce and evaluate on farms, with farmer participation led by village extension workers, options for development of new cocoa farming systems integrating food crops, livestock, and high-value shade and other tree crops.

# Findings

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

### Project theory of change

The **aim** of this project is to foster enterprise-driven transformation and increased production and profitability of smallholder cocoa farming in East Sepik, Madang, New Ireland, and Chimbu provinces of Papua New Guinea (PNG).

An initial impact pathway or theory of change was developed in a workshop in 2016, but this was not completed and not often referred to during project implementation. While not formalised, it is clear there was an underlying strategy linking various activities with higher-level outcomes or objectives. The theory of change diagram at Appendix 2.2 articulates that strategy, as understood by the evaluation team. Importantly, this theory of change describes the project's logic and assumptions at the outset of the project, rather than in light of what has been learned through implementation:

- If farmers participate in trialling transformative new farming practices (such as cocoa cultivars, intercropping, and cocoa selection, propagation, production and post-harvest methods) and have advice available on an ongoing basis through Cocoa Model Farmer Trainers (CMFTs), they will adopt new practices that increase their productivity and yield. This requires that:
  - Improved farming practices are developed and trialled with participation of farmers, with knowledge and skills shared through training by CMFTs.
  - New farming practices are sustainable, accessible, effective and affordable for farmers.
  - Farmers can generate additional income or economic benefits from increased yields to provide an incentive for continued adoption of new practices.
- If CMFTs can run profitable small enterprises and provide fee-for-service advice to farmers, they will be able to establish themselves as a self-sustaining network for delivery of extension services at the village level. In order to achieve this:
  - CMFTs need to have the skills and knowledge to run profitable advisory or cocoa-related small enterprises.
  - CMFTs need to be connected to commercial and government formal extension services to gain continued technical support and upskilling, including access to new innovations and research.
  - Farmers need to be supported by bank loans or private sector financing required to kickstart new farm development or rehabilitation of unproductive farms.
  - Increased interest and enthusiasm for cocoa production needs to be fostered among rural farmers, encouraging increased involvement in cocoa farming to drive demand for extension services.
- If farming families adopt a whole-family approach to farm labour and women and youth are more involved in cocoa management, diversified crops/livestock husbandry, and cocoa-related small enterprises, this will benefit both women and youth (through increased incomes and food security) and families as a whole (through increased family productivity). This requires that:
  - Farming families understand and adopt the approaches embedded in the Family Farm Teams (FFT) training modules.
  - New cocoa management and post-harvest production approaches are more conducive to the involvement of women and youth.

## Analysis of the theory of change

**The CMFT model has been demonstrated to be an appropriate extension model in most contexts in which the project was implemented**, enabling outreach to remote farmers, and filling a gap in areas with limited access to formal extension services. There are indications this is leading to the adoption of improved cocoa farming practices among CMFTs and the farmers they support, and reinvigorating farmer interest in the cocoa industry as planned. In New Ireland, the model appeared to be less successful as many CMFTs opted to work in logging rather than cocoa farming, and access to markets has been an issue. In the highlands, the CMFT model still worked effectively, although some stakeholders indicated that project approaches could have been further adapted for highlands areas where cocoa farming is new. It appears that the project was replicated and rolled out far more extensively in the highlands than initially intended, which may explain why this was not originally considered.

The concept of establishing CMFTs as self-sustaining businesses was an innovative solution to overcome the lack of existing government or private sector extension services. While many CMFTs have established small businesses related to cocoa farming, **the assumption that provision of cocoa-related products and advisory services would be an income-generating activity for CMFTs has not held true in many locations**, as farmers have often not been willing (or able) to pay for these services. This is particularly the case for paid advisory services. Nurseries have been more successful, although they have primarily supplied other government or donor-supported programs, rather than selling to farmers directly. On reflection, a number of stakeholders noted that this fee-for-service approach was unlikely to be viable in the PNG context.

**Activities to increase access to finance to support CMFT small businesses do not appear to have been undertaken as planned**, beyond initial consultations with financial institutions that indicated a hesitation to invest because of previous negative experiences. This does not seem to have had a major impact on the achievement of project objectives, in that CMFT businesses were constrained by a lack of access to markets for their products or services, rather than a lack of access to capital.

Strengthening access to cocoa markets for farmers was not a substantial focus of the program. Project stakeholders noted that this was because of an assumption that there were sufficient existing market linkages for cocoa products in project areas. While this generally held true, **New Ireland market connections were not as strong and this was a barrier for farmers wanting to sell their produce**. A more nuanced market analysis during the initial stages of the project may have been useful to enable a tailored approach to each project location. Initial plans for CMFTs to be linked to and potentially supported by cocoa-buying companies (effectively becoming buying agents) would also have helped to secure market access if this had eventuated. Without this, there continue to be questions around the overall sustainability of the model given limited resources within the Cocoa Board (CB) to provide ongoing extension support to CMFTs.

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

### Outputs

#### *Scientific knowledge*

A full list of scientific publications or reports produced by the project is included at Appendix 2.4. **The project undertook testing of cocoa clones to build knowledge of the productivity and sustainability of different cocoa varieties**. This included trialling seedlings to determine which variants best adapted to conditions specific to each target province. While there were some promising results, particularly in highlands regions, further exploration of appropriate cocoa clones is required as farmers identified issues with certain clones, and some varieties of cocoa plants produced highly variable results.

**The project established mature budwood gardens in at least 15 locations in each province**, providing farmers with access to the 18 latest-release clones from CCI. Farmers were supported to use their newly developed budding skills (see agricultural practices in this section) to test which trees performed best on their farms and multiplied their production (Keane and Clarke 2020).

**Particular attention was given to trialling cocoa production in areas previously considered ill-suited to growing cocoa, such as the highlands and the Sepik grasslands**. In the highlands, new cocoa hybrid seedlings were initially trialled by CCI. Seedlings found to perform strongly were selected by farmers for cloning through the project, with open-pollinated seedlings transported to other sites for test plantings (Keane and Clarke 2020). While the long-term success of these seedlings is yet to be determined, successes in locations such as Karamui has generated substantial interest and led to replication of the model across highlands provinces. This is promising for establishing cocoa farming as a viable livelihood and industry in highlands areas, which were previously thought to be at too high an altitude for cocoa production. In Sepik grassland areas, deep ploughing to aerate the soil and establishing adequate shade prior to cocoa planting have been found to be effective in supporting better growth of cocoa plants.

> *'For the first time in PNG, cocoa is being produced commercially and sold in the highlands. It is defying the textbooks. That is our biggest achievement.'*
>
> – Project team member

Sharing knowledge on cocoa farming was also facilitated through the distribution of 2 books: project manager Trevor Clarke's *Pacific Islands Cocoa Book* (2020), and the CCI extension handbook, *Buk Bilong Kakao Fama* (PNG Cocoa Coconut Institute 2017c), published during the project. Both books have been well received by farmers and have contributed to filling a knowledge gap in cocoa farming.

#### *Technologies*

**The project has developed and supported construction of solar dryers for drying cocoa beans, modelled on the style of dryers used in Solomon Islands**. These provide an affordable option for cocoa farmers in comparison to traditional kiln dryers, particularly for those in remote locations as they can be built from locally available materials (along with a UV resistant plastic film supplied through the project). Drying cocoa enables farmers to earn a greater return for their cocoa harvests through the sale of dry cocoa beans rather than wet beans. Other benefits of solar dryers include reducing the time and effort exerted on the collection of firewood (which often falls to women), as well as producing high-quality cocoa beans without smoke contamination.

There are contestable reports as to the efficacy of solar dryers in all weather conditions, with some indicating they are less effective in wet weather. This has prompted **development of techniques for drying cocoa beans in wet weather, including combination dryers and using solar powered fans**. The solar dryers are still awaiting certification from the CB, and this is delaying the commencement of commercial operation for some CMFTs. The project is also looking to source alternative suppliers of the plastic film used in the dryers so they can be constructed after the project ceases.

Other technological outputs include the development of cheaper alternatives to expensive farming equipment – including budding knives and budding tape (often made from strips of plastic bags) – which have enabled more farmers to access equipment required for grafting.

*Agricultural practices*

**The project has introduced new cocoa farming practices across different stages in the growing, harvesting, and processing cycle**, including propagating clones, budding, grafting, rehabilitation of cocoa trees, pruning, integrated pest and disease management, and post-harvest practices such as drying and fermenting to improve quality. These practices have been compiled into the *Pacific Islands Cocoa Book* (Clarke 2020), which has been widely distributed among farmers.

Integrating goat husbandry alongside cocoa farming was also trialled, with goats intended to assist with pruning trees, consuming waste from crops, and producing fertiliser for use on cocoa and other crops. These trials produced mixed results. The trial in Madang failed, while in East Sepik it initially faced challenges but was more successful after the goats were moved to a new site. While some training and advice was provided to farmers as part of the trials, **further effort is required to overcome farmers' lack of knowledge on goat husbandry to enhance the viability of goats within cocoa farming systems in PNG**.

**Other strategies to improve cocoa production included intercropping and use of different shade trees**. Galip nut, betel nut, coconut, and other palm and fruit trees were investigated as shade trees for cocoa, with intercropping found more effective than relying on just one type of shade plant in case it is affected by pests or diseases. In Madang, food crops were used as temporary shade trees. In East Sepik, intercropping with vanilla has proven effective, particularly when combined with goat husbandry, as the goat manure can be used as a fertiliser for vanilla. Field trials in East Sepik and New Ireland also demonstrated planting methods, including composting organic matter and deep ploughing to aerate soil and support better growth of cocoa plants.

*Capacity building*

The project sought to impart new agricultural skills and practices to farmers primarily through CMFTs. Training for CMFTs covered a broad range of skills and topics, including cocoa production, post-harvest practices and business skills. CMFTs also received training in the FFT approach, which encouraged more equitable division of labour within farming families. End-line data is not yet available, but there are indications many CMFTs developed a greater understanding of productive farming practices, ways of improving the quality of cocoa produced and post-harvest approaches as a result of the project. Some farmer groups are also demonstrating improved understanding on selecting the best cocoa varieties for cloning that suit their specific growing conditions.

The project guided CMFTs to establish model farms to test improved cocoa management methods and demonstrate these with other farmers. Most CMFTs established model farms, with 27 in Madang, 26 in East Sepik, 2 in West Sepik, 21 in New Ireland, and 7 in Chimbu as of June 2020 (Keane and Clarke 2020). These model farms are available to provide ongoing training to farmers on agricultural practices, and for use during field days.

**The CMFT model is proving to be a successful approach to capacity building, and appropriate to the context, filling a gap left by limited government extension services**. Engagement in demonstration farming and skills development has been strong, with some provinces recording far greater numbers of CMFTs involved than originally anticipated. Initially, CMFTs were predominantly men, however, most attended training with their wives. This enabled the CMFTs to operate as husband/wife teams in line with the FFT approach adopted by the project. All CMFTs received training through the project, with reports suggesting women constituted approximately 30% of attendees at project training and field days (Keane and Clark 2020).

Building cocoa farming capacity within communities has also been pursued through activities that reach beyond the CMFT model. In East Sepik, the project developed linkages with 3 secondary schools and a correctional institution to use cocoa model farms as teaching facilities. Project coordinators have spoken at school assemblies, and training materials have been developed for use by the CB and Department Agriculture and Livestock (DAL) in training with farmers and at village meetings. While not a direct focus of the project, carpenters were also trained in construction of new dryers.

**The project has also built the capacity of government extension workers**, including CB Research, Extension and Development Services (REDS) and provincial government DAL staff. This appears to have occurred primarily through mentoring and engagement in project activities, rather than more formal training. PowerPoint presentations prepared by project leader, Trevor Clarke, covering multiple aspects of cocoa technology, were distributed to CB, REDS, and DAL staff in most provinces, however, it is unclear how these were utilised and whether they demonstrably contributed to capacity development within these agencies (Keane n.d.). The project covered all the operating costs of those REDS employees involved in the project (including vehicles, fuel, allowances and in some cases housing), enabling the delivery of extension services that would otherwise not have been possible. The project also supported DAL staff to replicate the CMFT approach in additional locations within New Ireland and the highlands.

## Adoption

Australian Centre for International Agricultural Research (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 5.

### *New technologies or practical approaches*

#### Solar dryers and farming equipment

**The adoption of solar dryers has been a significant achievement for the project**. The affordable nature of solar dryers, and the ability to construct them from locally available materials, has supported their strong uptake by farmers, with numerous villages sourcing their own resources for construction. CMFTs in some areas are supporting other farmers to build dryers, for example a CMFT in Yekimbole established a successful wet bean buying and fermentary business and is assisting 7 villages to construct solar dryers, demonstrating uptake by both next and final users.

The use of cheaper equipment alternatives is continuously being taken up by farmers as a way of overcoming the challenges of high-cost equipment, for example budding knives (fashioned from hack saw blades) and budding tape. This has spurred the adoption of more affordable options, such as adapting kitchen knives, or using strips cut from plastic bags or rice packaging for grafting.

#### New cocoa farming practices

As end of project studies have not yet been undertaken, there is limited data on the extent of adoption of new farming practices. That said, **stakeholders reported a reasonably strong level of uptake of new cocoa farming practices by CMFTs, as the next users**, with some project coordinators estimating around 50% of CMFTs have applied changes in their farming practices during the project.

Specific practices which have demonstrated good levels of adoption by next users include new field grafting techniques, usage of solar dryers, establishment of nurseries and budwood gardens for cultivation of cocoa seedlings, and field budding of seedlings as an alternate option to reduce nursery costs. The annual project report (Keane and Clarke 2020) indicates that many CMFT nurseries, budwood gardens and model farms have been established – 27 in Madang, 26 in East Sepik, 2 in West Sepik, 21 in New Ireland, 7 in Chimbu.

**Reports suggest farmers have been successful at adapting methods and farming practices to suit their specific contexts, farming conditions, and available resources**. For example, in the highlands, some farmers are planting seedlings directly in the ground rather than establishing nurseries to grow seedlings.

**Table 5** Levels of adoption of key project outputs

| Category | Output | Users | Level of adoption |
|---|---|---|---|
| **New technologies or practical approaches** | Solar dryers | • Users of project-constructed dryers are initial users<br>• Other farmers building or using dryers are final users | NF* |
| | New cocoa farming practices | • CMFTs are initial users<br>• Other farmers are final users | Nf* |
| | FFT approach | • CMFTs are initial users<br>• Other farmers are final users | N** |
| **New scientific knowledge** | Cocoa production in the highlands | • CMFTs are initial users<br>• Other farmers are final users | NF* |
| **Knowledge or models for policy and policymakers** | CMFT model | • Those involved in the model are initial users<br>• Evidence of uptake of the model by extension agencies reflects final users | Nf |

Notes:
* Only anecdotal reports are available to assess adoption by final users
** There is no evidence available to assess adoption 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

Intercropping practices, particularly planting vanilla and coffee among cocoa crops, have been adopted by CMFTs in various locations, but there is insufficient data to ascertain their adoption beyond next users. Farmers in Madang province have taken up planting food crops, namely banana and taro, as temporary shade for cocoa trees while longer-term shade trees are developing.

The project aimed to support CMFTs to develop small businesses related to cocoa farming, including budwood gardens and nurseries, pruning and rehabilitation businesses, cocoa marketing and farm supplies businesses, advisory services, and cocoa fermentary and dryer businesses. **Reports indicate that many CMFTs have begun establishing self-sustaining businesses including budwood gardens, nurseries, wet bean buying and fermenting businesses, with several having been formally registered**. However, there is insufficient evidence on how many small businesses have been established as a result of the project, how successful they are, or the explicit activities undertaken by the project to actively support business development.

**As noted earlier, the concept of CMFTs providing fee-for-service advisory services for cocoa farming families has not eventuated in practice**. In some instances, CMFTs have been paid by farmers in kind, rather than in cash, although this does not appear to be widespread. Nurseries and post-harvest processing (such as drying) businesses seem to be the most viable small business options for CMFTs. There were reportedly several independent and self-sustaining nursery businesses supplying cocoa clones to farmers, particularly in New Ireland and East Sepik. However, successful nurseries are often linked to supplying government programs rather than supplying farming families. While this is supporting the viability of nurseries, there is not sufficient demand in all locations. In some cases, this lack of demand was noted as a disincentive for further nursery establishment. Goals to see the establishment of youth-run pruning businesses as an employment opportunity also struggled to gain traction amongst youth, as have businesses focused on cocoa marketing and farm supplies distribution.

> *'Some end their operation due to no payment of seedlings. The seedlings stay in the nursery and don't get sold … If nobody is paying for the seedlings then there is not motivation to keep growing them.'*
>
> – Project team member

Cocoa farmers in PNG removing cocoa beans from ripe pods after harvest. Photo: Conor Ashleigh

There has been good uptake of the CMFT model as an approach to building capacity of farmers, with evidence some CMFTs have become effective trainers. While each CMFT was designed to support up to 25 farmers in their own village, several CMFTs also established numerous new satellite groups beyond their villages through which training and resources are being provided to other farmers. The annual project report (Keane and Clarke 2020) indicates that:

- 5 of 27 CMFTs in Madang are supporting satellite groups
- 4 of 26 CMFTs in East Sepik are supporting new satellite groups, including one which is supplying materials to 50 satellite groups.

In addition, other farmers in project sites not originally selected as CMFTs have witnessed the success of the CMFT model and taken the initiative to start their own satellite groups.

While many CMFTs have taken up the role of building capacity of other farmers, some have been less interested or willing to do this and have primarily focused on improving their own farming practice or setting up a small business. One stakeholder suggested this may be because of the commercial advantage that comes from staying one step ahead of your peers.

> *'They (CMFTs) are well trained, they are doing some of the work that the extension workers normally do, they are telling their farmers and forming groups. The knowledge is extending.'*
>
> – Project stakeholder

> *'A few of the CMFTs are still providing training to others – extension work. Others are just working on their project sites – but they still discuss with others on how to go about cocoa.'*
>
> – Project stakeholder

### FFT approach

While the FFT training was reported to be well received by CMFTs, there is not yet evidence available as to the extent to which CMFTs have adopted or shared the FFT approach. This evidence will be collected during an end-line evaluation of the Collaborative Research Grant (CRG), which was scheduled for late 2020 but was delayed due to COVID-19.

#### *New scientific knowledge*

**The project has seen next and final users adopt scientific knowledge in relation to new cocoa variants for cloning, propagation, and rehabilitation of ageing trees**. Farmers have demonstrated greater knowledge of cocoa clones and clone selection methods through successful identification and propagation of seedlings best adapted to various growing conditions. Notably, a key achievement has been farmers selecting cocoa types better adapted to highlands conditions, with success in cloning and distributing seedlings to other highlands provinces for test plantings with support by local administrators. This demonstrates adoption of new knowledge built through the project on growing cocoa in high altitude areas, where **certain cocoa types can now be grown up to 1,600 m above sea level, significantly higher than previous understanding that cocoa growing was limited to around 600 m above sea level**.

The longer-term sustainability of disseminating new research and knowledge to farmers will present a challenge once the project closes. There is no plan to continue resourcing activities such as visits to cocoa growing regions to provide ongoing encouragement and support to farmers. Furthermore, there is limited support for facilitating wider sharing of farmer-led innovations which may benefit other farmers, especially those in remote areas.

#### *Knowledge or models for policy and policymakers*

The project has demonstrated a model for CB/DAL extension staff to be able to deliver extension services to cocoa farming families and communities through CMFTs. REDS staff within the CB have expressed strong interest in continuing the model but have not yet secured commitment from CB management to do so.

**A notable achievement has been the replication of the model (or aspects of it) in new provincial government programs and other donor programs**. For example, the Provincial Government in New Ireland commenced a project called the Cocoa Development Extension Liaison Project following the CMFT model in 2017. This project supports activities which follow the same model as ACIAR project activities, but on a larger scale, extending to cover all 109 cocoa-growing wards in New Ireland (Keane et al. 2017). The ACIAR project team has been able to assist the provincial government with building capacity of extension workers to deliver this project. In addition, the concept of establishing budwood gardens and nurseries as a source for distributing seedlings in the community has been adopted by the EU-funded Smart Cocoa Project.

Provincial governments are beginning to consider cocoa as a salient policy priority area, with annual budgets starting to include fund allocations to cocoa projects, predominantly in low-lying areas, but also to some extent in highlands regions (Keane and Clark 2020). This represents a significant change since the project commenced and is an indication of the revived interest and confidence in cocoa throughout the region.

## Outcomes

### *Scientific achievement*

The project has contributed to significant scientific achievements in establishing successful cocoa crops in areas where cocoa farming was previously considered unviable. One of the key achievements has been the establishment of the cocoa industry in the highlands, which has prompted considerable interest by provincial administrations and DAL officers in Eastern Highlands, Western Highlands, Southern Highlands and Jiwaka provinces in trialling cocoa planting. Test plantings of cocoa seedlings have begun in these provinces, while in some areas, cocoa is being commercially produced and sold in the highlands for the first time. **Cocoa is now able to be grown at altitudes over twice as high as was previously thought**. The successful propagation of cocoa in the Sepik grasslands areas is also a notable outcome, with the project identifying that aerating soil, and ensuring shade trees are well established prior to planting of cocoa, are critical factors in its success.

**The project has been successful in establishing nurseries and budwood gardens in locations where cocoa planting materials were previously unavailable**. Prior to the project, cocoa planting materials were primarily distributed from government-run stations which were inaccessible to many communities. Establishing nurseries and budwood gardens within community locations, and the adoption of this approach by provincial governments and other donor projects, marks an important shift in practice which should have long-term positive implications for cocoa production.

**The project also successfully introduced methods for using solar dryers to dry cocoa beans** rather than conventional dryers, identifying optimum techniques to use these dryers in all weather conditions. Some dryers are now beginning to be 'unofficially' registered by the CB (Keane and Clarke 2020). Most stakeholders interviewed were positive about the ability for solar dryers to be used year-round, albeit with lowered effectiveness during wet weather.

### *Capacity built*

At the village level, the project has significantly contributed to building the capacity of CMFTs to manage improved cocoa farming and viable small enterprises. **Model farms are operating successfully and driving the rollout of new practices across farmer groups by providing a space for demonstrations and training on farming techniques and methods**. Outcomes have reached beyond CMFT and their direct farmer groups, with satellite groups being established in all 4 provinces and other farmers emulating what CMFTs are doing. While it is unclear exactly how many CMFTs have shared knowledge with other farmers, there are reports farmers have taken up new ideas and practices, adapting learned techniques to suit their specific contexts and capacities. There are also examples of new practices contributing to improved quality of cocoa products, with cocoa produced by CMFTs in Madang placing second and eighth at the CB PNG Cocoa of Excellence Show held in Lae in 2019, and cocoa from one CMFT selected as a finalist at the Salon du Chocolate in Paris in 2019.

**Project reports indicate CB staff have built capacity to link to and educate farmers on improved cocoa farming practices, including through field days, village visits and training sessions**. Capacity development supported within REDS focused on upskilling in technology and approaches to providing extension services. This was particularly important for new staff coming in following the merging of CCI into the CB. However, there is limited evidence of capacity building beyond the core project team. Nevertheless, a key achievement was the ability of CB extension officers to continue to lead the project and maintain progress against all activities during the COVID-19 pandemic, including through lockdown periods and with limited Australian staff presence due to travel restrictions.

> *'The project has actually assisted in terms of mobility – by engaging our staff and getting them involved. Some of them were quite new when they started so we have been building their capacity in terms of the technology and approaches to extension.'*
>
> – Government stakeholder

Stakeholders were positive about the sustainability of the CMFT model and believed CMFTs would continue to provide advice to their farmers after project support ceased. However, many CMFTs reported feeling unprepared to operate as independent extension service providers in their communities, without formal support systems linking them to new cocoa research and expert advisory services when needed (ACIAR n.d.). As yet, there is no formal commitment from the CB to continue supporting the CMFT model so it is unclear how or to what extent CMFTs will be supported beyond the project.

*Economic outcomes*

A central objective of the project was to support CMFTs to establish viable small businesses which would increase availability of cocoa planting materials and extension services in communities in a sustainable manner, beyond the life of the project. Although the project is complete, it is still very early to be assessing economic outcomes as many of the new or rehabilitated cocoa trees have only recently started bearing fruit, and production is anticipated to increase over the coming years.

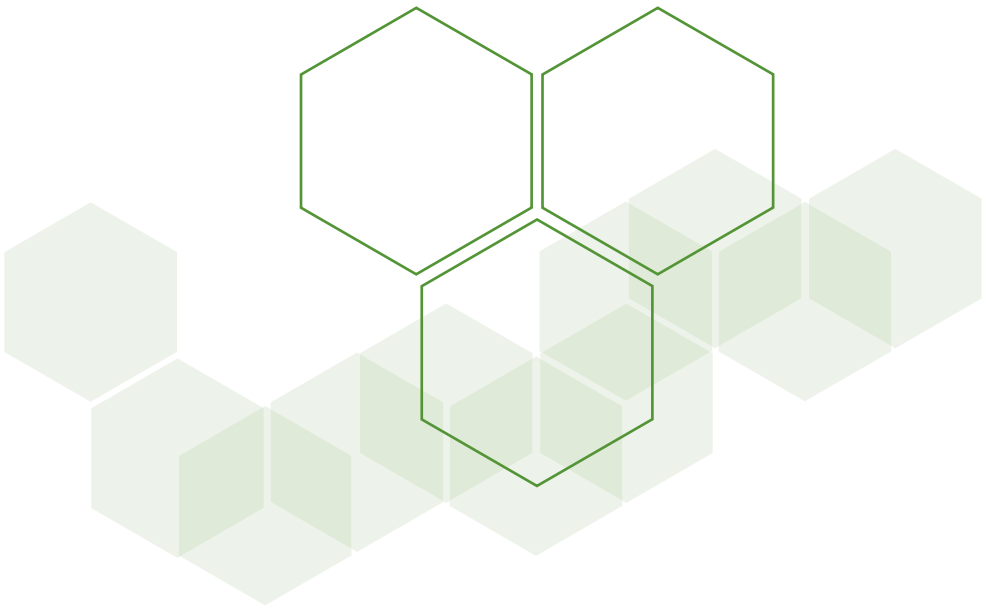
Many budwood gardens and nurseries have been established by CMFTs and are starting to provide a source of income, although there is no clear evidence yet about their longer-term commercial viability. Other avenues of income generation promoted through the project included post-harvest processing, including construction of cheap, plastic-covered solar dryers. Some CMFT groups in East Sepik successfully developed businesses buying wet beans from nearby farmers to dry in their solar dryers, with one group in Yekimbole now selling dry beans to one of the main cocoa buying and exporting companies in PNG (Keane and Clarke 2018). Many businesses have struggled to take off given time lags in CB officially registering nurseries and solar dryers to enable farmers to begin commercial operations. **Overall, beyond individual success stories, there is limited evidence to date to suggest the project has been able to produce economic outcomes for farmers**.

*Community outcomes*

**Multiple stakeholders noted the impact of the project in increasing enthusiasm and interest in cocoa farming**, which had waned substantially following the rise of the Cocoa Pod Borer. This enthusiasm for the project resulted in a far greater reach than anticipated, with the project expanding from the initial design of working with 10 CMFTs in 4 provinces to working with about 80 groups across 8 provinces, reaching a few thousand farmers.

> *'Improving morale is the main one [achievement] – getting farmers back to cocoa.'*
>
> – Project team member

CMFTs are reported to be becoming more involved in their communities and facilitating families to work together, which has reportedly improved morale and contributed to relationship building within communities. In some instances, CMFTs have also gone on to be selected as ward counsellors, indicating their positive position and respect within their communities. In some communities, unintended consequences have arisen in the form of jealousy coming from community members towards CMFTs as a result of actual or perceived benefits that CMFTs have received through the project. The payment of allowances (designed as an incentive to encourage CMFTs to share their knowledge with other farmers) has proved particularly problematic and did not necessarily support capacity building outcomes.



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

### Factors influencing adoption and outcomes

**The project was impacted substantially by the closure of CCI, and the transition of cocoa functions from CCI to the CB in 2017**. Key project staff (including the in-country manager and 2 provincial coordinators) were lost in this transition, which in some cases meant specific research activities could not be completed as planned. In addition, while the original project design anticipated the sharing of costs related to extension services with CCI, the CB did not provide any funding in this regard. The project team has proven very resilient in these challenging circumstances, adapting budgets and activities to enable the project to continue to work towards its objectives. This has required diverting funds originally designed for project activities into operational costs for the project team – such as vehicles, fuel, operating expenses and travel allowances – which should have been supplied by CB. This poses a serious sustainability risk for capacity built through the project and the continuation of the CMFT system as there is no certainty among stakeholders that support will continue beyond areas where other donors are operating. Limited engagement and support from the CB also hindered some project outcomes. For example, it took 5 years to influence the CB to officially recognise and register solar dryers, which delayed their use in commercial production. Similar delays in registering gardens and nurseries also impacted further development of commercial nursery enterprises (ACIAR n.d.).

**The process for selecting CMFTs was a critical factor influencing levels of engagement and attrition**. Although project reports indicate selection criteria were followed and selection of CMFTs was done in consultation with village wards, several stakeholders stated this process was not sufficiently robust. In some cases this resulted in selection of farmers to be CMFTs who had little interest in cocoa; overlooking other farmers who were more dedicated to cocoa farming. Inappropriate selection of CMFTs is thought to be a key reason some sites have not performed as well as others and for weak dissemination of knowledge. Other projects, including Family Farm Teams (ASEM/2014/095) and Bougainville cocoa project (HORT/2014/094), identified similar issues regarding selection of village extension workers/ village farmer trainers. Stakeholders suggest that an alternative selection process could be to establish the group first, and then allow farmers to select their own leader, rather than the leader being selected by external stakeholders.

> *'There were a few groups where the PNG representatives on the project took the lead in appointing the group leaders (CMFTs). Where the farmers themselves did the selection it worked much better.'*
>
> *'When we pick the model farmers – looking back I feel we should have understood the community better, I should have got the community to nominate their own leaders.'*
>
> – Project team members

**Beliefs held by farmers concerning the direct benefits they would receive from the project for taking on the role of CMFT also influenced their retention and success**. An allowance system was introduced as an incentive for CMFTs, but this proved to be problematic as it motivated some farmers to sign up as CMFTs for the allowance rather than for their genuine commitment to the role. In some cases, promises were made during initial community awareness meetings which were not always kept, and this inhibited some farmer involvement in the project. In other areas, CMFTs struggled to get community buy-in to demonstrate and encourage uptake of new practices among farmers as villagers felt the CMFTs should do all the work as they were getting paid. It was also reported allowances created jealousy between farmers and CMFTs. Project leaders identified a better approach would be to pay farmers in kind with materials, and drive engagement through the results and increased yield they generate rather than providing cash allowances. Better communication at the outset of the project about the value of becoming a CMFT could also have bolstered greater understanding among farmers of the expected benefits of taking on the CMFT role.

**Incentives to undertake cocoa farming varied across locations, and were strongly influenced by the perceived income earning potential of cocoa compared to other crops**. This influenced the extent of adoption of new practices shared by the project. Higher prices for cocoa beans in comparison to other cash crops, such as coffee, positively influenced farmers in some provinces (particularly the highlands) to switch to cocoa growing. Conversely, expansion of logging practices in New Ireland negatively impacted progress in boosting cocoa farming as logging work offers an opportunity to earn 'fast and easy money', making cocoa production less appealing. Further consideration of these external influences and focusing projects on locations where adequate incentives are thought to exist will assist with maximising outcomes.

While there were established markets for farmers to sell cocoa products in most locations, **insufficient access to markets was a persistent issue in New Ireland, and in some other remote communities**. In these areas, limited or poor-quality roads and high transportation costs were a barrier to accessing markets, and also made it challenging for project staff to visit sites regularly. The project attempted to address this issue by establishing a buying point in Kokapo, East New Britain (although local agreement on this has not yet been reached). In New Ireland, one dominant cocoa buyer also insisted on buying cocoa at a very low price which resulted in prices remaining low.

**The participatory approach adopted through the project seems to have enabled it to be more successful**. For example, new practices and technologies which have emerged through the project, such as solar dryers, were co-developed with CMFTs and were therefore appropriate for the local context and adopted widely. This proved to be a good research-for-development methodology and useful for wider learning for ACIAR. This approach also promoted use of cheap, locally available materials which supported uptake.

Table 6 provides key findings against the categories and factors influencing adoption and outcomes as part of the ACIAR evaluation framework.

**Table 6** Factors influencing adoption and impact

| | Factor | Key findings |
|---|---|---|
| **Knowledge** | Do potential users know about the outputs? | • This was not a relevant issue for this project. |
| | Is there continuity of staff in organisations associated with adoption? | • The transfer of the cocoa function of CCI to the CB resulted in key project staff not being offered continued employment at CB. This undermined project implementation and capacity building of staff. Multiple staffing changes in regional coordinator roles also affected implementation. |
| | Are outputs complex in comparison with the capability of users? | • The availability of inexpensive, localised materials and approaches was central to key achievements through the project, notably the construction of solar dryers. |
| **Incentives** | Are there sufficient incentives to adopt the outputs? | • In most areas the project has revitalised interest in cocoa farming. In some cases, insufficient incentives contributed to CMFTs not adopting outputs or sharing practices with other farmers. |
| | Does adoption increase risk or uncertainty? | • This was not an issue for this project. |
| | Is adoption compulsory or effectively prohibited? | • The need for cocoa solar dryers, nurseries and budwood gardens to be certified by the CB delayed commercial production. |
| **Barriers** | Do potential users face capital or infrastructure constraints? | • This does not appear to be an issue for farmers.<br>• The lack of budget from CB for extension services meant there was no indication that their support would continue beyond the project, risking sustainability of progress achieved under the project. |
| | Are there cultural or social barriers to adoption? | • The evidence available is inadequate to assess this, however it is likely that social networks influenced selection of CMFTs which played a role in levels of attrition. |

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

### Gender equity

**While not an explicit project objective, the project design expresses an intention to increase involvement of women and youth in cocoa production and marketing**, with the expectation this would improve the status and financial situation of women in their communities. The project employed 2 key strategies to achieve this. The first was the integration of concepts around equity and involvement of women into the CMFT training. This was done initially through the University of Natural Resources and Environment (UNRE) training in sustainable livelihoods, and then through incorporation of the FFT approach through a Transformative Agriculture and Enterprise Development Program (TADEP) CRG with the FFT project. The FFT training promoted the concept of husband/wife farmer teams as community trainers of cocoa farmers, and introduced ideas around negotiating roles and shared control over resources within family units. Second, the project promoted cocoa management practices focused on 'light' work aimed to encourage greater involvement of women and youth, and strategies to diversify crop production.

Early in the project, the number of women who participated was disappointing, with reports indicating over 90% of attendees at initial training were male (Keane and Clarke 2020). This was primarily because most CMFTs selected within communities were men, indicating that a more gender-aware approach to selection of CMFTs was needed to ensure gender parity. FFT trainers reflected that in some cases women were unwilling to participate as men generally have control over the sale of cocoa and cocoa-related income. **With continued encouragement from the project team, women's interest and participation in project activities increased throughout implementation**. Women started accompanying their husbands to training, indicating more successful adoption of the husband/wife team approach. By 2020, the annual project report indicated that approximately 30% of training attendees were women (Keane and Clarke 2020).

**Beyond training participation, there were multiple examples of women actively contributing to and benefiting from project activities**. For example, during a visit to one site in East Sepik, women were carrying out all the nursery work (filling polybags, planting seeds and so on), while in Madang province, women are becoming increasingly involved in harvesting and processing cocoa. Female CMFTs are successfully leading farmer groups and cooperatives established through the project in sites in East Sepik, Madang and New Ireland, including all-female groups led by women who are the head of their household. In addition, women have benefited from the introduction of solar dryers as this has lessened women's workload in relation to collecting firewood which is required for kiln-based dryers. **These examples are very positive, but there is currently insufficient evidence to determine how widespread women's involvement is or the extent (if any) this has impacted on gender roles more broadly**. Project stakeholders observed that while women are more active as cocoa farmers they are still largely excluded from decision-making, particularly in relation to use of family financial resources, although discussions are beginning to take place around more equitable financial decision-making through the FFT training.

With the exception of the FFT approach, the strategies used to promote women's participation in cocoa production and farming more generally worked primarily within existing gender norms rather than by trying to positively influence them. For example, adopting 'lighter' maintenance techniques which are seen as more appropriate for women, and encouraging diversification of cropping to include food crops traditionally seen as women's domain. Future ACIAR projects should be encouraged to take a more transformative approach to gender, coupled with close monitoring of gender outcomes.

> *'Some of the families are really helping each other and working together – they are changing from the previous way they used to live. Previously even though the family worked at the farm, when it came to selling the cocoa the man would sell it and get the money and spend it, but during the training they now discuss with the family and spend income more wisely.'*
>
> – Project team member

## Social inclusion

The project design indicated an intention to support youth to develop small enterprises linked to cocoa farming services, with targets to establish 5 youth pruning 'gangs' within each province. Through this, the project aimed to reinvigorate the cocoa farming industry in rural areas and reduce rural to urban migration by young people. It is unclear whether the project has had an impact in this area, and there is little evidence indicating young people have gained employment through cocoa-linked enterprises. However, **stakeholders consistently reported that youth are more engaged in cocoa farming due to the project**. Youth have reportedly been establishing their own cocoa plots, growing and harvesting seedlings for sale, distributing seedlings to farmers, and working as pruners to prune trees. In East Sepik, young people have been active in learning propagation skills and using these skills in other projects as well.

Youth engagement in cocoa farming has had other positive impacts for communities. In a community in New Ireland, stakeholders reported positive transformations in the behaviour of young men by giving them something productive to do rather than causing trouble. Importantly however, youth engagement is reportedly skewed towards young men, with no reports indicating young women have taken up opportunities in cocoa farming. Future work in this area should focus on finding ways to encourage participation of young women as part of broader strategies to enhance gender equality and diversity in the cocoa sector.

Beyond engaging women and youth in the project, there is no reference to people with disability being involved in the project. Enabling participation of people with disability was not a consideration within the project design, nor did project reports or stakeholder interviews indicate much awareness of broader social inclusion issues. More should be done in the future to engage people with disability and other marginalised groups in cocoa farming.

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

Stakeholders interviewed for this evaluation were very positive overall about the project management arrangements. **The structure of the project team, comprising regional coordinators located in each province, with an in-country project manager, was a successful model** and attributed as a key factor in the success of the project and enabling the continuation of activities through 2020 despite COVID-19 restrictions.

As noted earlier, the transfer of the cocoa function from the CCI to the CB had major ramifications for the project, with a number of key personnel lost during the transition. Within this context, **the project team showed exceptional resilience and creativity in identifying new personnel, and adapting project activities and the budget to continue to work towards objectives**. Staff changes within CB resulted in high turnover in regional coordinators at the provincial level – for example in East Sepik, 4 different people carried out the coordinator role over the project's life. This, alongside insufficient financial support, restricted the regularity of visits to remote locations, creating a bias preferencing sites that were closer and easier to get to. These challenges aside, project coordinators were positive about what they have been able to accomplish over the life of the project.

Management of the CMFT network was progressively handed over to REDS between August 2018 and December 2020, and it is hoped they will continue to provide support to CMFTs and deliver aspects of the project activities into the future. A handbook is in planning on the development and maintenance of an extension network involving CMFTs linked to REDS, provincial DAL and cocoa businesses, which aims to support this transition (Keane and Clarke 2020). However, the lack of clarity about project management or plans beyond the end of the project is creating uncertainty among staff and brings into question the sustainability of the model.

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

There were mixed levels of awareness of TADEP and its objectives among project staff and stakeholders, and differing views on the utility of grouping the different projects under the TADEP umbrella. **The project team did feel TADEP was generally valuable for facilitating collaboration, particularly through the CRG which enabled implementation of the FFT approach within the project**. Communications aspects of TADEP, for example production of videos and newsletters, and the annual meetings were also reported as key value-adds.

Some regional coordinators felt there was little value in grouping the projects together across crop varieties, and instead believed they would gain more by collaborating only with other cocoa projects. In addition, some felt there could have been more interaction or feedback at the program level in support of the projects, seeing the relationship as largely unidirectional with projects providing reports to TADEP for inclusion in program-level reporting.

### Alignment with TADEP objectives and projects

The project aligned to 3 of TADEP's 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. There was less focus on increasing access to markets.
- **To build individual and institutional capacity in agricultural research, development and extension**. The project had significant impact in the areas of capacity building, including supporting capacity development of both CB staff as well as CMFTs, and by extension other cocoa farmers through the CMFT model.
- **To promote gender equity and women's empowerment in rural communities**. The project aimed to achieve this through implementation of the FFT approach. Evidence suggests there has been a notable increase in the involvement of women in cocoa farming, including through husband/wife CMFT teams, and stories of female-led farmer groups and cooperatives, but there is no substantive evidence of changes in relation to women's empowerment and gender equity at the community level.

### Collaboration with other projects

The project collaborated to varying extents with 3 other TADEP projects:

- '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 CMFTs involved in this project through a CRG.
- 'Developing the cocoa value chain in Bougainville' (Bougainville cocoa) (HORT/2014/094). The PNG cocoa project coordinator was part of the mid-term review of the Bougainville cocoa project, and the 2 projects collaborated informally through sharing ideas and resources throughout implementation.
- 'Enhancing private sector-led development of the *Canarium* industry in Papua New Guinea' (galip nut) (FST/2014/099). The galip nut project provided advice to the PNG cocoa project on galip nut cultivation and production, with plans to integrate galip nut into cocoa farms to provide shade to cocoa trees, and a secondary source of income for cocoa farmers.

The FFT project had the strongest influence and collaboration among the other projects under the TADEP umbrella. The project leader described being influenced by that approach during the design of this project in aiming to select husband/wife teams as CMFTs rather than individuals. Following the mid-term review, allocation of CRGs allowed the project to roll out the FFT approach as part of the CMFT training. As with other TADEP projects, **this is another example of the CRGs being used strategically to allow the project team to 'make real' an interest or intention to collaborate**.

> *'That was the most profitable collaboration that we had through TADEP. I was very strongly influenced by the FFT approach.'*
>
> – Project team member

The project hoped to collaborate more with the galip nut project, including trialling galip nut as a shade tree for cocoa. This collaboration was not as active as it could have been, largely due to the slow-growing nature of galip nut trees.

As noted in the Bougainville cocoa review report, it is interesting that there was not stronger collaboration between the PNG cocoa and Bougainville cocoa projects given the appetite for programs to be structured more closely by crop type. This appears to have been a missed opportunity, particularly given both programs were trialling different community-based extension models.

## Knowledge transfer and learning

**Facilitating knowledge sharing between projects was seen as a key benefit of the TADEP umbrella program**. Stakeholders who had attended the annual TADEP meetings saw these as a useful mechanism for encouraging collaboration and knowledge sharing across the projects. Some noted that the meetings could be quite exhausting and there could be value in spreading the discussions out across additional days. It is worth noting though that these meetings were primarily for project leaders so most of the project team did not attend (or only attended once), and primarily received information about the other projects through the TADEP newsletters. These newsletters were very well received and seen as useful and informative.

While some stakeholders were very positive about the value-add of TADEP with regards to knowledge transfer, several people (particularly those who did not participate in the annual meetings) felt that informal collaboration and learning is common between ACIAR projects and would have occurred without the TADEP umbrella. As an example, this project collaborated closely with a soils project implemented by Sydney University that used the CMFT approach, but which is not part of TADEP.[3]

## Reporting

Stakeholders indicated that the reporting requirements for TADEP were high and at times felt burdensome. However, project stakeholders appreciated how this reporting fed into the annual project report, and found value in being able to gain insight into what other projects were doing.

Photo: Conor Ashleigh, ACIAR

3 'Optimising soil management and health in Papua New Guinea integrated cocoa farming systems' (SMCN/2014/048)

# Conclusions and lessons learned

The Papua New Guinea (PNG) cocoa project has generated new scientific knowledge, with particular breakthroughs in growing cocoa at higher altitudes and in grassland areas, and adoption of effective and affordable technologies such as solar dryers, which are predicted to positively impact the level of uptake and value of cocoa as a commodity crop in PNG. The project has also successfully expanded the availability and range of cocoa planting materials available in communities and tested the viability of an extension services model designed to be largely independent of government support. This is an important achievement in a context where government-led extension services continue to be under-resourced and misdirected. Evidence of project outcomes to date indicate there has been an increase in interest and enthusiasm for cocoa farming in all 4 regions, and the uptake of a range of new cocoa farming practices as a result of the project.

Difficulties in facilitating linkages to markets, particularly in New Ireland, and delays in registering solar dryers, nurseries and budwood gardens have constrained project impacts in terms of the extent to which improved cocoa yields have led to increased farmer incomes. Aspects of the Cocoa Model Farmer Trainer (CMFT) model regarding provision of fee-for-service advisory support to farmers have also been problematic, although some CMFTs have set up nurseries and solar dryers which are beginning to operate commercially.

The Transformative Agriculture and Enterprise Development Program (TADEP) was useful for collaboration and learning and enabled the Family Farm Teams (FFT) approach to be implemented in this program. This appears to have resulted in CMFTs comprising husband/wife teams and there are examples of how this is benefiting women and youth. However, there is insufficient evidence as yet to determine the extent to which women and youth have benefited, or whether the FFT approach has spread beyond core CMFTs to other farmers.

While the project has clearly achieved some good outcomes to date, the long-term sustainability of outcomes achieved is less certain, given CMFTs will require ongoing technical support and motivation from extension workers in some form, which cannot be assured beyond the end of the project.

## Lessons learned

Specific recommendations for future research have been documented elsewhere and will not be summarised here. More general lessons for Australian Centre for International Agricultural Research (ACIAR) in relation to implementation of research-for-development projects and the programmatic approach learned through this project include:

1. The CMFT model appears to be effective for supporting uptake of new and improved cocoa farming practices by many farmers. To overcome issues with retention and community tensions experienced in some areas, future projects should aim to better understand community and social structures and follow a more rigorous process in the selection of CMFTs.
2. Care should be taken to select appropriate incentives for CMFTs, with preference given to in kind rather than monetary rewards. Prior to CMFT selection, any incentives should be clearly communicated to potential CMFTs and the broader community in which they will be operating.
3. The participatory approach central to the project has proven valuable and should be encouraged. New practices and technologies co-developed with CMFTs, such as solar dryers, have proven effective as they are appropriate for the local context and able to be adopted widely by farming families.
4. Potential for sustainability should always be a central issue that is assessed and explored as agricultural extension models are trialled and developed. This includes consideration of what level of ongoing support village extension workers require, and where this will come from. Given scepticism around the viability of a fee-for-service model of extension within the PNG context, it is unclear why this was included in the original design.
5. Articulation and implementation of a specific gender equality and social inclusion strategy would help projects improve gender equality outcomes. Monitoring and reporting against this strategy should form part of regular project reports so that there is greater oversight of this area.
6. Undertaking market analysis at the outset of projects, with a focus on potential barriers to market access, would be useful to identify risks to the achievement of project objectives. Conducting this analysis as part of project design processes would enable planning of approaches to address and overcome barriers and facilitate more active private sector engagement and market linkages throughout the project duration.
7. The project management structure for this project, including an in-country manager, and regional coordinators embedded within the Cocoa Board (CB), appears to be an effective model to support project implementation.

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PNG Cocoa Institute (2017b) *Papua New Guinea Cocoa Farmer's Handbook*, PNG Cocoa and Coconut Institute, East New Britain Province.

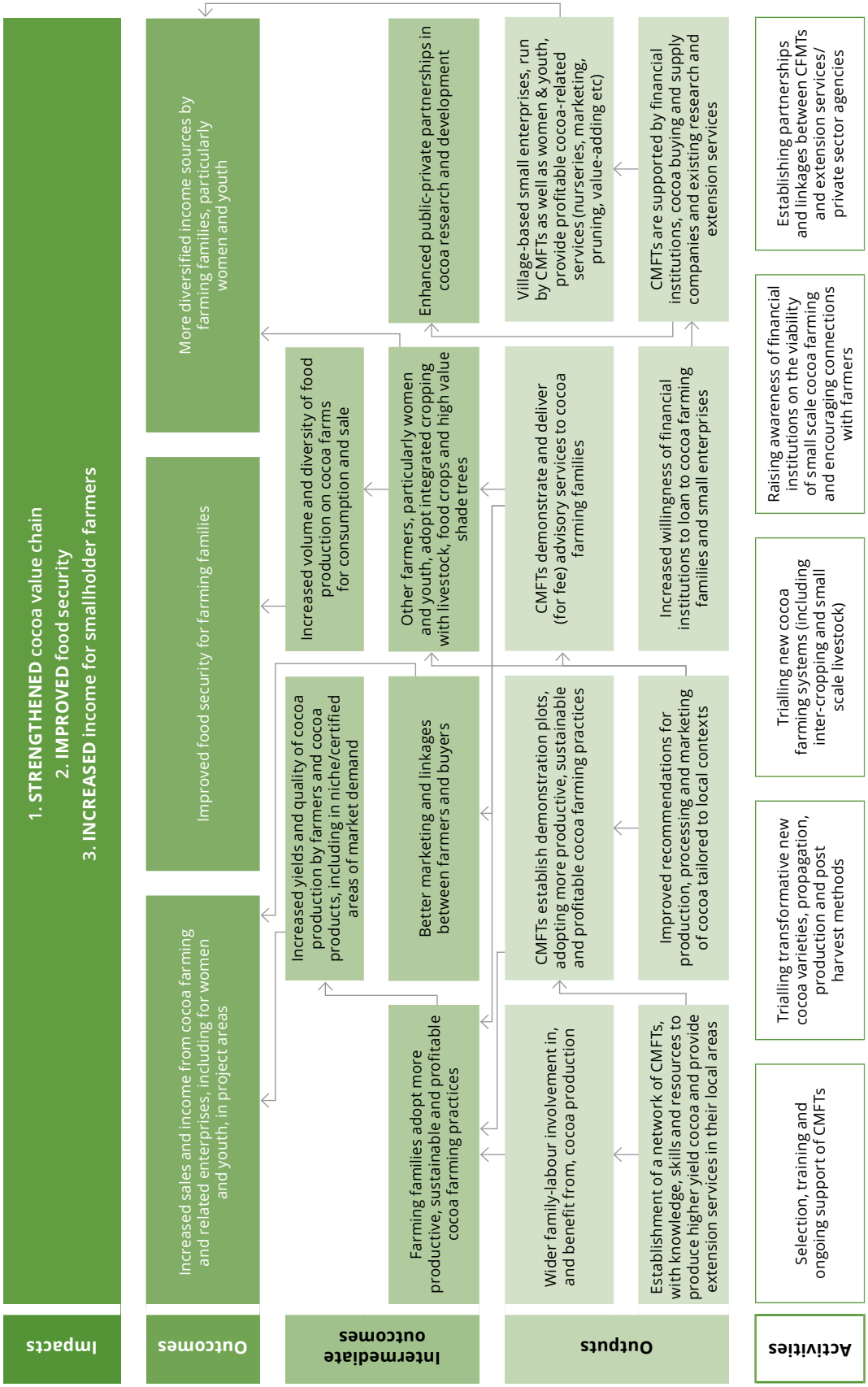
PNG Cocoa Coconut Institute (2017c) *Buk Bilong Kakau Fama*, PNG Cocoa and Coconut Institute, East New Britain Province.

# Appendices

## Appendix 2.1: Stakeholders consulted

| Name | Role | Organisation |
|---|---|---|
| **Dr Phil Keane** | Project Leader | Latrobe University |
| **Trevor Clarke** | Project Coordinator | REDS, CB |
| **George Curry** | Social Scientist | Curtin University |
| **Gina Koczberski** | Social Scientist | Curtin University |
| **David Yinil** | Senior Extension Manager | REDS, CB |
| **Timothy Sam** | Regional Coordinator, East Sepik | REDS, CB |
| **John Joseph** | Regional Coordinator, New Ireland | REDS, CB |
| **John Konan** | Regional Coordinator, Chimbu | REDS, CB |
| **Aitul Weoh** | Regional Coordinator, Madang | REDS, CB |

# Appendix 2.2: Theory of change



## Appendix 2.3: Project team members

| # | Team member | Gender | International/National Researcher |
|---|---|---|---|
| 1 | Philip Keane | M | International |
| 2 | Trevor Clarke | M | International |
| 3 | Peter Sale | M | International |
| 4 | George Curry | M | International |
| 5 | Gina Koczberski | F | International |
| 6 | Grant Vinning | M | International |
| 7 | John Morgan | M | International |
| 8 | Peter Green | M | International |
| 9 | James Hunt | M | International |
| 10 | Paul Horne | M | International |
| 11 | Eremas Tade | M | National |
| 12 | Alfred Nongkas | M | National |
| 13 | Boto Gaupu | M | National |
| 14 | Arnold Parapi | M | National |
| 15 | Josephine Saul-Maeora | F | National |
| 16 | John Konam | M | National |
| 17 | Aitul Weoh | M | National |
| 18 | Jimmy Risimeri | M | National |
| 19 | Daslogo Kula | M | National |
| 20 | John Joseph | M | National |
| 21 | Chris Toli | M | National |
| 22 | John Thomas | M | National |
| 23 | Graham McNally | M | National |
| 24 | John Nightengale | M | National |
| 25 | Steve Woodhouse | M | National |
| 26 | Joachim Lummani | M | National |
| 27 | Jeffrie Marfu | M | National |
| 28 | Kenny Francis | M | National |
| 29 | David Yinil | M | National |
| 30 | Peter Bapiwai | M | National |
| 31 | Chris Fidelis | M | National |
| 32 | Paul Gende | M | National |
| 33 | Samson Laup | M | National |
| 34 | Hosea Turbarat | M | National |
| 35 | Suri Taisa | M | National |
| 36 | Charles Maika | M | National |

## Appendix 2.4: Research outputs

| Publication | Peer-reviewed | Author (gender, nation) |
|---|---|---|
| **Books** | | |
| Clarke T and Meninga R (2020) *Pacific Islands Cocoa Book*, ACIAR, Canberra. | N | Clarke (male, PNG) |
| PNG Cocoa Institute (2017) *Papua New Guinea Cocoa Extension Manual*, PNG Cocoa and Coconut Institute, East New Britain Province. | N | Keane (male, Australia)<br>Nongkas (male, PNG) |
| PNG Cocoa Institute (2017) *Papua New Guinea Cocoa Farmer's Handbook*, PNG Cocoa and Coconut Institute, East New Britain Province. | N | Keane (male, Australia)<br>Nongkas (male, PNG) |
| PNG Cocoa Coconut Institute (2017) *Buk Bilong Kakau Fama*, PNG Cocoa and Coconut Institute, East New Britain Province. | N | Keane (male, Australia) |

# 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 |

# Acknowledgements

The evaluation team would like to thank Professor David Guest, the project leader, for his time and effort in supporting the evaluation. The efforts of Professor Guest and James Butubu to link the evaluation team with stakeholders in Papua New Guinea (PNG) were particularly appreciated.

The evaluation team would also like to thank Australian Centre for International Agricultural Research (ACIAR) staff who supported the evaluation. Particular thanks to Bethany Davies, Elizabeth Brennan and Irene Kernot.

The evaluation team would like to express its appreciation of all the project stakeholders who gave their time to be interviewed and to review the evaluation findings.

# Part 3 contents

# 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 Bokosou (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.

3

## 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.

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 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 *Canarium* 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. | • Individual scientists/researchers/ agricultural professionals<br>• Individuals responsible for the management of research or a government institution<br>• 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<br>• Public and private extension service providers<br>• Public policy actors<br>• Public and private value chain operators<br>• Consumers | **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 | | **Capacity built:** Project partners or stakeholders use enhanced capacity to do something differently |
| **Practices:** New practices and processes | | **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 | | |
| **Capacity building:** Short courses, academic training, coaching and mentoring | | |

## 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<br>Autonomous Bougainville Government (ABG) Department of Primary Industries and Marine Resources<br>Cocoa Board of PNG (CB)<br>University of Natural Resources and Environment, Vudal |
| Project leaders | Professor David Guest AM, University of Sydney<br>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<br>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**.

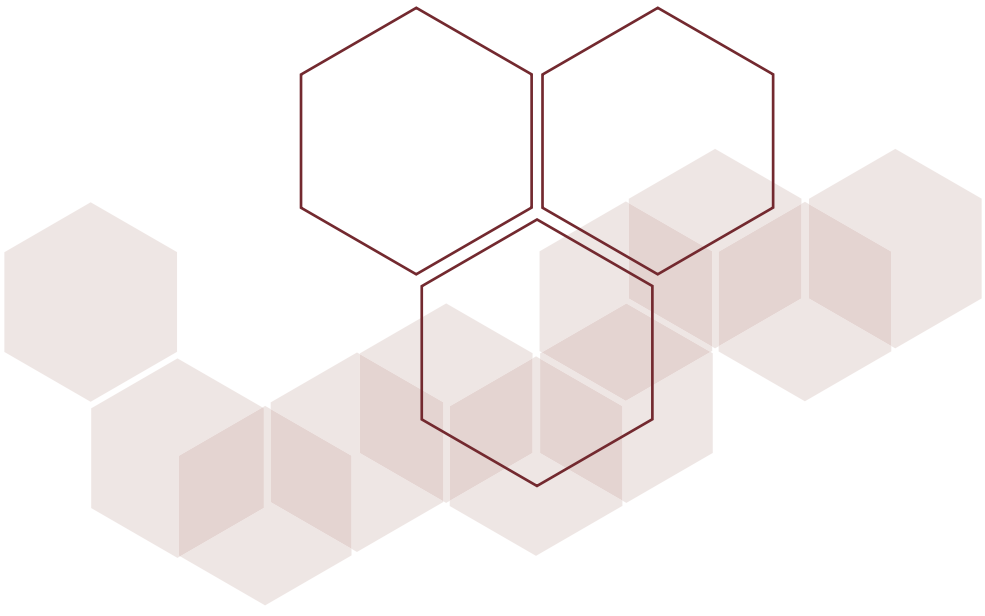
The cocoa industry in Bougainville has proven resilient and able to recover relatively quickly from periods of crisis. However, poor productivity and profitability of cocoa farming under current agricultural practices is a key challenge to the sustainability of cocoa farming in Bougainville. **Intensification 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 licences[4] 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 Health[7] 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 | • VEWs are initial users<br>• Other farmers are final users | N* |
| | Diversification of food cropping and livestock husbandry | • VEWs are initial users<br>• Other farmers are final users | N* |
| | Post-harvest processing practices | • VEWs are initial users<br>• Other farmers are final users | N* |
| **New scientific knowledge** | Livelihoods survey | • Government agencies (DoH and DPI) and development partners directly exposed to the results of the livelihoods survey are initial users<br>• People/organisations that they have influenced to use the findings are final users | Nf/F |
| | Chocolate production knowledge | • Chocolate laboratory staff are initial users<br>• Any other users are final users | N |
| **Knowledge or models for policy and policymakers** | Cocoa Farming Health Framework | • Government agency (DoH or DPI) staff are initial and final users | O |
| | Hub and spoke model of agricultural extension | • Those directly involved in the hub and spoke model are initial users<br>• 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)** | • New skills in cocoa farm management, soil nutrition and composting<br>• Integrated pest disease management practices<br>• Post-harvesting practices<br>• Facilitation skills<br>• Business development and marketing skills<br>• Greater understanding of quality issues |
| **Government extension service officers (DPI and CB)** | • Research skills – collecting data and conducting research trials<br>• Improved cocoa production and rehabilitation<br>• Post-harvest processing<br>• Crop diversification<br>• Monitoring and testing quality<br>• Nutrition and vegetable garden cultivation |
| **Central government agencies (DPI and DoH)** | • 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? | • Widespread awareness of the livelihoods survey findings led to its influence on the thinking of key government and development partners.<br>• The training and demonstration approach appears to have been effective in building VEW adoption of new practices.<br>• 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? | • 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? | • There was no evidence that this was a barrier to adoption. |
| **Incentives** | Are there sufficient incentives to adopt the outputs? | • 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.<br>• 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.<br>• 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? | • 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? | • 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? | • 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? | • 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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Australian Centre for International Agricultural Research (2020) *TADEP+ Collaborative Research Grants Mid-Term Report: Initiating vegetable cultivation to improve nutrition in Bougainville*, ACIAR, Canberra.

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Guest D, Butubu J, Yabom J, Vinning G (2018) *2017–2018 Annual Report: Developing the Cocoa Value Chain in Bougainville (HORT/2014/094)*, ACIAR, Canberra (not published).

Guest D, Walton M, Hall J, Butubu J, Yabom J, Vinning G, Paisi S, Batari B, Rereve J, Black K, Beardsley J (2019) *2018–2019 Annual Report: Developing the Cocoa Value Chain in Bougainville (HORT/2014/094)*, ACIAR, Canberra (not published).

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Walton M, Guest D, Hall J, Butubu J, Black K, Van Ogtrop F, Vinning G, Saul-Maora J (2018) *Report on the Results of a Livelihood Survey of Cocoa Farmers in Bougainville*, University of Sydney, Sydney (not published).

Wheaton H (2017) *Papua New Guinean Speciality Cocoa: Technical Report 107*, Pacific Horticultural and Agricultural Market Access (PHAMA) Program, DFAT, Canberra (not published).

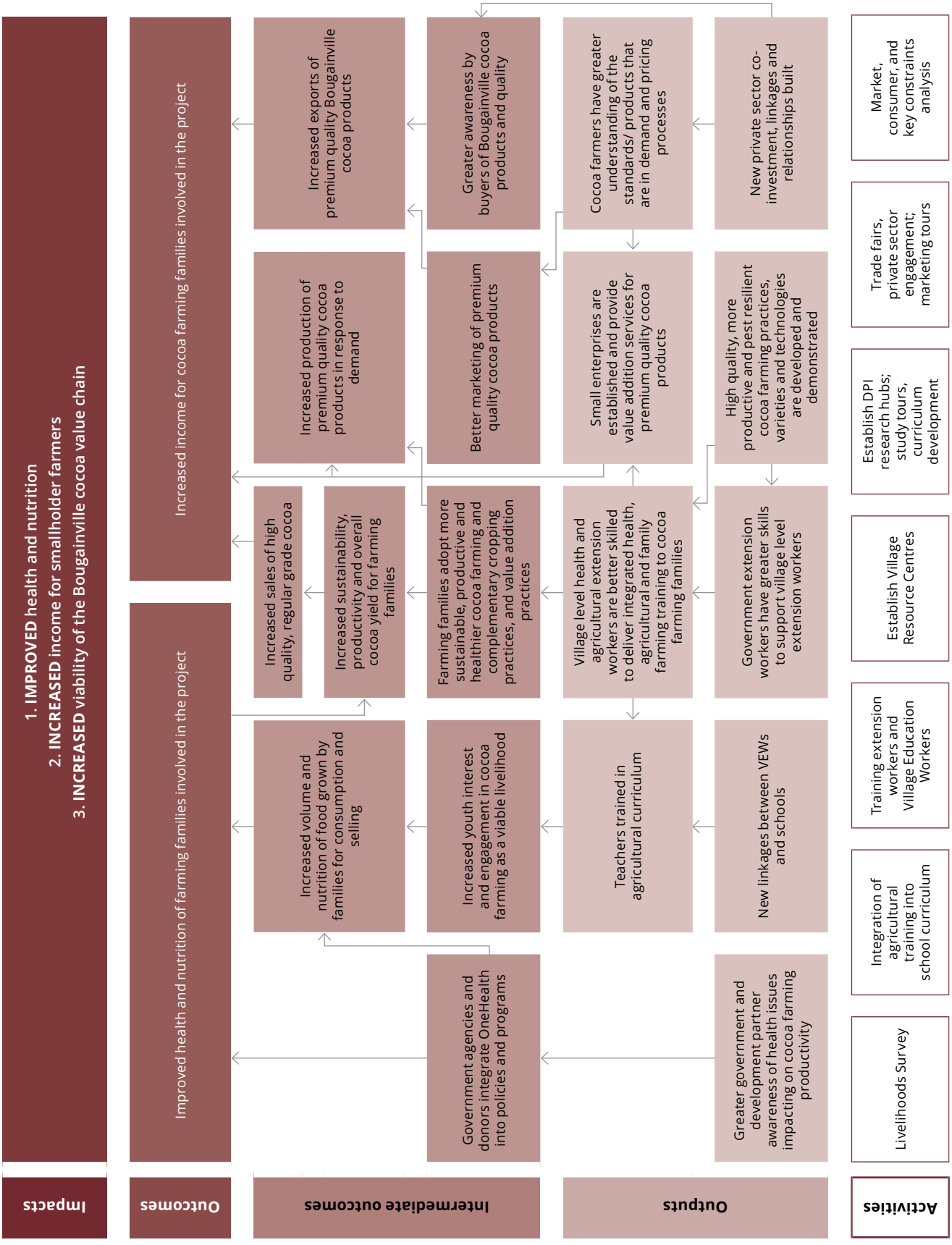
# Appendices

## 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** | Boungainville 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', *BMJ Global Health*, 5(8). | Yes | Hall (female, Australia)<br>Walton (female, Australia)<br>Van Ogtrop (female, Australia)<br>Guest (male, Australia)<br>Black (female, Australia)<br>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', *One Health*, 10, 100142. | Yes | Walton (female, Australia)<br>Hall (female, Australia)<br>Van Ogtop (female, Australia)<br>Guest (male, Australia)<br>Black (female, Australia)<br>Beardsley (male, Australia)<br>Totavun (male, PNG)<br>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', *One Health*, 10, 100143. | Yes | Walton (female, Australia)<br>Hall (female, Australia)<br>Guest (male, Australia)<br>Butubu (male, PNG)<br>Vinning (male, Australia)<br>Black (female, Australia)<br>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', *Phytopathology,* 109:1331–1343, doi:10.1094/PHYTO-12-18-0477-RVW | Yes | Marelli (male, USA)<br>Guest (male, Australia)<br>Bailey (male, USA)<br>Evans (male, UK)<br>Brown (female, USA)<br>Junaid (male, Indonesia)<br>Barreto (male, Brazil)<br>Lisboa (female, Brazil)<br>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', *Springer Nature*, 2021 (under review). | Under review at time of publication | Guest (male, Australia)<br>Butubu (male, PNG)<br>Vinning (male, Australia)<br>Van Ogtrop (female, Australia)<br>Hall (female, Australia)<br>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), *One Planet, One Health*, Sydney University Press, Sydney:127–141. | Yes | Walton (female, Australia)<br>Guest (male, Australia)<br>Vinning (male, Australia)<br>Hill-Cawthorne (male, Australia)<br>Black (female, Australia)<br>Betitis (male, PNG)<br>Totavun (male, PNG)<br>Mutubu (male, PNG)<br>Hall (female, Australia)<br>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], *11th International Congress of Plant Pathology*, Boston, USA. | No | Guest (male, Australia) |
| Guest D (2019) 'Interdependence of health and livelihoods of cocoa farming communities in Sulawesi and Bougainville', *Global Health Security Conference,* 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?<br>– Was the theory of change appropriate to the project context and desired results? | • Documented theory of change at project commencement<br>• Information on subsequent changes<br>• Information on project context<br>• Perspectives of key stakeholders regarding appropriateness of the theory of change | • Project concept / design documents and variations<br>• Project progress reports, annual plans, etc.<br>• Key stakeholders (project managers and collaborating partners, program manager/ coordinator, government authorities, producers, businesses) | • Desk review of available documents<br>• Interviews with key stakeholders<br>• Triangulation of findings from different sources<br>• Project verification workshops |
| 2. What outcomes (intended and unintended) has the project achieved or contributed to?<br>– What was the unique knowledge contribution of the project/cluster that was/is expected to influence practice/ policy?<br>– To what extent is there evidence of adoption of new practices based on research process and findings? | • Robust, documented evidence of progress towards planned outputs and outcomes (including progress along adoption pathways), and any unintended consequences<br>• Theory of change assessment from KEQ1<br>• Perspectives of key stakeholders, to test/ validate written reporting, including 'next users' of research outputs | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Desk review of available documents<br>• Interviews with key stakeholders<br>• Triangulation of findings from different sources<br>• Project verification workshops<br>• 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?<br>– To what extent and how did they differ from what was planned? | • Theory of change assessment from KEQ1<br>• Documented evidence of impact pathways, as per KEQ2<br>• Perspectives of key stakeholders including 'next users' of research outputs | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation, verification workshops<br>• 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 |
|---|---|---|---|
| 4. What strategies were adopted to address gender equity and social inclusion and how effective were these?<br>– How did the project impact men and women differently? | • Evidence of analysis/awareness of the potential gender equity issues that may impact on the project<br>• Evidence of steps taken to address the issues identified<br>• Evidence of level of participation of women and men in research activities<br>• 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)<br>• Perspectives of key stakeholders | • Documented gender strategy or analysis (if available)<br>• 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<br>• Any existing gender audits or inclusion-focused reviews<br>• Key stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation, verification workshops<br>• Gender analysis to explore the level and type of participation of men and women, and influence on positive or harmful gender norms |
| 5. How did management arrangements impact delivery of the project?<br>– What other factors influenced project performance? | • Any existing reporting and commentary on management arrangements<br>• Perspectives of key stakeholders<br>• Evidence of contextual factors external to the project that may have impacted performance | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation, verification workshops<br>• ACIAR progress assessment tools (e.g. Table 9) |
| 6. **How well did the project align with and contribute to the overall goals of its umbrella program?**<br>– To what extent has the programmatic approach added value at project level? | • Assessment of KEQs 1–5<br>• Information on program goal and approach<br>• Relevant existing reporting and commentary<br>• Perspectives of key stakeholders | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Assessment of consistency and value-add, based on analysis for KEQs 1–5 and supplementary program-level documentation, stakeholder interviews and verification workshops |

Collecting fallen galip tree fruit to process into galip nuts.
Photo: Conor Ashleigh, ACIAR

# Part 4: Galip nut project

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program Galip nut project

# Abbreviations and acronyms

| | |
|---|---|
| **ACIAR** | Australian Centre for International Agricultural Research |
| **ASLP** | Agriculture Sector Linkages Program |
| **DFAT** | Department of Foreign Affairs and Trade (Australia) |
| **DMS** | Devine Management Systems |
| **ENB** | East New Britain |
| **FFT** | Family Farm Teams |
| **KEQ** | KEQ Key Evaluation Question |
| **MEL** | Monitoring, evaluation and learning |
| **NARI** | National Agricultural Research Institute (PNG) |
| **PGK** | Papua New Guinea kina |
| **PhD** | Doctor of Philosophy |
| **PNG** | Papua New Guinea |
| **PPP** | Public–private partnership |
| **SEE4D** | Strategy, Evaluation, Engagement for Development Pty Ltd |
| **SME** | Small medium enterprise |
| **TADEP** | Transformative Agriculture and Enterprise Development Program |

# Acknowledgements

The evaluation team would like to thank Professor Helen Wallace, the project leader, for her time and effort in supporting the evaluation. We also thank all the project stakeholders who gave their time to be interviewed and to participate in the verification workshop to review the evaluation findings.

The evaluation team would also like to thank Australian Centre for International Agricultural Research (ACIAR) staff who supported the evaluation.

# Part 4 contents

# 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 the 'Enhancing private sector-led development of the *Canarium* nut industry in Papua New Guinea' (FST/2014/099), known as the galip nut project. This project aimed to **accelerate private sector-led development of the emerging galip nut industry in PNG**. It was led by the University of the Sunshine Coast, working in partnership with the University of Adelaide and the National Agricultural Research Institute (NARI). It commenced in June 2015 and concluded in December 2019, following a 12-month extension. The budget for the project was A$3,500,000.

The galip nut project built on a decade of ACIAR research on galip nut processing techniques and previous European Union funding to establish a pilot galip nut processing factory at NARI in Keravat, East New Britain (ENB). It employed a whole-of-value-chain approach, researching markets, providing technical advice, building capacity, mentoring businesses, and giving private and public sector stakeholders access to infrastructure. It aimed to attract the private sector into this new agribusiness at 3 different scales: smallholder and small-scale entrepreneurs, small medium enterprise (SME), and large-scale processors.

The galip nut project had 4 objectives:

1. To assess the needs of the private sector to participate in the *Canarium* industry.
2. To develop and undertake research-based interventions that address the needs of the private sector, including smallholders, small-scale entrepreneurs (especially women), SMEs, and large-scale processors.
3. To develop an appropriate commercial model for a medium-scale value-adding factory for the *Canarium* industry.
4. To create a model for public–private partnerships in the *Canarium* industry in PNG.

This project evaluation is Part 4 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).

A similar evaluation was conducted on the Agriculture Sector Linkages Program (ASLP) and is reported in ACIAR Outcome Evaluation No. 1.

A separate synthesis report, ACIAR Outcome Evaluation No. 3, will summarise lessons from the 2 ACIAR programs, ASLP and TADEP.

A galip nut tree in the PNG forest. Photo: Conor Ashleigh

## Key findings

1

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

**The central theory of change was stimulating medium-scale to large-scale private sector development of the galip nut industry, which was highly appropriate to the context**. Testing and demonstrating what was possible in a real commercial environment, and refining processes to improve efficiencies along the way, was a logical approach to overcoming scepticism from the private sector and proved an effective strategy. The project implemented a number of activities under objectives 2 and 4 which were not as central to the theory of change, and it is questionable whether these were needed to help the project achieve its overall goal. In particular, some of the training activities conducted with smallholder farmers and efforts to establish a public–private partnership with the NARI demonstration factory appeared less central.

**In contrast to some other ACIAR projects, limited attention was given to the role of government departments (beyond NARI) and extension workers in supporting growth of the new industry**. This was understandable for this initial project, given that the industry was newly emerging, but could usefully be taken up in future projects. This should include thinking strategically about how processing and value-adding approaches with smallholder farmers could be institutionalised into existing government and non-government agricultural extension systems.

2

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

***Outputs***

The project completed various studies to assess:

- the needs of the private sector at different levels to enable their participation in the galip nut industry
- the nutritional composition of galip nuts
- how to prolong the shelf life of galip nuts.

Using the knowledge gained through these studies, **the project developed, trialled and refined several value-added galip nut products at the NARI factory and developed a commercial model for production. These products proved so popular the factory could not keep up with demand in 2018 and 2019**. In addition, the project investigated how to improve key stages of galip nut processing to improve efficiency and maximise quality within a medium- to large-scale factory setting. Technological innovations introduced by the project allowed the NARI factory to increase its capacity and contributed to the factory more than doubling its production of processed galip nut products each year, to a total of over 2.4 tonnes in the final year of the project. The project also worked **extensively with women smallholders and small-scale entrepreneurs in ENB and surrounding areas, providing training and mentoring on a diverse range of topics**.

## Key findings (*cont.*)

*Adoption*

The action-research methodology used by the project meant that staff at NARI were closely involved in implementing and testing the commercial model as it was developed. This meant that **adoption of the commercial model by the NARI demonstration factory was strong**. However, having NARI enter the market as a commercial player was considered by some stakeholders as an unorthodox approach, stretching the boundaries of what was commonly understood as research. While it appears the existence and success of this model did influence other private sector investors to enter the industry, there is limited evidence on exactly what aspects of this model were adopted by other private sector processors.

Individual examples are available of women's groups or smallholders making and selling galip nut products immediately following training; however, **there is limited evidence of widespread adoption of the new galip nut processing or value-adding practices amongst smallholder farmers and small-scale entrepreneurs**. Smallholder farmers did adopt new practices in relation to the type of galip fruit sold to the NARI factory, with the quality of fruit sold improving substantially throughout implementation.

*Outcomes*

**Substantially more is now known about galip nut processing in PNG, and the impact different processing techniques have on nutritional qualities and product shelf life**. This knowledge has been used to develop and test new value-added products which proved to be desirable within the market.
**By the conclusion of the project, 4 private sector processors were processing and selling galip nut products commercially**. Given the lack of interest from SMEs and large-scale processors at the beginning of the project, this is a significant achievement.
Over the life of the project, the NARI factory directly purchased over PGK400,000 of unprocessed galip nut from smallholder farmers and entrepreneurs in ENB and surrounding areas, supporting the livelihoods of more than 1,300 farmers by the end of 2018.
The other processors are now also buying galip nut from smallholders, with an estimated farm gate value of PGK300,000–400,000 per annum. While no impact studies have been completed, individual case studies suggest this additional income is assisting women smallholders to cover living expenses and pay for costs associated with schooling and health care.

3

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

**Demonstrating commercially viable products in the market, particularly in Port Moresby, appears to have had a strong positive influence on prompting private sector investment in the galip nut industry**. Getting products on the shelf – at the right price point and in a form that was attractive to consumers – was the culmination of a significant body of research and commercial engagement by the project over the previous 3 years. The multidisciplinary nature of the project team was a critical success factor in ensuring all these different components came together to achieve this result.

The project faced a number of challenges which also influenced the results. **Operating the demonstration factory within a public research institute which was not designed for commercial operations was a major challenge**. Shortfalls in resourcing at the factory and inefficient work processes contributed to substantial delays and resulted in most of the results of the project being achieved within the final year of implementation. A public–private partnership at the NARI factory with the processor Equanut helped to address some of these issues; however it appears there were also challenges with this arrangement. The factory also struggled to determine the most appropriate scale of production, considering the supply of galip fruit available, demand for products and capacity of the factory. This may have impacted on analysis of the commercial model. Finally, uncertainty over continuity of funding towards the end of the project may have impacted on the willingness of investors to enter the industry.

4

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

The primary strategy used to promote gender equity was to target women smallholder farmers and entrepreneurs to increase their income from selling galip fruit to processors and undertaking small-scale value-adding of their own. This resulted in a **steady increase in women farmers selling galip fruit to the NARI factory**. It is unclear what impact this had on gender equity and the extent to which women had control of this income. About halfway through implementation, the NARI factory changed its approach to purchasing most galip fruit from the factory gate rather than travelling into the community and purchasing it at the farm gate. While this proved more cost-effective, it resulted in an increase in men selling galip fruit compared to women. Further research is needed to determine the gender impacts of this shift in approach.

Consideration was also given to promoting opportunities for women researchers within the project team to have their work profiled and take on leadership roles, and actions were taken to enable women to manage family responsibilities alongside work commitments. This should be commended and encouraged in other projects. Overall, a gender and social inclusion analysis undertaken early during project implementation, and a targeted gender strategy, may have helped contribute to more strategic gender outcomes.

## Key findings (*cont.*)

5

### How did management arrangements impact delivery of the project?

**The multidisciplinary nature of the project team was a key strength and was critical in supporting achievement of a range of project outcomes**. While this could have created division within the project, it appears to have been managed well. Having members of the project team based in-country was also widely regarded as a critical success factor. The project adopted an action-research methodology which involved an annual review and planning process. This process could have been strengthened by giving further attention to the broader theory of change underpinning project activities, and ensuring sufficient monitoring of initial outcomes was undertaken and considered during annual planning.

6

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

**The project aligned well with TADEP objectives and contributed to all 4 objectives to at least some extent**. There were mixed impressions of whether the 5 projects under TADEP had enough commonality to be part of a coherent program – some stakeholders thought they did, while others suggested that the fact they were different commodities and operating in different locations within PNG made collaboration difficult. Having said that, the galip nut project did collaborate with at least 2 other TADEP projects, primarily the Family Farm Teams project, and PNG cocoa to a lesser extent. This involved raising awareness of the potential of the galip nut industry and providing practical training for family farm teams, and investigating *Canarium*–cocoa systems.

Overall, the annual learning events and regular TADEP newsletters were appreciated by stakeholders and seen as providing opportunities for mutual sharing and learning across projects. Some PNG stakeholders noted these could be quite Australian-centric, and more could be done to increase involvement of PNG research partners as equal participants in these events.

## Conclusion and lessons learned

**'Enhancing private sector-led development of the *Canarium* nut industry in Papua New Guinea' has achieved substantial results in relation to raising the profile of a new industry in PNG, and attracting private sector investment in that industry**. While very limited galip nut was processed and sold commercially in PNG when the project commenced in June 2015, by December 2019, 4 private sector processors had entered the market. This has contributed to increased income for smallholder farmers, and created jobs for workers in the processing facilities. Substantially more is now known about the science and technology required to process galip nut within a medium- to large-scale factory setting, and the economic viability of the commercial model. The key strategy used to achieve this outcome was developing and testing products using the NARI demonstration factory to demonstrate what was possible to potential investors. This was considered by some to be an unorthodox approach to research, yet proved effective.

Further research and development interventions are needed to build on the successes of this project to consolidate the gains made, and address gaps in the current knowledge. Many of these have already been taken forward in the Phase 2 project (FST/2017/038), which commenced in December 2019 and will continue until December 2022. Specific recommendations for future research have been documented elsewhere and will not be summarised in this report (Wallace et al. 2020; Markham and Yakuma 2019).

## Lessons learned

General lessons for ACIAR in relation to implementation of research-for-development projects and the programmatic approach include:

1. The action-research approach is an effective methodology for allowing projects to adapt to changing contexts and iteratively use research findings to inform project interventions. It could be enhanced by encouraging stronger line of sight to the project's theory of change, and by enabling more flexible reporting formats. In addition, consideration should be given as to whether more substantial changes to project objectives are permissible and how these would impact contracting arrangements.
2. Developing and testing new products within a commercial setting was an effective way of stimulating private sector interest and investment within a new industry. This approach appeared to be fairly unique within ACIAR-funded projects. There would be value in sharing the strengths and challenges of this approach more broadly with ACIAR research networks to encourage adoption of this approach in other contexts.
3. Capacity-building activities need to be accompanied by stronger attention given to monitoring their effectiveness and outcomes throughout implementation. Consideration should also be given to the sustainability of capacity-development activities, and whether there are opportunities to build the capacity of existing extension workers (either government or non-government) to ensure knowledge generated through the project is shared widely.
4. A multidisciplinary team was a key strength of this project – this should be encouraged, but needs to be accompanied with strong project leadership (as in this project) to ensure the project team remains cohesive.
5. Gender analysis, social inclusion analysis and development of a targeted gender equality and social inclusion strategy would assist projects in developing a more strategic approach to influencing gender equity and women's empowerment, and ensuring people with disability and other marginalised groups can also benefit from the project. This needs to be monitored during implementation.
6. Wherever possible, in-country members of research teams should be supported to receive formal research qualifications (such as a Masters degree or PhD) through project implementation, alongside gaining practical skills.
7. Programmatic approaches such as TADEP are valuable to enable broader sharing and learning across projects. Collaborative research grants were particularly effective in allowing meaningful collaboration, and appeared to produce good outcomes for limited cost. Consideration should be given to ensuring in-country research partners are seen as equal contributors to these programs. This could be achieved by ensuring good representation on steering committees or in other governance structures. In addition, the programmatic approach could support a more strategic approach to building capacity of key in-country stakeholders (particularly when these stakeholders are involved in multiple projects).

# 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 12 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 galip nut 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 12** 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 *Canarium* 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 'Enhancing private sector-led development of the *Canarium* industry in Papua New Guinea' (FST/2014/099), known as the galip nut 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 programmatic evaluation is ACIAR staff with direct responsibilities for programs and/or their constituent projects. This includes Canberra-based research program managers and country network managers and coordinators.

# Methodology

## Data collection and analysis

Evaluation data was primarily drawn from existing project reports and reviews, supplemented by 9 semi-structured interviews with key stakeholders. Stakeholders were intentionally selected in consultation with Australian Centre for International Agricultural Research (ACIAR) and the project leader (see Appendix 4.1). Interviews were conducted online using Zoom, 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 13). In addition, economic and gender equality outcomes were assessed in line with the project design. Preliminary findings were shared and tested in a project verification workshop involving key project stakeholders and ACIAR. 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 routine project reporting, with only a limited number of interviews completed. 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.

Conducting interviews via Zoom or phone provided limited opportunity to build rapport with interviewees, and in some cases, poor phone/internet connections disrupted interviews and may have limited understanding.

Undertaking community-level consultations or impact assessment was beyond the scope of this evaluation. Given no systematic impact assessments or independent evaluations have been undertaken of the project, there is limited evidence of the impact project activities have had on communities. These gaps in evidence have been highlighted throughout the report.

**Table 13** ACIAR project outcome assessment terminology

| Outputs | Next users | Outcomes |
|---|---|---|
| **Scientific knowledge:** New knowledge or current knowledge tested in other conditions, locations, etc. | • Individual scientists/researchers/ agricultural professionals<br>• Individuals responsible for the management of research or a government institution<br>• 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<br>• Public and private extension service providers<br>• Public policy actors<br>• Public and private value chain operators<br>• Consumers | **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 | | |
| **Practices:** New practices and processes | | **Capacity built:** Project partners or stakeholders use enhanced capacity to do something differently |
| **Policy:** Evidence for policy formulation | | **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 |
| **Capacity building:** Short courses, academic training, coaching and mentoring | | |

## 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.

Inside a galip nut seedling nursery.
Photo: Conor Ashleigh, ACIAR

# Overview of project

| Project number | FST/2014/099 |
|---|---|
| **Project title** | Enhancing private sector-led development of the *Canarium* industry in Papua New Guinea |
| **Collaborating institutions** | University of the Sunshine Coast<br>Griffith University<br>The University of Adelaide<br>PNG National Agricultural Research Institute (NARI) |
| **Project leaders** | Professor Helen Wallace, Griffith University (formerly University of the Sunshine Coast)<br>Dr Birte Komolong, NARI<br>Tio Nevenimo, NARI<br>Craig Johns, The University of Adelaide<br>Theo Simos, The University of Adelaide |
| **Project duration** | June 2015 to December 2019 (following 12-month extension) |
| **Funding** | AUD3.5 million |
| **Countries involved** | Australia and Papua New Guinea |
| **Commodities involved** | *Canarium* (galip nut) |
| **Related projects** | FST/2010/013 |

## Context

Nuts have huge potential to improve the livelihood of the rural poor in developing countries. They have excellent nutritional value and can be stored for long periods and therefore can improve food security. *Canarium indicum* (galip nut) is an agroforestry tree in eastern Indonesia and the Pacific that produces edible nuts and timber. The tree has been domesticated in traditional agricultural systems in Papua New Guinea (PNG) for over 6,000 years. It is grown mostly in smallholder blocks, or harvested from the wild.

Galip nut has been the focus of efforts by donor agencies to commercialise the industry in PNG and the Pacific. In PNG, approximately 250,000 elite trees have been produced using various donor funds, and distributed to smallholders and cocoa plantations over the past 4 years. Most of these have been planted in East New Britain (ENB) with a small number going to West New Britain. At the commencement of the project there was no commercial market or processing factory for these nuts.

Women conduct the majority of galip nut growing and trading activities, including nut cultivation, harvesting, processing and selling. However, prior to the project women simply sold the raw nuts in village and roadside markets as there were no reliable commercial markets for value-added products. Earlier work undertaken by ACIAR developed appropriate technologies for value-adding, but a pilot nut processing facility at NARI in ENB (established with European Union funding) was only utilised on an ad hoc basis.

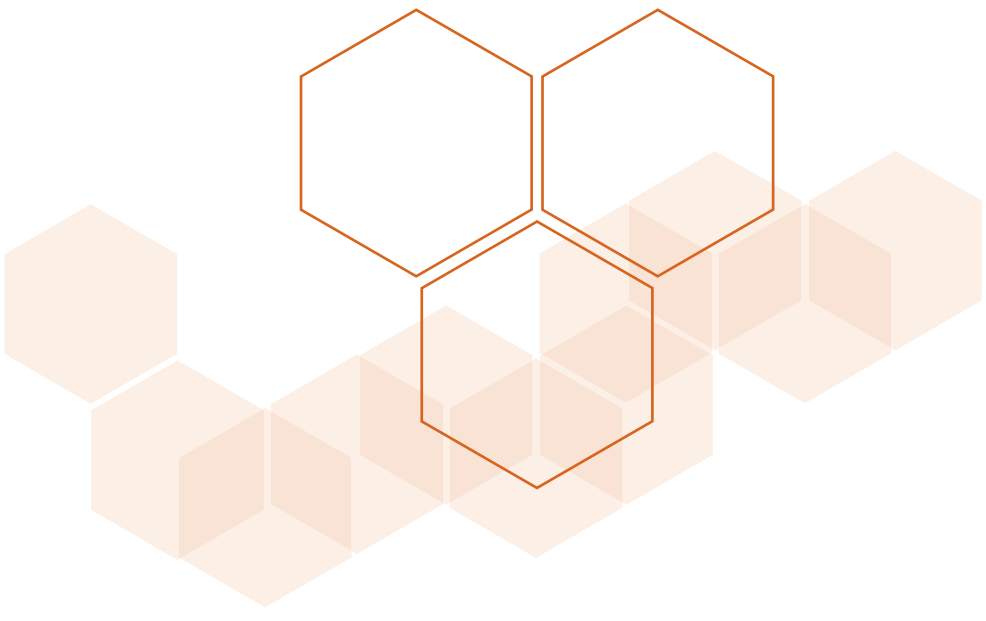
The galip nut industry has great potential for expansion and a strong industry will improve livelihoods for rural smallholders in PNG. However, the galip nut industry urgently needs more private sector investment to grow the industry, utilise the nut resources coming on stream and improve access to distant markets. The galip nut project was designed to address these needs.

## The project

This project (FST/2014/099) sought to expand markets and processing of galip nuts in ENB by strengthening private sector capacity and engagement using nuts from existing trees. The aim of the project was to **accelerate private sector-led development of the emerging *Canarium* (galip) nut industry in PNG and facilitate the development of a public–private partnership based around the NARI pilot processing plant in ENB**.

The objectives of the project were:

1. To assess the needs of the private sector to participate in the *Canarium* industry.
2. To develop and undertake research-based interventions that address the needs of the private sector including smallholders, small-scale entrepreneurs (especially women) SMEs, and large-scale processors.
3. To develop an appropriate commercial model for a medium-scale value-adding factory for the *Canarium* industry.
4. To create a model for public–private partnerships in the *Canarium* industry in PNG.



# Findings

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

In 2016, consultancy firm Strategy, Evaluation, Engagement for Development (SEE4D) was engaged by the Australian Centre for International Agricultural Research (ACIAR) to assist the project team to develop an impact pathway (theory of change) for the galip nut project, and prepare a monitoring, evaluation and learning (MEL) framework (Roberts 2016). The resulting impact pathway and MEL framework were very detailed and possibly too complex for the project team to engage with. It appears that this pathway and the MEL framework were not widely used by the team, except as a reference point for the team leader during reporting.

For the purposes of this evaluation, the evaluation team has further refined the impact pathway developed in 2016, taking into account the project objectives, activities and verbal descriptions of the strategy adopted by the project team to reach the project's goals. Through this process, it became apparent that while an impact pathway or theory of change was not explicitly part of the project's lexicon, the project team did have an underlying strategy which could be articulated, linking various activities with higher-level outcomes or objectives. The theory of change describes that strategy below.

### Description of the theory of change

The aim of the project was to accelerate private sector-led development of the emerging galip nut industry in Papua New Guinea (PNG). The central strategy to achieve this was to use the demonstration factory at the National Agricultural Research Institute (NARI) to refine galip nut processing strategies, develop trial products and test these in the market. This was designed to demonstrate what was possible to potential medium- and large-scale private sector investors and therefore attract investment. A separate stream of activities was undertaken to stimulate involvement of women smallholder farmers and small-scale enterprises in processing and sale of value-added galip nut products in local markets, in addition to supplying galip nut to larger-scale processors.

A high-level summary of the theory of change is (also presented visually in Appendix 4.2):

- If scientific and technological advances can be made in the processing of galip nut, sale of value-added galip nut products can become a viable industry and attract private-sector investment. For this to take place, these scientific advances are needed:
  - Finding efficiencies in processing methods to increase production and reduce costs.
  - Extending shelf life (through improved drying technologies, processing and packaging).
  - Researching nutritional value and impact of different processing options on nutritional properties.
- Private sector investors need to have confidence in the potential industry. If galip nut products can be successfully produced and sold in the marketplace in PNG and prove to be profitable during pilots, this will increase confidence of private sector investors and encourage investment. For this to take place:
  - Pilot products ready for commercial sale need to be developed using the NARI demonstration factory.
  - Suitable market connections need to be made with wholesalers and retailers to enable distribution and sale of pilot products.
  - Appropriate price points need to be determined through economic analysis to maximise profitability, and this information shared with potential investors.
- If interested private sector investors can visit the NARI demonstration factory to see galip nut processing in action, and access technical and financial information about establishing their own processing line, this will assist them in starting their own processing. This requires:
  - relationships to be established with the private sector
  - tours/open days at the factory to share knowledge and expertise
  - information products available to share with potential processors.

- Increased commercial processing of galip nut will result in increased demand for raw/unprocessed galip nut from local smallholder farmers. This will contribute to increasing the income of PNG local farmers (particularly women). This requires:
  - knowledge of the available galip nut supply, including both wild and elite varieties
  - farmers to understand the type and quality of nuts required by the factory/private processors, and where and how to sell their produce
  - an attractive price point for farmers.
- Smallholder farmers and small medium enterprises (SMEs) can increase their income by undertaking their own processing and selling value-added galip nut products in the market. This requires:
  - knowledge of processing techniques, and the right skills and equipment to undertake processing
  - knowledge of the types of value-added products that can be produced and sold locally.

## Analysis of the theory of change

**The central theory of change regarding stimulating medium- to large-scale private sector development of the galip nut industry was highly appropriate to the context**, where one of the main barriers identified in attracting private sector investment was scepticism as to the potential of the industry (Young 2017). Testing and demonstrating what was possible, and refining processes to improve efficiencies along the way, was a logical approach to addressing this challenge and proved an effective strategy to achieve results.

By design, the project sought to work across all levels of the value chain simultaneously. This was seen by the project team as critical to ensure that smallholder farmers currently selling produce in the local markets were not disadvantaged by commercial developments. While this is important, it did result in the project undertaking many separate small activities, which didn't always have apparent outcomes. There is often a trade-off between addressing the various facets of an issue simultaneously but potentially spreading resources too thinly; versus focusing on a smaller number of issues and addressing these well, but with the risk of doing harm, or missing opportunities to 'do good' through less central activities.

**A number of activities under Objectives 2 and 4 certainly seem to be less central to the theory of change, and it is questionable whether these were needed to help the project achieve its overall goal**. One of the challenges with activities under Objective 2 was that the original design assumed a greater number of existing SMEs would be available, but project stakeholders reported that these numbers did not exist in the way the design envisaged. This resulted in a shift to focusing more on smallholder farmers. However, that too had its challenges. Training activities were deliberately demand-driven, however in some cases, this meant activities strayed from focusing on galip nut at all. For example, training on producing jams and cordials from other harvested fruit, and training in coconut oil production, did not have a clear line of sight to the project's theory of change. The assumptions around how training activities would prompt changed behaviours with smallholders also did not hold true, in that training and mentoring did not produce the change in practice foreseen in the project design. Further work is needed to unpack the barriers to uptake of value-adding techniques amongst smallholders and small-scale entrepreneurs within the PNG context.

Objective 4 to 'create a model for public–private partnerships in the *Canarium* industry in PNG' and related activities was also not central to achieving the overall aim of the project. While technically this objective formed part of the official project aim, it appears this was more of an add-on to meet a political imperative around public–private partnerships (PPPs) and the need for NARI to offset some of its operating costs, rather than being a central part of the theory of change. It is unclear how activities in this area align with bigger picture goals of stimulating private sector investment.

**In contrast to some other ACIAR projects, limited attention was given to the policy enabling environment, or the role of government departments and extension workers in supporting growth of the new industry**. Brief mention of the role of government departments is noted under Objective 4 of the project design, where one of the activities was to 'build capacity of NARI and relevant government departments in markets and agribusiness skills to support the growth of the private sector'. It does not appear that any government departments (beyond NARI) were actively engaged in the project. Similarly, where other ACIAR projects have focused on building the capacity of extension workers or peer educators, training in this project was largely provided directly by the project team. This was understandable given the nascent nature of the galip nut industry in PNG (in contrast to other commodities), however additional focus on this area would be valuable in future projects to increase sustainability of the emerging industry.

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

### Outputs

*Scientific knowledge*

**The project completed a broad range of studies to assess the needs of the private sector to participate in the galip nut industry**. This included investigating:

- the existing scale of market participation by women smallholders, SMEs and large-scale processors
- mapping the galip nut resource supply (although this proved difficult to assess and requires further investigation) (Markham and Yakuma 2019)
- barriers to scaling up sale and processing of galip nut at different levels of the value chain
- the priority training and extension needs of different actors in the value chain.

These studies were used to develop knowledge products, and also informed other aspects of project decision-making.

**The project researched and refined appropriate methods for extending the shelf life of galip nut products, and investigated the nutritional composition of galip and soil nutrient concentrations of *Canarium*–cocoa plantations**. Experiments were undertaken to determine how different storage options and processing affects kernel quality and shelf life of kernels, and how this can be extended. Galip nuts are regularly sold fresh in markets with a limited shelf life of 72 hours, whereas the project was able to extend shelf life to up to 12 months when processed and packed correctly (Wallace et al. 2020). Nutritional analysis included comparing the nutrients of galip nut with other popular nuts including almond, cashew, pistachio and peanut. Information was used to develop accurate nutrition labelling on products and inform decisions on the maturity of nuts purchased from suppliers. Nutrient content of by-products was also examined to explore its suitability for use as livestock feed.

Using the knowledge gained through these studies, **the project developed, trialled and refined a range of value-added galip nut products at the NARI factory and developed a commercial model for production**. This included investigating consumer preferences about taste, new market opportunities, packaging and labelling, and retail price points. Products were first tested in the East New Britain (ENB) market during 2015–16. Demand for the products was strong and the factory received many repeat orders (Wallace et al. 2016). After market analysis, a decision was taken to focus on a premium product. New products with premium packaging and labelling were developed and produced under the brand of the Galip Nut Company. These were launched in ENB in May 2018 and Port Moresby in July 2018 at 3 CPL supermarkets and Prouds Duty Free at Jackson Airport. **These products proved so popular the factory could not keep up with demand in 2018 and 2019**, with the products being out of stock for long periods (Wallace et al. 2020). Financial analysis of the commercial model was undertaken at all stages of the project and used to inform operational and strategic decisions (Wallace et al. 2020).

*Technology*

**The project investigated how to improve key stages of galip nut processing to improve efficiency and maximise quality within a medium- to large-scale factory setting**. In doing so, it developed and introduced a range of new technologies at the NARI factory. This was an iterative process, whereby technologies and processes were trialled and adapted during each processing season as bottlenecks were identified. Key innovations included:

- Construction of a solar-assisted dryer, which allowed for better control and analysis of moisture levels than using the sun directly (which resulted in substantial product losses during the 2018 season).
- Refinement and testing of a mechanical cracker, which was imported and then modified locally to suit galip nut.
- Introduction of a mechanical de-pulper to replace the practice of de-pulping by trampling with feet.

Collectively, these technological innovations **increased the capacity of the NARI factory and contributed to it more than doubling production of processed galip nut products each year**, to a total of over 2.4 tonnes in the final year of the project (Wallace et al. 2020).

> *'[Technological innovations] helped us to process more nuts, more efficiently and to a better quality.'*
>
> – NARI representative

A range of technological advances aimed at small-scale entrepreneurs were also developed and tested in relation to cracking, de-pulping, drying and processing. Two key advances were a solar dryer and nutcracker. These were both designed to be affordable and produced locally from available materials so they could assist small-scale processors to add value to galip nut products and other foods.

### *Practices*

The project developed a range of information products to improve food safety practices and food handling, and share information about the galip nut industry. These targeted different levels of the value chain:

- A food safety booklet targeting female entrepreneurs in the market was produced and distributed.
- Packaging demonstrations were undertaken with SMEs (using locally available materials such as second hand jars) to encourage appropriate storage of products.
- Factory standard operating procedures were developed and produced to assist SMEs looking to move into the industry.
- An information manual for processors interested in investing in the industry was produced to document lessons learned and best practices in a user-friendly manner.

### *Capacity building*

Capacity building was originally designed to be provided to both women smallholders and SMEs on galip nut processing and value-adding, however the project was unable to find SMEs to work with at the beginning of the project, and so adapted activities in early years to focus primarily on smallholders.

**Following a training needs assessment, an extensive range of training was provided to women smallholders and small-scale entrepreneurs in ENB and surrounding areas on a diverse range of topics**. This involved workshops with 10–40 participants, both in the community and at the NARI factory. Training was often very practical, including demonstrations of new technologies (such as a solar dryer) and opportunities for participants to try these for themselves.

Training participants included members of the ENB Women in Agriculture Cooperative Society, smallholder families, local market stallholders identified as selling galip nut, and members of the Galip Club.[8] Training was also undertaken in Bougainville and New Ireland in collaboration with the Transformative Agriculture and Enterprise Development Program (TADEP) Family Farm Teams project. While women were the primary target, some men did attend various events.

Topics were demand-driven and covered a range of subjects, including:

- Small-scale galip nut growing and processing techniques, including drying (using an oven or solar dryer), cracking, de-pulping, packaging, labelling and storage.
- Sanitation, hygiene and safe food handling.
- Creation of value-added products, such as cooking with galip nut, making jams and cordials, and coconut oil production.
- Farm management and tree spacing.

Reports and stakeholder interviews indicate that the training was widely appreciated by participants and helped to strengthen their knowledge on processing techniques and value-added products that could be produced.

**Stalls were set up and awareness activities undertaken at large festivals and events to build awareness of the type and quality of nuts that could be sold to the factory**. This included stalls at the World Environment Day celebrations each year, the ENB Fire Dance Festival and Kokopo Agricultural Show. It is estimated that several hundred people were reached through each of these events (Wallace et al. 2020).

More targeted business development mentoring and support was provided to women entrepreneurs, and technical advice to emergent processors in the later years of the project as they showed interest and entered the industry (Wallace et al. 2017). This included technical advice on processing stages such as drying, de-pulping and packaging, and food safety and hygiene. Interested processors visited the NARI factory regularly, and were able to use the NARI factory to run tests or request the project team to check the quality or their products.

8 The Galip Club is a group of farmers participating in the galip nut industry. The club is facilitated by Devine Management Services, which purchase galip nut from farmers, and in return provide training and other capacity-development opportunities to members.

**A notable strength of capacity-building activities with smallholders and SMEs was the practical demonstration of products and approaches and the flexible, contextually driven approach**. For example, drying techniques and packaging options shared with smallholders were adapted from location to location to suit the context and local resources available. Given the lack of SMEs available early in the project, the project team also did well to adapt their approach and then introduce these activities later once sufficient interest and demand had been built. Training activities were also very demand driven. This is a key strength but also meant that topics occasionally strayed from the specific objectives of the project.

In 2016, a work experience program was developed in response to concerns at the lack of opportunities available to young people. This provided an opportunity for young people to gain experience in the workplace, and downstream processing and marketing of galip nuts. Twelve young people identified by ENB Women and Youth in Agriculture Cooperative participated in the 2-week program. Feedback from the program was very positive, with participants indicating that it had broadened their knowledge and would inform what they do in the future. From the 12 participants, 2 have found employment in the galip nut industry, and several others are now pursuing further study in the area of agriculture and related fields (Wallace et al. 2020:51).

**The project team also built capacity of NARI throughout implementation**, training staff in using new technologies and equipment, as well as plant hygiene and plant maintenance required to run the factory and maintain high-quality standards (Wallace et al. 2020:23). This was undertaken through ongoing one-on-one mentoring and support with Australian members of the project team, and more structured training courses. NARI staff also developed skills in market assessment and product development processes. While NARI staff appreciated the capacity-development opportunities provided, some stakeholders indicated that these focused too much on technical capacity to operate the factory, rather than broader research skills. Multiple stakeholders also commented on the missed opportunity for the project to contribute to formal qualifications for PNG team members (such as Master degrees or PhDs), despite the project contributing to numerous such qualifications for Australian-based team members. This is something that should be prioritised in future projects, noting that it is not a straightforward process. PNG counterparts would need to be accepted into a suitable university course either in PNG or through an Australian scholarship arrangement, with sufficient lead time for the academic qualification to be built into the ACIAR project design.

> *'There is a need to build in post-graduate study courses into the project proposals, where NARI staff have supervision through the hosting university.'*
>
> – Project team representative

***Policy***

Policy influence was not a strong focus of the project. One activity that had potential influence was the development of a Canarium Industry Roadmap. This was prepared during the proposal development stage as a result of stakeholder consultations and then refined towards the end of the project. Development of the roadmap appeared to be a process of consulting with stakeholders to identify key knowledge gaps, and areas where further assistance was required to inform research activities, rather than developing a strategic plan for development of the sector. This was highlighted in the final project review, which noted that while the roadmap was informative, it would have benefited from being a more strategic document, which outlined a vision for the galip nut industry in PNG together with a process on how to achieve that vision (Markham and Yakuma 2019).

## Adoption

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 14.

### *New scientific knowledge*

#### Knowledge on extending product shelf life and nutritional composition

Knowledge generated on extending product shelf life and the nutritional composition of galip nut products was adopted by the NARI demonstration factory and influenced decisions on processing methods and the type of packaging used. Beyond NARI, one of the private sector processors, Devine Management Systems (DMS), did appear to adopt many of the scientific advancements in galip nut processing and storage, noting that this meant there was far less wastage. Limited evidence is available of how other final users adopted the new knowledge generated by the program.

#### Commercial model for value-added galip nut products in PNG market

The action-research methodology used for this component of the project meant that staff at NARI were closely involved in implementing and testing the commercial model as it was developed. This resulted in strong adoption of the model by the NARI demonstration factory. NARI produced a variety of products, including raw and roasted galip nut kernels and oil, which were sold into commercial markets in ENB and Port Moresby. In 2018–19, the last year of the project, total revenue from all sales from the factory was PGK246,222, equivalent to AUD103,413 (Wallace et al. 2020:47). Financial and market analysis of the model was positive, with farmers showing interest in selling galip fruit at the prices offered, and products generating strong repeat demand and producing reasonable gross profit margins (Wallace et al. 2019:16).

**Table 14** Levels of adoption of key project outputs

| Category | Output | Users | Level of adoption |
|---|---|---|---|
| **New scientific knowledge** | Knowledge on extending product shelf life and nutritional composition | • NARI factory is an initial user<br>• Other processors are final users | Nf* |
| | Commercial model for value-added galip nut products in PNG market | • NARI factory is an initial user<br>• Other processors are final users | Nf* |
| **New technologies or practical approaches** | Technology and capacity building for small-scale processing and value-added galip nut products | • Smallholders and small-scale processors are initial and final users | O / N |
| | Capacity building on quality of nuts to sell to NARI factory | • Smallholders and SMEs are initial and final users | NF |
| | Technology and capacity building for medium- to large-scale processing of galip nut | • NARI factory is an initial user<br>• Other processors are final users | Nf |
| **Knowledge or models for policy and policymakers** | Roadmap for *Canarium* industry | • Project team are initial users<br>• Government and donors are final users | N |

Notes:
* Nf – limited evidence available of 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

**Having NARI (a public research institute) enter the market as a commercial player was considered by some stakeholders as an unorthodox approach, stretching the boundaries of what was commonly understood as research**. This did cause some tension throughout implementation. Some industry stakeholders suggested NARI had an unfair advantage in the market, as its products received substantial financial backing from Australia. Questions were also raised as to whether NARI potentially faced a conflict of interest between the imperative to share knowledge and research findings with potential private sector investors when these same investors would then become commercial competitors to NARI. It is clear how this could present a conflict of interest if NARI did seek to be a long-term commercial player in the galip nut industry, however consultations with NARI representatives do not support this finding. Key stakeholders confirmed that NARI continued to be highly transparent throughout the project, sharing research findings and technological advances with private sector processors, and doing what it could to build up other processors, regardless of how this would impact its own sales. Furthermore, while NARI has benefited financially from selling products commercially, and has indicated an intention to continue production at the factory, at least in the short-term, the primary goal of this arrangement remains supporting broader development of the industry rather than its own commercial gain.

The entry of 4 private sector players into the galip nut industry during 2018–19 (one in a partnership with NARI, and 3 processing and selling products independently) is the best indication of adoption of the commercial model by final users. Limited evidence is available about the specifics of what aspects of the commercial model have been adopted, although the project team indicated that aspects such as the price points of products, packaging and distribution points have been adopted.

#### *New technologies or practical approaches*

Some examples are available of women's groups or smallholders making and selling galip nut products immediately following training, however **there is limited evidence of widespread adoption of the new galip nut processing or value-adding practices amongst smallholder farmers and small-scale entrepreneurs**. The end of project review noted:

> *The project invested considerable effort in community-level capacity building but so far there seems to be only limited uptake of improved processing technology and value-adding opportunities.*
>
> – Markham and Yakuma 2019

While no systematic assessment of uptake has been undertaken, stakeholders shared a similar sentiment, noting that no matter what strategies the project adopted, smallholder farmers and small-scale entrepreneurs continued to be reluctant to adopt new processing strategies and instead continued to sell existing products at the markets. There were some reports of improved hygiene practices, such as more frequent handwashing following training, but again, there is insufficient evidence on how widespread this uptake was.

**Efforts to improve the quality of nuts sold to the NARI factory by smallholder farmers appear to have achieved good results**, with project reports and multiple stakeholders noting that the quality improved over the life of the project. Whereas in early years farmers brought all types and sizes of galip nut to the factory for sale and many nuts had to be rejected, in later years the quality of product sold to the factory was higher and more consistent.

> *'At the start they were just giving us any type of nuts. As we continued to do training and awareness on the specific type of nuts we wanted we saw a change – people started giving us quality nuts.'*
>
> – NARI representative

### Technology and capacity building for medium- to large-scale processing of galip nut

New technologies and practices introduced by the project were widely adopted by the staff in the NARI factory. Most of these are reported to still be used after the project's completion (with the exception of the mechanical cracker which needs further adjustment by an engineer). **This greatly increased the throughput capacity of the factory, which was able to go from processing less than one tonne of raw material in 2014 to 207 tonnes in 2018**.

NARI staff have used their increased knowledge and skills to undertake a range of activities, for example:

- Analysing product samples for quality and providing testing services to other export processors.
- Performing leaf and soil sample processing and litter decomposition experiments.
- Using the CommCare[9] application to design several surveys.
- Delivering food safety and hygiene workshops for local smallholders and SMEs (Wallace et al. 2020).

9 CommCare is a mobile data collection platform designed for low resource settings.

Limited information is available about the extent to which specific technologies or practices were adopted by SMEs or large-scale processors as a result of the project. **DMS appeared to adopt a range of practices, including new drying, de-pulping and roasting techniques, and new food safety and hygiene practices**. BISI Trading is also reported to have adopted new drying and roasting techniques based on the project's advice.

Interestingly, 2 emerging processors, Niugini Organics and BISI Trading, have modified the NARI factory's processing model, buying nut-in-kernel which has been hand-cracked in the community rather than nut-in-pulp. This is purchased from farmers at the higher price of PGK15–20 per kilogram, rather than nut-in-pulp at PGK1 per kilogram. The project team has avoided this model because of concerns about maintaining quality control when the nuts have already been cracked, although acknowledges the livelihood benefits this would bring to smallholders (Wallace et al. 2019). It remains to be seen which model proves to be more viable.

***Knowledge or models for policy and policymakers***

The project team used the Canarium Industry Roadmap to inform research activities, which helped to ensure they were grounded in the needs and priorities of key stakeholders. However, there is no evidence that this document has been used by others within the industry.

### Strengthening the galip nut value-adding processes of DMS

Dorothy Luana from DMS became engaged with the project team during the last 2 years of project implementation. DMS was already processing and selling galip nut products on a small scale, but was interested to learn better processing techniques. The project team provided information on a range of processing techniques such as drying, roasting and de-pulping, as well as training on food handling, hygiene and new galip nut recipes. The team also provided technical assistance to troubleshoot issues and conducted testing on DMS products to ensure their quality.

Dorothy adopted many of the new processes shared by the project, including adapting her drying, de-pulping and storage techniques, and changing her food handling practices. She noted that this helped to systematise her production, which resulted in her discarding far less spoiled product. She said, 'Through [the project] I was able to improve the quality of my product and I was really motivated to take it to the next stage.'

She went on to construct a commercial kitchen, and in doing so, increased her production capacity substantially. Dorothy also attended training and conferences with the project and shared her experiences to encourage others to take up galip nut processing.

## Outcomes

### *Scientific achievement*

**Substantially more is known about galip nut processing in PNG, and the impact different processing techniques have on nutritional qualities and product shelf life**. This knowledge has been used to develop and test new value-added products which proved to be desirable within the market. New technologies have been introduced within the NARI factory, which have improved the efficiency of processing and enabled sale of value-added products to become more economically viable. This knowledge has been shared through papers in scientific journals, and with other potential processors through factory tours, and informal mentoring and networking.

### *Capacity built*

The key capacities built through the project are summarised in Table 15. These have been critical in underpinning the other outcomes achieved by the project.

### *Economic outcomes*

**By the conclusion of the project, 4 private sector processors were processing and selling galip nut products commercially**. Three of these processors were sourcing and producing their own value-added product separately to the NARI factory, while the fourth, Equanut, entered into a partnership arrangement with the NARI factory (Wallace et al. 2020:8). The emerging industry has an estimated farm gate value of PGK300,000–400,000 per annum. Given the lack of interest from SMEs and large-scale processors at the beginning of the project, this is a significant achievement. While further work may be needed to develop a sustainable industry, there appears to be substantially more interest and willingness to engage in galip nut processing than when the project commenced.

Equanut entered the market in 2018–19 in a PPP with NARI. Equanut is a New Zealand-based investor with co-funding from the New Zealand Ministry of Foreign Affairs and Trade. It entered into a factory-sharing arrangement whereby it would source and crack the galip nut and then pass to NARI staff for packaging. Creating a model for PPPs was one of the 4 objectives of the project, although this does not seem central to the project achieving its overall goal. The establishment of the partnership with Equanut helped address some of the inefficiencies in the factory operations, but also appeared to create some displacement of NARI staff, and introduced confusion over roles and responsibilities in factory operations (Markham and Yakuma 2019). Equanut was involved in processing during the 2019 season, but then pulled out of PNG with the rise of COVID-19 in early 2020. As yet, no other commercial processor has taken its place.

The demonstration factory has been an important source of revenue for NARI, which faces significant resource constraints. While this was not the primary objective, the revenue has assisted the research institute to meet some of its operating costs.

**Table 15** Capacity built relevant to project objectives

| Who | Skills and knowledge |
|---|---|
| NARI | • Use of new technologies and equipment required to run the galip nut factory<br>• Plant hygiene and plant maintenance<br>• Quality testing and techniques for maintaining high-quality standards |
| Medium- to large-scale processors | • New galip nut drying, de-pulping and roasting techniques<br>• New food safety and hygiene practices<br>• Knowledge of commercial models for production |
| Women smallholders and small-scale entrepreneurs | • Small-scale galip nut growing and processing techniques, including drying (using an oven or solar dryer), cracking, de-pulping, packaging, labelling and storage<br>• Sanitation, hygiene and safe food handling<br>• Creation of value-added products<br>• Farm management and tree spacing |

### *Community outcomes*

Prior to the project, there were very few opportunities for local smallholders to sell unprocessed galip nut to private processors. **Over the life of the project, the NARI factory directly purchased over PGK400,000 of unprocessed galip nut from smallholder farmers and entrepreneurs in ENB and surrounding areas, supporting the livelihoods of over 1,300 farmers by the end of 2018** (Table 1, Wallace et al. 2020).

In addition, the other private sector investors that entered the industry in 2019 were also purchasing nuts from local smallholders, with an estimated farm gate value of PGK300,000–400,000 per annum. A number of intermediary actors and microenterprises have also now emerged, purchasing galip nut from farms and then transporting and reselling it to the NARI factory.

With the different processing models now in operation, there are now 2 main income generating options for smallholder farmers: selling nut-in-pulp to the NARI factory at PGK1 per kilogram, or manually cracking the nut and selling it nut-in-kernel for PGK15–20 per kilogram to the other processors. Stakeholders suggest that some farmers choose to sell both products – cracking some of the galip nut themselves to sell for a higher value, and then also selling the nut-in-pulp with any leftover supply. While no impact studies have been completed, examples of the impact this increased income has had on farmers are included in project reports. These suggest that women are using the additional income from selling galip nut to the factory to meet general family expenses, such as covering the costs of school uniforms and buying medication for unwell children (Wallace et al. 2019:29).

The emerging industry is also estimated to have created approximately 40 formal jobs across the processing facilities in ENB and New Ireland (Wallace et al. 2020).

### *Environmental outcomes*

Project reports indicate that there may be some positive environmental outcomes resulting from the increased market opportunities for galip nut, and research on the *Canarium*–cocoa cropping system, as this will stimulate more investment in planting galip trees, resulting in more carbon sequestered and greater resilience of the cocoa cropping systems.

A possible negative environmental impact of the project is waste from factory de-pulping as the current process requires large volumes of water and produces a slurry of fruit pulp. Further work is needed to investigate methods of on-farm de-pulping and composting of the fruit pulp to turn the waste into an opportunity, along with more efficient methods of large-scale de-pulping (Wallace et al. 2020:65).

**Table 16** Galip nut purchased by the NARI factory each year

| Year | Nut in pulp purchased (PGK101.5 per kg) | Number of farmers selling to the factory | Farm gate value |
|---|---|---|---|
| **2014** | Small volumes (under 1 tonne) | N/A | N/A |
| **2015** | 11 tonnes | 243 | PGK10,669 |
| **2016** | 25 tonnes | 647 | PGK26,349 |
| **2017** | 65 tonnes | Women selling direct, and entrepreneurs collecting from farmers and selling to factory | PGK65,000 |
| **2018** | 207 tonnes | Women selling direct, and entrepreneurs collecting from farmers and selling to factory | PGK310,500 at factory gate |

*Source:* Wallace et al. 2020:48

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

### Factors influencing adoption and outcomes

Table 17 provides key findings against the categories and factors influencing adoption and outcomes as part of the ACIAR evaluation framework. It should be noted that no systemic research was undertaken about the factors influencing adoption of the project outputs, so the findings below are primarily based on what key stakeholders and the evaluator perceive to be the factors.

**Table 17** Factors influencing adoption and impact

| | Factor | Key findings |
|---|---|---|
| **Knowledge** | Do potential users know about the outputs? | • Not identified as a constraint for this project. Substantial time was taken to raise awareness of outputs and engage with private sector at all levels. |
| | Is there continuity of staff in organisations associated with adoption? | • Not identified as a constraint for this project. |
| | Are outputs complex in comparison with the capability of users? | • Not identified as a constraint for this project. Outputs for smallholder farmers appeared to be tailored specifically to their needs and manageable within the context. |
| **Incentives** | Are there sufficient incentives to adopt the outputs? | • Lack of incentives were identified as a potential issue for smallholders in adoption of value-added approaches.<br>• For medium to larger private sector processors, a lack of incentives may have contributed to initial reluctance to invest in the industry, however the success of the Galip Nut Company products in the market appeared to address this. |
| | Does adoption increase risk or uncertainty? | • This is potentially a constraint at multiple levels of the value chain. For smallholders and women entrepreneurs, stepping outside of the social norm may pose risks and may have contributed to a reluctance to adopt new approaches.<br>• For medium- to large-scale processors, the nature of galip nut as a new industry poses risks associated with the uncertainty of the commercial viability of the product. Project activities directly sought to address this through the NARI demonstration factory. |
| | Is adoption compulsory or effectively prohibited? | • Not identified as a constraint for these projects. |
| **Barriers** | Do potential users face capital or infrastructure constraints? | • Some smallholders may face capital constraints in adopting new technology. This appeared to effect adoption of the new nutcracker and solar dryer.<br>• This did not appear to be a constraint for medium- to large-scale processors, some of which were already processing other nut products and could re-purpose equipment. |
| | Are there cultural or social barriers to adoption? | • As noted above, smallholders appear to be impacted by social and cultural norms, however further research is required to fully understand this. |

**Demonstrating commercially viable products in the market, particularly in Port Moresby, appeared to have a strong positive influence on prompting private sector investment in the galip nut industry**. The launch of the Galip Nut Company products was widely identified by project stakeholders as a pivotal turning point, whereby potential investors moved from being sceptical about the emerging industry, to showing interest and then actually commencing their own production processes. While only DMS was consulted as part of this evaluation, other evidence is available to support this assertion. Scepticism over the potential of the industry was a key barrier identified in previous projects, and an issue this project specifically sought to address. Despite the project's industry engagement efforts, private sector investors were still wary of investing in the industry prior to the product launches in 2018, and sceptical as to whether the products could be sold at a high price point. This can be seen in the mid-term review report of June 2017 which stated, 'At this stage private sector investors still need to be convinced of the financial viability of producing processed galip nuts commercially' (Young 2017). DMS commenced selling product commercially on a small scale prior to the Galip Nut Company product launches in 2018, however all other processors commenced production following these launches and the success of the 2018 season. The increase in consumer awareness through sales of Galip Nut Company products may also have assisted other entrepreneurs to capture a share of the emerging market.

Getting products on the shelf, at the right price point and in a form that was attractive to consumers was the culmination of a significant body of research work and commercial engagement by the project over the previous 3 years. This was made possible because of:

- the technological advances made in processing at the NARI factory
- engagement with smallholder farmers to ensure a sufficient supply of galip nut to the factory
- refinement of packaging and labelling
- economic and financial analysis
- development of a commercial partnership with CPL supermarkets to distribute and sell products in its retail outlets.

**The multidisciplinary nature of the project team was a critical success factor** in ensuring all these different components were considered and given appropriate attention. In particular, having targeted expertise in financial/economic analysis and marketing to help develop the commercial model and engage the private sector was an important addition to the agricultural science and social science skills within the project team.

The project faced several challenges which also influenced the extent of adoption and impact. One major challenge was **operating the demonstration factory within a public research institute, which is not designed for commercial operations**. Issues around staff rosters and competing staff priorities created workflow issues as staff would become unavailable at short notice. These arrangements were highly inefficient and led to frequent handovers of work between staff (Marham and Yakuma 2019). Lengthy public sector procurement processes also delayed key infrastructure investments, and funding shortfalls within the NARI operating budget led to ongoing issues with unreliable electricity supply and telecommunications, as well as vehicle shortages (Young 2017). Some of these issues were addressed through the partnership with Equanut as it enabled a commercial entity to take over a range of factory processes. However, this arrangement was relatively short-lived and had its own challenges. Co-locating 2 team members from University of the Sunshine Coast in ENB (initially full time, then fly-in fly-out), and the project team's ability to think creatively and solve issues as they arose, were particularly beneficial in overcoming these challenges (Young 2017).

**Another related challenge was determining the most appropriate scale of production at the factory**. This stemmed from difficulties in assessing the supply of galip nut available in the community and the potential demand for products. In 2016, there were concerns about supply of galip nut from farmers, however this eased during 2017 when there was a threefold increase in nut sold to the factory. Then the factory was over-supplied and faced storage issues. In 2018 with the successful product launches in ENB and Port Moresby, the factory was unable to produce sufficient supply to meet demand, resulting in products being out of stock for extended periods. In 2019, challenges with Equanut's mobilisation and a lower yield from farmers again contributed to shortages of products. These challenges in calibrating supply and demand were potentially unavoidable when developing a new industry but may have impacted on economic and financial analysis of the commercial model.

**Uncertainty around continuity of funding for the project also affected the project's implementation and its ability to secure private sector investors**. Earlier delays meant that product launches were planned for 2018, which was in the final year of the project (under the original timeframe). This caused significant anxiety for the project team because there was a danger that new products would be launched into the market just as the project was due to finish and then could not be supported. This held substantial reputational risk for ACIAR and NARI. Fortunately, a project extension was granted and ACIAR made the decision to continue supporting the project's second phase, despite a DFAT decision to discontinue funding. It is also fortunate that commercial distributing partner CPL supermarkets continued to support the project despite the frequent interruptions to the supply of products and uncertainty during this period.

**For smallholder farmers, a range of factors were identified in project reports and consultations which may have limited the uptake of value-adding approaches shared by the program**. These included:

- Women were reluctant to leave their produce in the solar dryer in case it was stolen while drying.
- The cost outlay of the solar dryer and mechanical cracker (although designed to be affordable) were still prohibitively expensive (Young 2017).
- Social stigmatisation and unwanted community attention occurred when people stepped outside of traditional activities, acting as a disincentive (Wallace et al. 2020:35).
- The additional time required to process value-added products is not seen as worthwhile (Wallace et al. 2018).

It is important to note that similar technologies such as the solar dryer have been used successfully in Pacific countries such as Vanuatu (Wallace et al. 2016), so cultural and economic factors unique to PNG may be important to investigate further to fully understand why these approaches were not taken up.

Unripe galip fruit on the tree. Photo: Conor Ashleigh, ACIAR

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

### Gender equity

**The galip nut project showed some awareness of gender and sought to contribute to women's economic empowerment**. The project design noted that women are generally responsible for the majority of galip nut growing and trading activities, including nut cultivation, harvesting, processing and selling. The design indicated that the project would help to foster social inclusion of women because it targets an activity that is often women's domain (Wallace et al. 2019). The primary strategy adopted by the project to promote gender equity was to target women smallholder farmers and entrepreneurs for capacity building and mentoring – to increase their income from selling galip nut to processors and encourage small-scale value-adding of their own.

While women were often the primary focus of capacity-building activities, project team members report learning from the Family Farm Teams (FFT) approach and inviting men in communities to participate as well. This led to a few instances of men showing a greater appreciation for women's role in preparing food, with some noting for example that 'cooking is really hard work' (Wallace et al. 2020). While these examples are positive, they appear to be an unexpected outcome, rather than part of a strategy to encourage reflection on the gendered division of labour within households and how this could become more equitable. Instead, the project worked primarily within the existing gender norms, potentially reinforcing them by focusing capacity-development activities on women. There was limited awareness or monitoring of potential negative consequences that could come from this approach – for example, the potential for increased workloads for women if they took on additional productive tasks within the family but still expected to undertake the majority of reproductive tasks, or potential backlash from spouses if productive work interfered with their domestic responsibilities.

While capacity-development activities around small-scale processing didn't appear to have strong uptake, **the project did contribute to a steady increase in the number of smallholder farmers selling galip nut to the NARI factory, providing a new source of income for these families. Many of these farmers were women**. Examples are available of the positive impact this had on women, although it is unclear how widespread these impacts were. There was also no evidence of the extent to which women who did sell galip nut to the NARI factory could control decision-making on how this income was used.

During implementation, the project made a few decisions which could potentially have had negative impacts for women. The first was when the project commenced selling galip nut commercially in ENB. The project received feedback that their products were potentially competing with the produce women were selling informally in the markets. This was unintentional and was quickly rectified by raising the price of products sold commercially. A second issue related to the model of purchasing galip nut from smallholder farmers for processing. Midway through project implementation, the NARI factory introduced a dual price strategy for how nuts were purchased from farmers. Whereas initially NARI would travel into the community to purchase galip nut at the farm gate, under the new strategy, NARI purchased galip nut for PGK1 per kilogram at the farm gate or PKG1.5 per kilogram delivered to the factory gate. This led to a large increase in factory gate sales, with almost 95% of sales occurring at the factory gate in 2018 (Wallace et al. 2019:6). **While this proved to be more cost-effective, it resulted in a shift from women primarily selling galip nut, to far more men bringing produce to the factory for sale** (Marham and Yakuma 2019). This is likely due to concerns around safety for women when travelling further from home, and challenges with transporting produce to the factory. Further research is needed to determine the impact this has on women and gender relations within families.

Within the project team, consideration was given to promoting opportunities for women researchers to have their work profiled and to take on leadership roles, and actions were taken to enable women to manage family responsibilities alongside work commitments. This should be commended and appears to have had a positive impact on PNG women within the team.

**Overall, the approach to gender equity could have been strengthened by undertaking more in-depth analysis of the roles of women and men within the communities where the project was operating and considering how project activities would influence these**. Future projects should be encouraged to move beyond reinforcing existing gender norms to challenging unequitable division of labour within families and communities, or at a minimum, ensuring they do no harm. Developing a targeted strategy of how the program will achieve this, and implementing ongoing monitoring of potential intended and unintended gender-related consequences is also critical to ensure a 'do no harm' approach.

## Social inclusion

Through consultations with women smallholders, the project team identified disadvantaged young people as another key target audience for capacity development. This was due to high rates of youth unemployment within the area and concerns around a lack of opportunity for youth to gain work experience. In response to these concerns, **the project designed and implemented a 2-week work experience program at the NARI factory which was run once in 2016 for 12 young people who were neither studying nor working**. The young people were identified by the Women and Youth in Agriculture Cooperative Society and gained experience in all aspects of the factory's activities including collecting, buying, processing, packaging and labelling galip nut. Following this program, 2 participants gained employment in the galip nut industry, and several others are pursuing studies in related fields (Wallace et al. 2020). While this activity seemed worthwhile and was well received, it was not part of any broader strategy to support inclusion of diverse groups within the project. **Future projects could consider strategies to ensure youth, people with disability and other groups benefit from project activities**.

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

**The multidisciplinary nature of the project team was a key strength and was critical in supporting achievement of a range of project outcomes**. While this could have created division within the project, it appears to have been managed well and created fertile ground for robust discussion and problem solving as challenges arose. This is testament to the strong leadership of the project leader, who was widely regarded to have managed the overall coordination of the project well, and actively encouraged team members to feel confident in voicing their opinions and actively contributing to discussion.

**The project adopted an action-research methodology which involved an annual review process, whereby activities from the previous year where evaluated and activities for the next year planned in response to emerging research and challenges**. This approach appeared to be implemented well and enabled the team to be responsive to the changing environment. This was particularly important given the nature of the project in attempting to establish a new industry which had many unknowns. Some reports suggest that an annual cycle was not frequent enough and that additional revisions to activities were needed throughout the year as challenges emerged and the project evolved (Wallace et al. 2020). Examples of activities that benefited from adaptive planning included:

- The approach to financial analysis of the commercial model was changed to focus on gross margin analysis. This enabled better identification of inefficiencies in the production process (Markham and Yakuma 2019).
- Financial analysis identified that the purchase of fruit contributed to 49% of the cost of the final product. This was expensive because the purchasing model required the project team to visit villages and collect the fruit directly from the farm gate. Changing the purchasing model to the factory gate reduced this to 31% of the cost of the final product (Markham and Yakuma 2019).

**The action-research process could have been strengthened by giving further attention to the broader theory of change underpinning project activities and ensuring sufficient monitoring of initial outcomes was undertaken and considered in the annual planning process**. This occurred relatively well for activities related to the factory, but was lacking in relation to capacity-building activities with smallholders, which continued to be undertaken despite very limited evidence of their success. In addition, some stakeholders reflected that despite good intentions, the real ability to change the project substantially during implementation was actually quite limited. Adaptions could be made to how individual activities within objectives were undertaken but the overall objectives themselves had to be retained, despite some aspects of these no longer appearing to be relevant. The rigid structure of project reporting was also seen as reducing the extent to which outcomes achieved could be reported.

> *'Adaptive planning was good in theory but there was no adaptability within the reports. We still needed to report against the same objectives. That was one of the most frustrating things – we couldn't really list our real outcomes because they didn't fit in the boxes.'*
>
> – Project team representative

**Having 2 team members based in-country (initially full time, then fly-in fly-out) was widely regarded as critical to the success of the project**. This enabled the Australian project team to develop strong relationships with staff at NARI and more broadly, and also helped the team to build an in-depth understanding of the context and the challenges operating on the ground. Within the NARI factory, this enabled a greater level of one-on-one mentoring and support than would have been available otherwise, and supported real-time problem solving of issues as they emerged. It also enabled the flexible and demand-driven approach to training, as time was taken to understand the priority learning needs of different stakeholders and communities to adapt the approach as needed.

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

**Most project stakeholders were aware of TADEP and its objectives, however, there were contrasting perspectives on the appropriateness of grouping the individual projects under TADEP**. Some stakeholders considered the program a useful tool for cross-project collaboration and learning, and valued the opportunity to network with the other project participants. Others questioned whether there was enough commonality between the projects, considering they involved different commodities and were implemented in different locations within PNG and Bougainville. This was perhaps felt most acutely for the galip nut project compared to other TADEP projects because the galip nut industry was newly emerging, whereas other projects worked on commodities that were considerably more established.

> *'On a high level we can all see how [the projects] relate to each other but more closely it started to become more difficult to see how they were complementary.'*
>
> – Project representative

**Overall, it appears that Australian-based researchers from this project were more involved in TADEP activities than their PNG counterparts. Some PNG stakeholders would have appreciated greater involvement**. This was a source of frustration for some of the stakeholders consulted, who expressed that TADEP meetings and dialogue seemed largely 'Australian-centric' and provided less scope for PNG nationals to be represented. When they were present at TADEP meetings, they did not always feel like equal partners. More could be done in future programs and in the remaining TADEP lifetime to ensure better representation of in-country stakeholders, and engagement of in-country stakeholders in setting the agenda and directions of program activities. In addition, some suggested that more could have been done to support and encourage local collaboration across the PNG organisations involved in the projects.

### Alignment with TADEP objectives

The project aligned well with, and contributed to, all 4 TADEP objectives:

1. **To stimulate and strengthen inclusive private sector-led development in agriculture**. The project made a direct contribution to this objective by attracting private sector investment in the galip nut industry and providing scientific knowledge to help strengthen the industry.
2. **To sustainably increase agricultural productivity, quality and value**. Galip nut production has potential to be highly sustainable, either from indigenous trees or through plantations (Young 2017). The project has directly supported increased quality and value of galip nut products through product development and technological advances.
3. **To improve access to markets and strengthen value chains**. Whole value chain initiatives helped to link poor rural households to urban markets and provided new avenues for smallholders to sell their produce. Decentralising early-stage processing, as has been done by some of the newly emerging processors, has the potential to provide additional cash income for isolated rural communities that are otherwise unable to access markets directly.
4. **To promote gender equity and women's empowerment in rural communities**. Collaboration with women's organisations such as cooperatives and Women and Youth in Agriculture Cooperative groups has placed women as the main beneficiaries of post-harvest management training activities. However, there remains scope to move the focus beyond women as beneficiaries to more holistically consider gender equity and empowerment.

**Stronger monitoring and evaluation is needed at both the programmatic and project levels to capture the extent to which planned activities have meaningfully contributed to both project and program objectives**. Considering the overarching goal of TADEP is to improve livelihoods of rural men and women in PNG, additional monitoring is needed to really understand how project activities are contributing to this goal. This was a source of frustration to some stakeholders consulted, who indicated there was too much emphasis on reporting activities and outputs, and insufficient focus on outcomes.

## Collaboration with other projects

**Opportunities for collaboration with other TADEP projects were highly valued by project stakeholders**. The project collaborated most closely with the FFT project, delivering training with FFT groups in Bougainville on galip nut and value-adding in 2017, and then going on to work together on 2 Collaborative Research Grants with the FFT project once these grants were introduced, as summarised below.

1. **Sharing income generating ideas for women market sellers across provinces**
   This grant involved the galip nut project disseminating knowledge on preservation, packaging and value-adding of galip nut and other produce with smallholder groups engaged in the FFT project in New Ireland and ENB. Approximately 400 women and men smallholders participated in the workshops. The grant also supported development of a cookbook titled, *Food for Life*, which was disseminated to participants and focused on preparing nutritional food from locally grown produce. The level of uptake of the recipes and new technology from this training is unknown (ACIAR n.d.b).
2. **Organic wastes or wasted opportunities**
   This grant enabled collaboration with the FFT project and another ACIAR project on soil management in PNG[10]. It involved assessing the impact of using galip nut waste products as compost on soil nutrients and yield of sweet potatoes, and training smallholder farmers in compost and biochar production. Composting trials were held at the NARI research station in Kerevat, ENB, and training conducted in ENB and New Ireland (ACIAR n.d.a).

The Collaborative Research Grants were highly valued by stakeholders and seen as a cost-effective way of contributing to the program goals and also an important opportunity for ACIAR to role model collaboration between its projects. They also enabled the project to broaden its footprint into new provinces of PNG, raising awareness of the newly emerging industry.

The project also had ongoing engagement and discussion with the PNG cocoa project about *Canarium*–cocoa intercropping systems. This included sharing knowledge on galip nut, and supplying some galip trees, which were planted by the cocoa project.

> *'Before we were working in isolation, it was TADEP that brought us together.'*
>
> – Project representative

## Knowledge transfer and learning

**TADEP annual meetings were cited as the most effective mechanism for sharing project results and cross-program learning**. Stakeholders noted these meetings were extremely useful for building knowledge and networks between the projects. However, as the meetings were face to face, costs associated with travel limited the involvement of a wide range of project stakeholders. This contributed to a sense that they were primarily for the Australian project leaders. Some stakeholders suggested that in the future, increased use of technology to support virtual networking events between the face-to-face meetings could be helpful.

The TADEP updates (an electronic newsletter) reached a broader range of project stakeholders than could attend the meetings and for some people this was the main engagement they had with the program. Most stakeholders indicated these updates were very useful, with one highlighting that they helped to build a culture of amicable 'competitive tension' between the projects. **While the updates were appreciated, the reporting required from project teams to feed into the updates was widely disliked and seen as too burdensome**. Reducing reporting from monthly to bi-monthly midway through implementation assisted with managing this somewhat, although further efforts could be made to better align program reporting with existing project-level reporting requirements.

**TADEP also provided capacity-building opportunities for projects beyond what would have been available within the project itself, and encouraged cross-project capacity development**. For the galip nut project, a key highlight was gaining access to and using the CommCare mobile data app. The galip nut project team used this app across multiple data collection activities, and then provided training and support to other TADEP project teams and partners in using the app.

10 Optimising soil management and health in Papua New Guinea integrated cocoa farming systems (SMCM/2014/048).

# Conclusions and lessons learned

**The project has achieved substantial results in raising the profile of a new industry in Papua New Guinea (PNG), and attracting private sector investment in that industry**. In 2015 very limited galip nut was processed and sold commercially in PNG, but 4 private sector processors had entered the market by 2019. This is a significant achievement, contributing to increased income for smallholders and creating processing facility jobs.

The science and technology required to process galip nut within a medium- to large-scale factory is now better understood, as is the economic viability of the commercial model. The developing and testing of products using the National Agricultural Research Institute (NARI) demonstration factory to show potential investors what was possible was central to this outcome. This unorthodox research approach proved to be very effective.

## Lessons learned

Further research and development interventions are needed to build on the successes of this project to consolidate the gains made and address gaps in the current knowledge. Many of these have already been taken forward in the Phase 2 project (FST/2017/038), which commenced in December 2019 and will continue until December 2022. Specific recommendations for future research have been documented elsewhere and will not be summarised here (Wallace et al. 2020; Markham and Yakuma 2019). General lessons for ACIAR in relation to implementation of research-for-development projects and the programmatic approach include:

1. **The action research approach allows projects to adapt to changing contexts and iteratively use research findings to inform project interventions**. It could be enhanced by encouraging stronger line of sight to the project's theory of change, and by enabling more flexible reporting formats. In addition, consideration should be given as to whether more substantial changes to project objectives are permissible and how these would impact contracting arrangements.
2. **Developing and testing new products within a commercial setting was an effective way of stimulating private sector interest and investment in a new industry**. This approach appeared to be fairly unique for ACIAR-funded projects. There would be value in sharing the strengths and challenges of this approach more broadly within ACIAR research networks to encourage adoption of this approach in other contexts.
3. **Capacity-building activities need to be accompanied by stronger attention given to monitoring their effectiveness and outcomes throughout implementation**. Consideration should also be given to the sustainability of capacity-development activities, and whether there are opportunities to build the capacity of existing extension workers (either government or non-government) to ensure knowledge generated through the project is shared widely and embedded in local systems rather than being dependent on ongoing project support.
4. **A multidisciplinary team was a key strength**. This should be encouraged, but needs to be accompanied by strong project leadership to ensure the project team remains cohesive.
5. **Gender and social inclusion analysis, and development of a targeted gender equality and social inclusion strategy would help develop a more strategic approach** to influencing gender equity and women's empowerment, and ensure people with disability and other marginalised groups also benefit from projects. This needs to be monitored during implementation.
6. **Wherever possible, in-country members of research teams should be supported to receive formal research qualifications** (such as Master degrees and PhDs) through project implementation, alongside gaining practical skills.
7. **Programmatic approaches enable broader sharing and learning across projects**. Collaborative research grants were particularly effective in allowing meaningful collaboration, and appeared to produce good outcomes for limited cost. However, in-country research partners need to be seen as equal contributors to these programs by ensuring good representation on steering committees or other governance structures. In addition, the programmatic approach could support a more strategic approach to building capacity of key in-country stakeholders (particularly when these stakeholders are involved in multiple projects).

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Wallace H, Komolong B, Nevenimo T, Waii C, Hannet D, Hannet G, Bai SH, Grant E, Hodges B, Kill E, Randall B, Carter J, Johns C, Simos T, Jones K (2017) *2016–2017 Annual Report: Enhancing private sector-led development of the* Canarium *industry in Papua New Guinea (FST/2014/099)*, ACIAR, Canberra (not published).

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Wallace H, Komolong B, Nevenimo T, Waaii C, Hannett D, Hannett G, Ling-Kapi S, Grant E, Hodges B, Kill E, Randall B, Carter J, Ashford G, Bai SH, Johns C, Simos T, Jones K (2020) *Final Report: Enhancing private sector-led development of the* Canarium *industry in Papua New Guinea (FST/2014/099)*, ACIAR, Canberra.

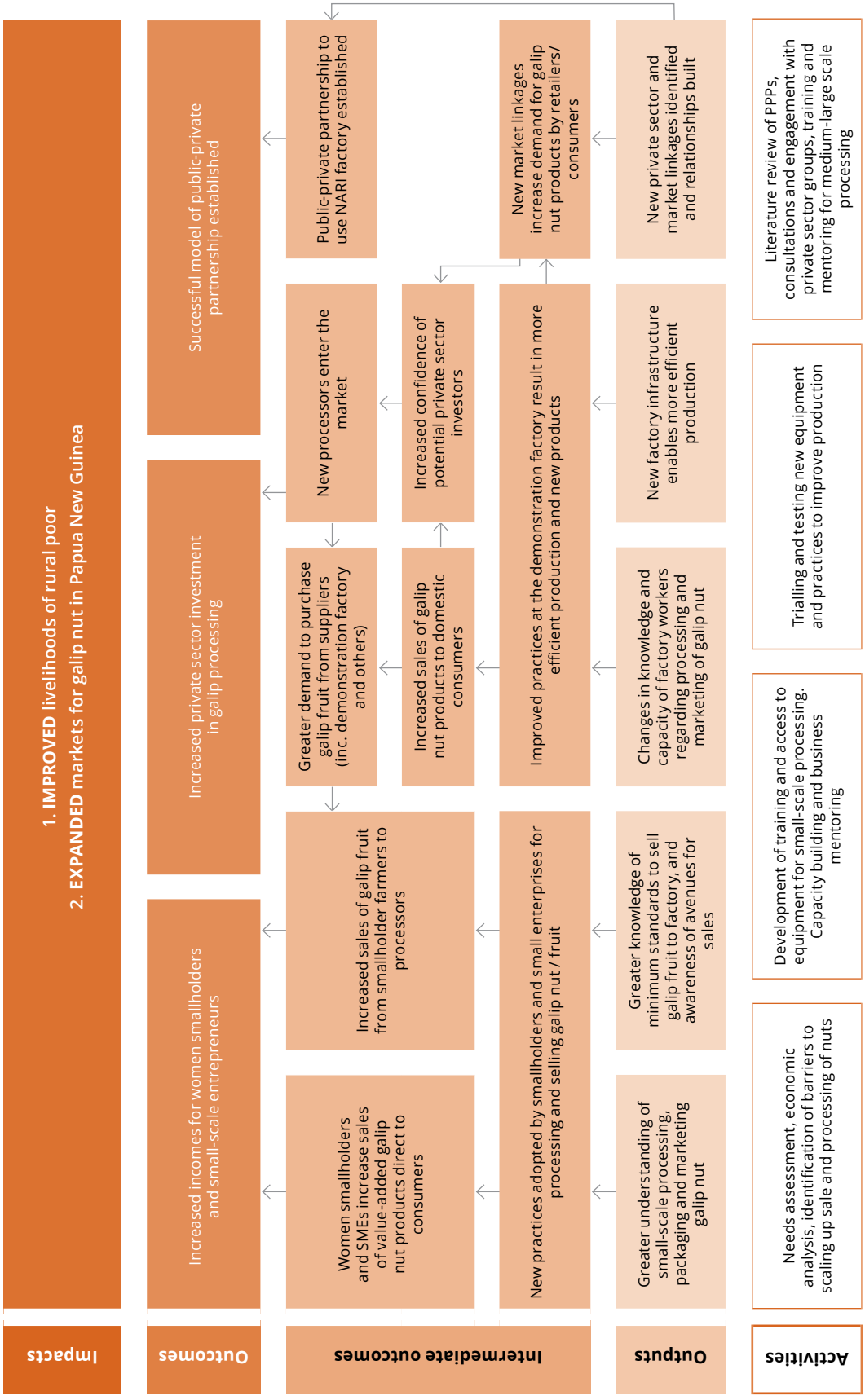
Young D (2017) *Review of the ACIAR Project: Enhancing Private Sector-led Development of the* Canarium *Nut Industry in Papua New Guinea (FST/2014/099)*, ACIAR, Canberra (not published).

# Appendices

## Appendix 4.1: Stakeholders consulted

| Name | Role | Organisation |
|---|---|---|
| **Professor Helen Wallace** | Professor in Agricultural Ecology, (Project Leader) | Griffith University |
| **Dr Birte Komolong** | Program Director, Agriculture Systems | National Agricultural Research Institute |
| **Mr Godfrey Hannet** | Research Associate | National Agricultural Research Institute |
| **Mrs Dalsie Hannet** | Junior Scientist | National Agricultural Research Institute |
| **Mrs Dorothy Luana** | Managing Director | Devine Management Services Ltd |
| **Mr Brett Hodges** | Research Associate | University of the Sunshine Coast |
| **Ms Emma Kill** | Social Researcher | University of the Sunshine Coast |
| **Mr Theo Simos** | Marketing Specialist | University of Adelaide |
| **Mr Tio Nevenimo** | Production Scientist | Previously National Agricultural Research Institute; now International Fund for Agricultural Development (galip nut industry) |

# Appendix 4.2: Theory of change



## Appendix 4.3: Project team members

| # | Team member | Gender | International/National Researchers |
|---|---|---|---|
| 1 | Professor Helen Wallace | F | International |
| 2 | Mr Bruce Randall | M | International |
| 3 | Dr Jen Carter | F | International |
| 4 | Dr Elektra Grant | F | International |
| 5 | Dr Graham Ashford | M | International |
| 6 | Professor Stephen Trueman | M | International |
| 7 | Mr Stefan Lippistch | M | International |
| 8 | Mr Kim Jones | M | International |
| 9 | Mrs Votausi Mackenzie-Reur | F | National |
| 10 | Dr Chris Searle | M | International |
| 11 | Ms Jo Roberts | F | International |
| 12 | Mr Theo Simos | M | International |
| 13 | Mr Craig Johns | M | International |
| 14 | Dr Nora Omot | M | National |
| 15 | Mrs Dalsie Hannett | F | National |
| 16 | Mr Tio Nevenimo | M | National |
| 17 | Mr Godfrey Hannett | M | National |
| 18 | Ms Isodora Ramita | F | National |
| 19 | Mr Seniorl Anzu | M | National |

# Appendix 4.4: Research outputs

| Publication | Peer- reviewed | Author (gender, nation) |
|---|---|---|
| **Journal articles** | | |
| Bai SH, Brooks P, Gama R, Nevenimo T, Hannett G, Hannett D, Randall B, Walton D, Grant E and Wallace HM (2019) 'Nutritional quality of almond, canarium, cashew and pistachio and their oil photooxidative stability', *Journal of Food Science and Technology,* 56:792–798. | Yes | Bai (female, Australia)<br>Brooks (male, Australia)<br>Gama (male, Zimbabwe)<br>Nevenimo (male, PNG)<br>Hannett G (male, PNG)<br>Hannett D (female, PNG)<br>Randall (male, Australia)<br>Walton (male, Australia)<br>Grant (female, Australia)<br>Wallace (female, Australia) |
| Bai SH, Darby I, Nevenimo T, Hannett G, Hannett D, Poienou M, Grant E, Brooks P, Walton D, Randall B and Wallace HM (2017) 'Effects of roasting on kernel peroxide value, free fatty acid, fatty acid composition and crude protein content', *PloS one,* 12:9. | Yes | Bai (female, Australia)<br>Darby (male, Australia)<br>Nevenimo (male, PNG)<br>Hannett G (male, PNG)<br>Hannett D (female, PNG)<br>Poienou (male, PNG)<br>Grant (female, Australia)<br>Brooks (male, Australia) |
| Bai SH, Nevenimo T, Hannett G, Hannett D, Jones K, Trueman SJ, Grant EL, Walton D, Randall B and Wallace HM (2019) 'Freezing, roasting and salt dipping impacts on peroxide value, free fatty acid and fatty acid concentrations of nut kernels', *Acta Horticulturae.* 1256:71–75. | Yes | Bai (female, Australia)<br>Nevenimo (male, PNG)<br>Hannett, G. (male, PNG)<br>Hannett, D. (female, PNG)<br>Jones (Male, Australia)<br>Trueman (male, Australia)<br>Grant (female, Australia)<br>Walton (male, Australia)<br>Randall (male, Australia)<br>Wallace (female, Australia) |
| Bai SH, Tahmasbian I, Zhou J, Nevenimo T, Hannett G, Walton D, Randall B, Gama T and Wallace HM (2018) 'A non-destructive determination of peroxide values, total nitrogen and mineral nutrients in an edible tree nut using hyperspectral imaging', *Computers and Electronics in Agriculture,* 151:492–500. | Yes | Bai (female, Australia)<br>Tahmasbian (male, Australia)<br>Zhou (male, Australia)<br>Nevenimo (male, PNG)<br>Hannett (male, PNG)<br>Walton (male, Australia)<br>Randall (Male, Australia)<br>Gama (female, Zimbabwe)<br>Wallace (Female, Australia) |

| Publication | Peer- reviewed | Author (gender, nation) |
|---|---|---|
| Bai SH, Trueman SJ, Nevenimo T, Hannett G, Randall B and Wallace HM (2019) 'The effects of tree spacing regime and tree species composition on mineral nutrient composition of cocoa beans and canarium nuts in 8-year-old cocoa plantations', *Environmental Science and Pollution Research*, 26:22021–22029. | Yes | Bai (female, Australia)<br>Trueman (male, Australia)<br>Nevenimo (male, PNG)<br>Hannett (male, PNG)<br>Randall (male, Australia)<br>Wallace (female, Australia) |
| Bai SH, Trueman SJ, Nevenimo T, Hannett G, Bapiwai P, Poienou M and Wallace HM (2017) 'Effects of shade-tree species and spacing on soil and leaf nutrient concentrations in cocoa plantations at 8 years after establishment', *Agriculture, Ecosystems & Environment*, 246:134–143. | Yes | Bai (female, Australia)<br>Trueman (male, Australia)<br>Nevenimo (male, PNG)<br>Hannett G (male, PNG)<br>Bapiwai (male, PNG)<br>Poienou (male, PNG)<br>Wallace (female, Australia) |
| Han Y, Liu Z, Khoshelham K and Bai SH (2021) 'Quality estimation of nuts using deep learning classification of hyperspectral imagery', *Computers and Electronics in Agriculture*, 180:105868. | Yes | Han (male, China)<br>Liu (male, China)<br>Khoshelham (male, Australia)<br>Bai (female, Australia) |
| Hannet G, Singh K, Fidelis C, Farrar MB, Muqaddas B and Bai SH (2021) 'Effects of biochar, compost, and biochar-compost on soil total nitrogen and available phosphorus concentrations in a corn field in Papua New Guinea', *Environmental Science and Pollution Research*, 28(21):27411–27419. | Yes | Hannett, G (male, PNG)<br>Singh (female, Australia)<br>Fidelis (male, PNG)<br>Farrar (male, Australia)<br>Muqaddas (female, Australia)<br>Bai (female, Australia) |
| Malmir M, Tahmasbian I, Xu Z, Farrar MB and Bai SH (2020) 'Prediction of macronutrients in plant leaves using chemometric analysis and wavelength selection', *Journal of Soils and Sediments*, 20(1):249–259. | Yes | Malmir (male, Iran)<br>Tahmasbian (male, Australia)<br>Xu (male, Australia)<br>Farrar (male, Australia)<br>Bai (female, Australia) |
| Malmir M, Tahmasbian I, Xu Z, Farrar MB and Bai SH (2019) 'Prediction of soil macro-and micro-elements in sieved and ground air-dried soils using laboratory-based hyperspectral imaging technique', *Geoderma*, 340:70–80. | Yes | Malmir (male, Iran)<br>Tahmasbian (male, Australia)<br>Xu (male, Australia)<br>Farrar (male, Australia)<br>Bai (female, Australia) |
| Tahmasbian I, Wallace HM, Gama T and Bai SH (2021) 'An automated non-destructive prediction of peroxide value and free fatty acid level in mixed nut samples', *LWT – Food Science and Technology*, 143:110893. | Yes | Bai (female, Australia)<br>Wallace (female, Australia)<br>Gama (female, Zimbabwe)<br>Tahmasbian (male, Australia) |

## Appendix 4.4: Research outputs (*cont.*)

| Publication | Peer- reviewed | Author (gender, nation) |
|---|---|---|
| **Conference Papers** | | |
| Bai S, Wallace H (2021) 'Underutilized forest food systems', ANH Academy Week, Pakistan. | No | Bai (female, Australia)<br>Wallace (female, Australia) |
| Jones K, Nevenimo T, Hodges B, Bai S, Hannet G, Hannet D, Grant E, Randall B and Wallace H (2017) 'Construction and operation of an energy efficient, solar assisted, drying system for *canarium* nuts', VI International Conference Postharvest Unlimited, Spain. | Yes | Bai (female, Australia)<br>Jones (male, Australia)<br>Hodges (male, Australia)<br>Nevenimo (male, PNG)<br>Hannett G (male, PNG)<br>Hannett D (female, PNG)<br>Randall (male, Australia)<br>Grant (female, Australia)<br>Wallace (female, Australia) |
| Bai S, Trueman S, Wilson R, Keller A, Hannet G and Wallace H (2018) 'Nutrient competition of cacao and coffee with shade trees', *International Agroforestry Conference*, Nepal. | No | Bai (female, Australia)<br>Trueman (male, Australia)<br>Keller (male, Germany)<br>Hannett, G (male, PNG)<br>Wilson (female, Australia)<br>Wallace (female, Australia) |
| Bai S, Trueman S, Wilson R, Keller A, Hannet G and Wallace H (2019) 'Root studies in agroforestry systems – a case study of coffee and cocoa trees', 4th World Congress on Agroforestry, France. | No | Bai (female, Australia)<br>Trueman (male, Australia)<br>Kellwer (male, Germany)<br>Hannett, G (male, PNG)<br>Wilson (female, Australia)<br>Wallace (female, Australia) |

## Appendix 4.5: Project 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?<br>– Was the theory of change appropriate to the project context and desired results? | • Documented theory of change at project commencement<br>• Information on subsequent changes<br>• Information on project context<br>• Perspectives of key stakeholders regarding appropriateness of the theory of change | • Project concept / design documents and variations<br>• Project progress reports, annual plans, etc.<br>• Key stakeholders (project managers and collaborating partners, program manager/ coordinator, government authorities, producers, businesses) | • Desk review of available documents<br>• Interviews with key stakeholders<br>• Triangulation of findings from different sources<br>• Project verification workshops |
| 2. What outcomes (intended and unintended) has the project achieved or contributed to?<br>– What was the unique knowledge contribution of the project/cluster that was/is expected to influence practice/ policy?<br>– To what extent is there evidence of adoption of new practices based on research process and findings? | • Robust, documented evidence of progress towards planned outputs and outcomes (including progress along adoption pathways), and any unintended consequences<br>• Theory of change assessment from KEQ1<br>• Perspectives of key stakeholders, to test/ validate written reporting, including 'next users' of research outputs | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Desk review of available documents<br>• Interviews with key stakeholders<br>• Triangulation of findings from different sources<br>• Project verification workshops<br>• ACIAR progress assessment and analysis tools (e.g. Table 13 and Table 14) |
| 3. How did project activities and outputs contribute to the outcomes achieved?<br>– To what extent and how did they differ from what was planned? | • Theory of change assessment from KEQ1<br>• Documented evidence of impact pathways, as per KEQ2<br>• Perspectives of key stakeholders including 'next users' of research outputs | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation, verification workshops<br>• Analysis of adoption and impact pathways, including 'next users' (e.g. Table 13 and Table 14) |

| Key Evaluation Question | Evidence/information required | Data sources | Data collection and analysis approach |
|---|---|---|---|
| 4. What strategies were adopted to address gender equity and social inclusion and how effective were these?<br>– How did the project impact men and women differently? | • Evidence of analysis/awareness of the potential gender equity issues that may impact on the project<br>• Evidence of steps taken to address the issues identified<br>• Evidence of level of participation of women and men in research activities<br>• Evidence on changes in women's and men's control of assets, resources and decision making, and to gender equity (e.g. through impacts on female researchers; gendered knowledge generation; influence on inclusivity within partner organisations)<br>• Perspectives of key stakeholders | • Documented gender strategy or analysis (if available)<br>• 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<br>• Any existing gender audits or inclusion-focused reviews<br>• Key stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation, verification workshops<br>• Gender analysis to explore the level and type of participation of men and women, and influence on positive or harmful gender norms |
| 5. How did management arrangements impact delivery of the project?<br>– What other factors influenced project performance? | • Any existing reporting and commentary on management arrangements<br>• Perspectives of key stakeholders<br>• Evidence of contextual factors external to the project that may have impacted performance | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Documentation review, stakeholder interviews, triangulation, verification workshops<br>• ACIAR progress assessment tools (e.g. Table 14) |
| 6. **How well did the project align with and contribute to the overall goals of its umbrella program?**<br>– To what extent has the programmatic approach added value at project level? | • Assessment of KEQs 1–5<br>• Information on program goal and approach<br>• Relevant existing reporting and commentary<br>• Perspectives of key stakeholders | • Annual and/or final reports<br>• Mid-term and/or final reviews<br>• Key stakeholders (as above) | • Assessment of consistency and value-add, based on analysis for KEQs 1–5 and supplementary program-level documentation, stakeholder interviews and verification workshops |

# Part 5: Sweetpotato project

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

# Abbreviations and acronyms

| | |
|---|---|
| **ACIAR** | Australian Centre for International Agricultural Research |
| **ANU** | Australian National University |
| **ASLP** | Agriculture Sector Linkages Program |
| **CDW** | Community development worker |
| **CQU** | Central Queensland University |
| **DFAT** | Department of Foreign Affairs and Trade (Australia) |
| **FFT** | Family Farm Teams |
| **FPDA** | Fresh Produce Development Agency (PNG) |
| **LAMP** | Loop-Mediated Isothermal Amplification |
| **NARI** | National Agricultural Research Institute (PNG) |
| **NATTB** | National Apprenticeships and Trade Testing Board |
| **PGK** | Papua New Guinea kina |
| **PNG** | Papua New Guinea |
| **QDAF** | Queensland Department of Agriculture and Fisheries |
| **TADEP** | Transformative Agriculture and Enterprise Development Program |
| **TEAM** | Technology evaluation and marketing |

# Acknowledgements

The evaluation team would like to thank Professor Phil Brown from Central Queensland University (CQU), the project leader, for his time and effort in supporting the evaluation. We also thank all the project stakeholders who gave their time to be interviewed and to participate in the verification workshop to review the evaluation findings.

The evaluation team would also like to thank Australian Centre for International Agricultural Research (ACIAR) staff who supported the evaluation.

# Part 5 contents

# 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 the 'Supporting commercial sweetpotato production and marketing in the Papua New Guinea highlands' (HORT/2014/097), known as the sweetpotato project. This project aimed to **expand market-oriented sweetpotato value chains and consequently improve the livelihoods of sweetpotato producers and their communities in the PNG highlands**. It was led by Central Queensland University (CQU), in collaboration with the Australian National University (ANU) and PNG partners, the Fresh Produce Development Agency (FPDA) and the National Agricultural Research Institute (NARI). It commenced in February 2016 and concluded in June 2021 following a 6-month extension due to COVID-19.

The budget for the project was AUD4,990,000.

The sweetpotato project objectives were:

1. To develop and strengthen market-oriented sweetpotato supply chains.
2. To build capacity of sweetpotato value chain players.
3. To develop a 'clean seed' scheme to increase availability of virus-free (or 'clean') sweetpotato planting material.

The project supported smallholders in 5 sites in the Mount Hagen-Goroka corridor (Asaro Valley, Hagen Central, Anglimb, Minj and Tsinsibai) to move from subsistence farming towards market-oriented sweetpotato production, producing specifically for the market and managing production to meet market and customer requirements.

This project evaluation is Part 5 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).

A similar evaluation was conducted on the Agriculture Sector Linkages Program (ASLP) and is reported in ACIAR Outcome Evaluation No. 1.

A separate synthesis report, ACIAR Outcome Evaluation No. 3, will summarise lessons from the 2 ACIAR programs, ASLP and TADEP.

Sweetpotato project farmers with a bed of *klin kaukau* seedlings in the nursery. Photo: ACIAR

## Key findings

1

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

Based on project documentation and interviews, the evaluation team constructed an indicative theory of change for the project. The theory of change identified several core elements to achieving the project aim of strengthening commercial sweetpotato value chains. These included:

- improving sweetpotato yields and quality
- building capacity of value chain participants
- identifying and evaluating opportunities for market-oriented value chains.

**The foundational elements of the theory of change were appropriate for the context of the project and intended results**. A core proposition of the theory of change was that production and distribution of clean planting material was critical to increasing sweetpotato production, yields and quality in the PNG highlands. This was based on sound evidence generated through past projects in Australia and PNG evaluating the role of clean seed schemes, which indicate that virus-free planting materials have yield rates 25–75% higher than traditional growing practices.

A further strategy was to work initially with commercial growers to establish the clean seed scheme and build a group of lead farmers to use and distribute clean planting materials. This approach proved effective with these commercial growers, who actively operated secondary clean planting material propagation sites, and influenced other growers and community members in the use of clean planting materials.

An area where the theory of change evolved and adapted related to assumptions about the role and capacity of extension staff within FPDA. Early recognition of the need to build the capacity of FPDA extension officers in community-based development led to greater emphasis on FPDA staff as community development workers (CDWs) and gaining accreditation for project extension staff as CDWs.

2

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

***Outputs***

**New scientific knowledge** was generated through several studies designed to understand the commercial sweetpotato value chain and identify market opportunities and priorities for intervention. This included a published study mapping sweetpotato value chains, and a systematic review of literature on local value chain interventions which was presented at an international conference. The project also involved experiments to identify suitable conditions for multiplication of seed stock and trials to generate best practice recommendations for planting and harvesting of sweetpotato vines (known locally as *klin kaukau*) in the propagation facilities.

**The establishment of the clean seed scheme to produce virus-free sweetpotato planting materials is the primary new technology** introduced by the project. The foundations of a clean seed scheme have been established through close work and collaboration with NARI, FPDA and select commercial growers. The project has produced a *Clean Seed Scheme Laboratory Manual* to guide the work of NARI laboratory staff and a *kaukau* shade house and seedbed management manual for commercial growers. At the time of evaluation, there were 14 commercial growers operating propagation facilities and successfully multiplying and distributing clean vines for 6 varieties of sweetpotato (Gimani, Wanmun, Wahgi Besta, Beauregard, Korowest and Rachel).

## Key findings (*cont.*)

**Capacity development** of value chain participants is a core objective of the project and underpinned the introduction of the clean seed scheme, and new production and post-harvest practices. NARI staff at Aiyura significantly increased their skills in virus diagnostics, with accompanying skills in nursery management, herbaceous indexing and trial design. Commercial seed propagators were trained in the management of seedbeds for multiplication of disease-free vines. Training focused on enhancing the extension service capacity within FPDA and demonstrating a community-led model for community engagement was delivered for FPDA extension staff. Community development training was carried out in 14 communities. Using an organisational approach to community engagement supports these communities to identify their goals, aspirations and training needs, which includes those they can address themselves (Road A) and those that require external assistance (Road B).

*Adoption*

**New scientific knowledge** on value chains has been used by the project team to identify a number of commercial sweetpotato growers whose value chains hold significant potential to advance the economic and social welfare of their communities. It has assisted in identifying areas for further research.

During interviews, stakeholders reported uptake and use of clean planting materials by commercial growers, as well as increasing numbers of smallholders, across the target regions. There was also a growing interest in *klin kaukau* in neighbouring communities. Commercial growers are trialling or have adopted practices relating to production and post-harvest activities to maximise the benefits from the use of *klin kaukau*.

Through its strong focus on building the capacity of FPDA extension workers and CDW training within FPDA, the project has supported a shift in how FPDA engages with growers and communities. Two significant development actors, Oil Search and Ok Tedi Development Foundation, are in the process of adopting the CDW standard and complementary technology, including training materials on the organisational planning approach.

*Outcomes*

**There is increased understanding of sweetpotato value chains, including production, distribution and marketing of sweetpotato in the 3 main commercial growing areas of the PNG highlands**. It is too early to fully assess the extent to which scientific knowledge outputs will influence key institutions such as NARI and FPDA into the future. However, FPDA has established a sweetpotato program as a result of the project.

**The clean seed scheme along with changes in agronomic practices has resulted in an increase in the value of sweetpotato commercial production**. Greater levels of production and increased yields of sweetpotato in the targeted communities are enabling a shift towards more market-oriented production. Higher yields and improved sweetpotato appearance are beginning to provide access to new, higher value markets for growers, including direct sales to supermarkets in centres such as Port Moresby.

**New business opportunities now exist and are being used by value chain participants to generate improved incomes**. Commercial growers participating in the project have established new income sources through the sale of clean sweetpotato vines. Training and support to other value chain participants, including grower groups and community members, has led to the emergence of new sweetpotato-related businesses generating new income streams. These include selling products made from sweetpotato such as cakes, biscuits and noodles, and using sweetpotato roots and vines as feed to improve the quality of poultry and livestock.

There is also reported evidence of broader community social and health outcomes of the project, including better nutrition and improved housing as a result of increased incomes. There is the potential for improved soil health through greater crop rotation and enhanced resilience through access to the new 'seed bank'.

3

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

**The clean seed scheme has been the key driver of increasing production levels and yields of sweetpotato in the 5 sites in the Mount Hagen-Goroka corridor**. The project's focus on targeting a select group of commercial growers as the entry point to introducing *klin kaukau* was an important factor in achieving outcomes. Initial concerns and resistance were overcome by demonstration of the potential yield and quality benefits of using clean planting material. This has led to strong demand for vines.

**Stakeholders credit FPDA extension officers as playing a critical role in adoption of clean planting materials**. This occurred in a context where there were staff and management-level changes within FPDA. The key FPDA extension staff working on the project were seen as playing an essential role in selecting farmers to work with, engaging with farmers, building trust, providing ongoing support, and progressing the rollout of the clean seed scheme and adoption of *klin kaukau* by growers, grower groups and other smallholders across the region. An important shift in the project design was increasing the focus on developing the skills and capability of FPDA extension staff in community-led development. A key factor in success of this process was drawing on the expertise of community development professionals with significant experience in PNG and leveraging and aligning with PNG national standards for CDWs.

A 2019 study tour to Australia for commercial farmers played an important role in motivating them to develop their enterprises and adopt improved production and post-harvest practices. Most of the growers that participated in the training are reported to have adopted new production and post-harvest practices and have developed a strong interest in developing irrigation systems and infrastructure.

Some issues were raised related to sustainability of the project outputs. Specifically, there was concern that the project funds the purchase of clean planting material from NARI and distribution to commercial growers by FPDA, and that this will cease at the end of the project. Supporting growers to develop a profitable business model that includes buying the clean vines, propagating and selling them will be important moving forward.

## Key findings (*cont.*)

4

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

According to the project design, a secondary focus and enabling strategy of the project is to create economic opportunities for rural women through small enterprise development. There were actions taken by the project to address gender equity. These included ensuring women commercial growers were part of the select group to propagate *klin kaukau*, encouraging women's participation in training and community development workshops, and supporting the development of women-led enterprises for value-added products.

Like their male counterparts, women commercial growers participating in the project improved their sweetpotato production and yields and benefited from business development support. There is also evidence of more fledging women-led small enterprises being established. However, it is unknown what impact this had on gender equity and the extent to which women have control of this income.

Consistent with our findings in other project-level reports in TADEP, a gender and social inclusion analysis undertaken early during project design, and a targeted gender strategy, might have contributed to more strategic gender outcomes. Issues relating to the selection of commercial growers to be supported by the project, such as the potential impact on social inequalities, could have been addressed as part of these early processes.

5

### How did management arrangements impact delivery of the project?

The project leader had a strong commitment to empowering PNG partners, in particular FPDA, to drive the project and let each partner take leadership of their respective areas. The project demonstrated a participatory and adaptive approach to working with communities and addressing community-identified needs and priorities.

Communication between NARI and FPDA was a challenge and could have been improved through more frequent conversations between the organisations and coordination meetings. There were some signs that the project's Australian partners tended to work in silos with their PNG counterparts without knowledge of the actions of other project team members. More regular project coordination meetings may have enhanced communication, coordination and delivery of the project.

6

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

The project aligns with and has contributed directly to 4 of the 5 overall TADEP goals. The project was conceived with the intention of engaging with and drawing on the work of other TADEP projects, particularly the Family Farm Teams (FFT) project, for approaches to empowering women and increasing their business skills. While the project supported the delivery of FFT in some communities where this was requested, there was generally very limited collaboration with other TADEP projects. The different focus of the projects, dispersed geographies and differing challenges faced by the projects were raised as possible reasons for this lack of collaboration. The sweetpotato project was perceived as quite different to the galip nut and cocoa projects and therefore an outlier to an extent. Overall, there were benefits of being part of TADEP, including information sharing between projects (particularly through annual workshops), informal mentoring from other projects, access to the CommCare app, and greater prominence and traction with PNG partners due to being part of a broader program.

## Conclusions and lessons learned

Since its commencement in February 2016, the sweetpotato project has achieved significant results in terms of establishing the foundations of a scheme to provide clean planting materials, and enabling commercial growers to expand production through the use of higher yielding and better quality *klin kaukau.* These lead farmers are taking on increased roles as farmer traders – coordinating and aggregating produce from growers in their communities and encouraging the expanded use of *klin kaukau*. These farmers have also established new sources of income through the sale of clean planting material, and new enterprises in the sweetpotato value chain are emerging. Access to higher value markets has commenced, underpinned by research identifying challenges and opportunities with the value chain relating to post-harvest practices, distribution and marketing. This is an area requiring further research, strategic interventions and investment.

Significant effort has been invested in capacity development of staff within NARI and FPDA in PNG, farmers, grower groups and communities. The project has taken an adaptive approach responding to identified capacity-building needs within partner organisations and communities more broadly.

### Lesson learned

Endline studies will provide comparative 'hard' data on changes to the sweetpotato value chain including production levels and business development. General lessons for ACIAR in relation to implementation of research-for-development projects and the programmatic approach include:

1. **The project design made some implicit assumptions about the capacity of partner organisations, particularly FPDA, to engage effectively with farmers and communities using a community-led development approach**. This project highlights the importance of identifying and assessing assumptions about the capacity of partner organisations, including their internal operating environments at the design stage and developing appropriate strategies to address these development needs. **A strength of the project was the willingness to respond to capacity-development needs** by initially focusing on building the capacity of FPDA staff in community-led engagement.
2. **This project illustrates the value of drawing on existing knowledge and local structures and standards**, for instance for the CDWs. Developing training compliant with the PNG standards, building internal policy to support the change, and accrediting staff has led to broader institutional adoption and impact in FPDA, and adoption by other key development actors.
3. **Gender and social inclusion analysis and development of a targeted gender equality and social inclusion strategy would assist projects in developing a more strategic approach** to influencing gender equity and women's empowerment, and ensuring people with disability and other marginalised groups can also benefit from the project. This needs to be monitored during implementation. This observation is common across a number of TADEP projects considered by the evaluation team.
4. **There are opportunities to enhance the value of a programmatic approach more broadly**. While collaboration between projects is one element, there are broader opportunities for considering more strategic whole-of-program investment in key enablers such as capacity development for common project partners such as NARI and FPDA.

# 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 18 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 sweetpotato project.

### Purpose

The project-level evaluation has 2 key purposes:

1. Compile performance information from each project under TADEP 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 18** 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 *Canarium* 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 'Supporting commercial sweetpotato production and marketing in the PNG highlands' (HORT/2014/097), known as the sweetpotato 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 programmatic evaluation is ACIAR staff with direct responsibilities for programs and/or their constituent projects. This includes Canberra-based research program managers and field-based program managers and coordinators.

# Methodology

## Data collection and analysis

Data was primarily drawn from existing project reports and reviews, supplemented by data collected from key stakeholders through semi-structured interviews and written responses to interview questions. Stakeholders were intentionally selected in consultation with Australian Centre for International Agricultural Research (ACIAR) (see Appendix 5.1). Interviews were conducted with 8 stakeholders online using Zoom 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 19). In addition, economic and gender equality outcomes were assessed in line with the project design. Preliminary findings were shared and tested in a project validation workshop involving most of the stakeholders 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, with only a small number of interviews completed. Interviewees were intentionally selected by ACIAR, the evaluation team and the project leader, and interviews were primarily undertaken with members of the project team. This meant there were limited opportunities to triangulate some findings, and perspectives on the outcomes of the project may have a positive bias.

Conducting interviews via Zoom or phone provided limited opportunity to build rapport with interviewees, and in some cases, poor phone/internet connections disrupted interviews and may have limited understanding and interpretation of non-verbal communication cues.

The project was extended a further 6 months until the end of June 2021, which means that further data will become available. In particular, an endline study of sweetpotato production, supply and marketing in the Papua New Guinea (PNG) highlands will include additional quantitative analysis of changes in commercial sweetpotato value chains in the region.

**Table 19** ACIAR project outcome assessment terminology

| Outputs | Next users | Outcomes |
|---|---|---|
| **Scientific knowledge:** New knowledge or current knowledge tested in other conditions, locations, etc. | • Individual scientists/researchers/ agricultural professionals<br>• Individuals responsible for the management of research or a government institution<br>• 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<br>• Public and private extension service providers<br>• Public policy actors<br>• Public and private value chain operators<br>• Consumers | **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 | | |
| **Practices:** New practices and processes | | **Capacity built:** Project partners or stakeholders use enhanced capacity to do something differently |
| **Policy:** Evidence for policy formulation | | **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 |
| **Capacity building:** Short courses, academic training, coaching and mentoring | | |

## 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.


A farmer harvests clean sweetpotato with the support of relatives and other growers. Photo: Conor Ashleigh, ACIAR

# Overview of project

| Project number | HORT/2014/097 |
|---|---|
| Project title | Supporting commercial sweetpotato production and marketing in the Papua New Guinea highlands |
| Collaborating institutions | **Australian organisations**<br>Central Queensland University (CQU)<br>Queensland Department of Agriculture and Fisheries (QDAF)<br>Australian National University (ANU)<br>**PNG partners**<br>Fresh Produce Development Agency (FPDA)<br>National Agricultural Research Institute (NARI) |
| Project leaders | Professor Philip Brown, CQU, Australia<br>Mark Worinu and Robert Lutulele, FPDA<br>Dr Ramakrishna Akkinapally, NARI |
| Project duration | February 2016 to February 2021 (extended to June 2021) |
| Funding | A$4,998,084 |
| Countries involved | Papua New Guinea |
| Commodities involved | Sweetpotato |
| Related projects | Sustaining soil fertility in support of intensification of sweetpotato cropping systems (SMCN/2012/105)<br>Developing improved crop protection options in support of intensification of sweetpotato production in Papua New Guinea (HORT/2014/083) |

## Context

Sweetpotato is a major staple food crop in Papua New Guinea (PNG) and is grown by a high proportion of the semi-subsistence smallholder farmers in the country. Traditionally, sweetpotato is a low value, low input crop often used as animal feed. Crops benefit from fertiliser applied to a previous crop such as cabbage or carrot in a rotation system.

In many areas of the PNG highlands, the economy is evolving, particularly where there is relatively good transport infrastructure. Smallholders are turning from subsistence farming to market-oriented production. Sweetpotato has more recently become a cash crop in its own right, improving food security and providing a cash income alongside coffee, other vegetables and livestock. There is increasing commerce in sweetpotato with growers developing marketing and distribution chains into centres such as Port Moresby and Lae.

Low crop yields, infrastructure issues, and limited technical and business skills on the part of farmers and potential entrepreneurs are reported as constraining the impact that the market-oriented sweetpotato sector in PNG could have on rural communities in sweetpotato production areas. Previous ACIAR projects including 'Validating and documenting a strategy for producing virus-free sweetpotato planting material in Papua New Guinea' (PC/2010/026) considered the use of pathogen-tested planting materials, marketing efficiency, post-harvest management and value addition in the sweetpotato value chain. These projects informed the design of the current project, which sought to build on existing relationships with key PNG partners.

## The project

The project's aim was to sustainably increase the contribution that sweetpotato makes to cash income and food security by improving sweet potato value chains. This was intended to contribute to the broader development goal of improving the livelihoods of sweetpotato producers and their communities in the highlands of PNG. The project focused on 5 technology evaluation and marketing (TEAM) sites in the Mount Hagen-Goroka corridor:

- Asaro Valley
- Hagen Central
- Anglimb
- Minj
- Tsinsibai.

These sites had different characteristics in terms of production potential and existing levels of marketing activity, but all had emerging links to markets for sweetpotato or other similar products.

The project supported smallholders in these 5 sub-regions of the highlands to move from subsistence farming towards producing specifically for the market and managing production to meet market and customer requirements.

The project's objectives were:

1. To develop and strengthen market-oriented sweetpotato supply chains.
2. To build capacity of sweetpotato value chain players.
3. To develop a 'clean seed' scheme to increase availability of clean planting material of sweetpotato (referred to locally in PNG as *klin kaukau*).

The project was conceived after the establishment of TADEP and was designed with the intent of drawing on components of other TADEP projects, in particular 'Family Farm Teams' (ASEM/2014/095), which focused on women's empowerment and improving women's skills in business management.

# Findings

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

A project theory of change (or impact pathway) was apparently developed during the early stages of implementation of the project. Most stakeholders interviewed, however, were not aware of the project's theory of change, and it was not available for consideration as part of this evaluation. For the purpose of the evaluation, the evaluation team developed a representative theory of change drawing on the description of the project aims, objectives and activities, causal pathways in the project design proposal, and information from interviews with stakeholders. Importantly, while there may not have been a documented theory of change in the project proposal, the proposal itself outlines a narrative of the project goal, objectives, and outputs and how the project's activities would contribute to the change.

### Description of the theory of change

The core aim of the project was to strengthen commercial sweetpotato value chains. The underlying theory was that sweetpotato producers in the selected highland sites and their local communities would benefit from moving from subsistence farming towards market-oriented sweetpotato production. This transition would enable growers and other community members to improve incomes by producing sweetpotato or sweetpotato food products. This in turn was expected to contribute to achieving the broader development goals (or impacts) of greater food security, and improved health and livelihoods of sweetpotato growers, traders and communities.

The theory of change is summarised at Appendix 5.2. There are several linked causal pathways that contribute to improvements in sweetpotato value chains:

- **Improving sweetpotato yields and quality**. Commercial crop yields and quality can be improved through the establishment of a clean seed scheme. This scheme will ensure that pathogen-tested plant vines (referred to as clean planting material) are propagated, distributed and used by a group of commercially oriented growers. These lead growers will be responsible for the multiplication and distribution of clean planting material to broader grower groups and communities. In order to establish the foundations of a clean seed scheme the following needs to occur:
  - Research on effective seedbed management practices to optimise yield of clean planting material.
  - Improving the infrastructure for tissue culturing and plantlet growth at National Agricultural Research Institute (NARI) facilities and training of NARI staff in pathogen-tested plant material production according to established protocols (primary multiplication sites).
  - Establishing secondary multiplication sites in screenhouses (igloos) at locations within each of the technology evaluation and marketing (TEAM) sites and training farmers in these sites to manage production and distribution of clean planting material.
- **Building capacity of value chain participants**. Participants in sweetpotato value chains (family-based village producers, women's groups, other community groups, growers and traders) require enhanced capacity to plan and execute the production and sale of sweetpotato and associated crops and products. Capacity will be built by:
  - identifying technical and capability gaps in high priority value chains
  - participatory training for existing or emerging supply chain participants through farmer field/business schools in commercial production, business management and market orientation
  - participatory planning and training of community members in establishing new value chains
  - building capacity of NARI and FPDA staff in value chain analysis and facilitating interventions.

- **Identifying and evaluating opportunities for market-oriented value chains**. Research is necessary to identify priority areas where the project can support viable and sustainable value chain development to build commercial production. This requires:
  - Socio-economic review and analysis of current value chains.
  - Participatory planning workshops and surveys on current knowledge of sweetpotato production, demand and marketing, and production of sweetpotato-based products.
  - Identifying technical and capability gaps in high priority chains.
  - Follow-on research and development activity specific to each targeted value chain, including product consistency and supply, post-harvest research (transport, storage and processing) and social science research on communications, finance, relationships and governance aspects of value chain functionality and marketing research.

There are number of basic assumptions that underpin the theory of change, including:

- NARI and FPDA staff have capacity to support the project and are able to develop enhanced capacity to work with farmers, communities and other value chain participants.
- Commercial growers are willing to take the potential risks of producing and using clean planting material.
- Farmers, traders and communities are willing to adopt new practices relating to the use of *klin kaukau*.
- Women and women's groups will be engaged in the project support activities and gain skills and confidence to develop sweetpotato-based enterprises.
- Targeted support to communities will lead to new enterprise development using sweetpotato.
- Increased *klin kaukau* yields and quality will, with other supports, open up access for producers to higher value markets in larger urban centres.

## Analysis of the theory of change

**The foundational elements of the theory of change were appropriate for the context of the project and intended result**. A core proposition of the theory of change was that production and distribution of clean planting material is critical to increasing sweetpotato production, yields and quality in the PNG highlands. This was based on sound evidence, generated through past projects in Australia and PNG, that virus-free materials propagated through clean seed schemes have yield rates 25–75% higher than traditional growing practices.

A further underlying rationale was to focus initial efforts on commercial growers: those who had foundational business skills, awareness and willingness to accept the business risks (as opposed to family-based smallholder risk) of participating in the clean seed scheme. It was intended that the actions of lead farmers would influence actions of other growers and community members in the target regions. The evidence discussed below shows that commercial growers have actively operated secondary clean planting material production sites. However, there were some earlier challenges with farmers distributing primarily to their own villages (and initially at no cost), impacting on assumptions on the geographic reach of clean planting material, and the commerciality of producing and selling clean planting materials. This issue was addressed with the support of the FPDA, which worked with growers and communities to ensure a broader geographic distribution of clean planting materials.

An area where the theory of change evolved and adapted related to assumptions about the role and capacity of extension staff within FPDA. As some stakeholders highlighted, it was recognised early in the project that it was of critical importance to invest in building the skills and capacity of extension staff to engage effectively with growers and communities through an approach informed by community development principles. This led to greater emphasis on building the capacity of FPDA staff as community development workers (CDWs) and accreditation of staff as CDWs. This in turn led to an enhanced focus on a more inclusive community-led approach where FPDA staff worked with communities to identify technical and business development needs and provided tailored support to address the identified needs.

While research has been undertaken on opportunities within the value chain, it has also highlighted existing barriers to accessing higher value markets and building more sustainable market-oriented supply chains. Access to higher value markets is largely impacted by transport infrastructure and the supply chain participants – traders and intermediaries – and is an area that will require increased focus as production levels and quality continues to improve and become more consistent.

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

### Outputs

#### *Scientific knowledge*

The project conducted several studies to understand the commercial sweetpotato value chain and identify market opportunities and priorities for intervention. These included:

- A socioeconomic review of sweetpotato production and marketing in the PNG highlands was completed in 2017. The review drew on secondary information from published sources, and participatory planning workshops with target communities, to review local knowledge of sweetpotato production and marketing. The report identified several factors which were driving expansion of commercial production and sales, particularly from the Hagen Central area. The movement of sweetpotato from Mount Hagen to urban centres and resource camps in adjacent provinces had not been previously reported.
- Detailed mapping of sweetpotato value chains was completed to identify those chains which showed the greatest potential to advance the economic and social welfare of their communities. Through the use of CommCare (a web-based survey tool) and working alongside FPDA extension staff, the research identified a number of commercial sweetpotato growers, whose value chains hold significant potential to advance the economic and social welfare of their communities. The survey also revealed that commercial growers and traders in the highlands had been consistently supplying sweetpotato in large quantities to the urban markets of Mount Hagen, Lae and Port Moresby by utilising family and *wantok* networks. The findings of this mapping study and survey were published by the project team in 2019 (Brown et al.). The paper outlined the need for further research directed toward identifying post-harvest management strategies, reducing marketing costs, and determining the breakeven point for different levels of the commercialisation spectrum so that sweetpotato businesses can be profitable and sustainable.
- A systematic review of literature on local value chain interventions was completed. This was undertaken to inform the design of interventions for those growers with the greatest capacity to engage with formal markets. The findings of the review were presented as a conference paper at the 2018 International Horticulture Congress (Brown et al. 2018) and accepted for publication in the *Journal of Agribusiness in Developing and Emerging Economies* (Hainzer, Best and Brown 2019).

Further work is also underway on a publication examining the value of study tours following the growers study tour of Australia in 2019. The project has also conducted:

- Baseline and midline surveys of demand and marketing for sweetpotato in Port Moresby, Lae and the highlands, and production aspects in TEAM locations. The project team is in the process of undertaking the end of project surveys to compare changes over time.
- Experiments and trials on conditions for multiplication of seed stocks and to generate best practice recommendations for planting and harvesting of *kaukau* vines in the propagation facilities.

#### *Technologies or practical approaches*

The project established the foundations of a 'clean seed scheme', consistent with Objective 3. Through the scheme, farmers in the 3 main commercial sweetpotato production regions in the PNG highlands had access to virus-free clean planting material. The core components of the scheme included:

- production of pathogen-tested planting materials (or vines) at the NARI laboratory in Aiyura – primary multiplication facilities
- distribution of clean planting materials to a select group of commercial sweetpotato growers, who multiply the vines and distribute them to other growers and community members – secondary multiplication sites.

A facility to clean virus-infected material and maintain this clean material for delivery to multiplication sites is integral to a clean seed scheme. Queensland Department of Agriculture and Fisheries (QDAF) worked with the staff of the NARI tissue culture laboratory and screenhouses at Aiyura Research Station to ensure the effective operation of primary multiplication facilities at the station. Key activities included clean seed foundation stock preparation, review of virus testing protocols, experiments to determine optimum conditions for multiplication, introduction of 2 new varieties, and provision of a Loop-Mediated Isothermal Amplification (LAMP) unit and establishment of initial protocols for rapid virus testing. Significantly, QDAF and NARI project team members prepared a draft *Clean Seed Scheme Laboratory Manual*, ensuring that all processes were documented in detail to provide rigidity to the *klin kaukau* scheme in the long-term and to assist in training of new laboratory staff. The draft is being peer-reviewed by QDAF.

Commercial growers across the Eastern Highlands, Western Highlands and Jiwaka provinces were selected to be secondary multiplication sites for clean vines. The project worked with these growers to establish igloos (screenhouses) on their farms to propagate clean vines. At the time of evaluation, there were 14 commercial growers who multiply and distribute clean vines. Activities to establish and support the operation of these secondary multiplication facilities included:

- training of commercial seed propagators in the management of seedbeds for field multiplication of clean vines
- trials to generate best practice recommendations for planting and harvesting of *klin kaukau* vines in the propagation facilities
- establishing a network of contact farmers to manage field multiplication in new locations to deliver clean seed to more PNG *kaukau* farmers.

A key product has been the development of the *kaukau* shade house and seedbed management manual for use by farmers managing screenhouses. The manual includes 12 standalone fact sheets, which cover a range of topics on best practice handling and maintenance of *klin kaukau* planting material.

### *Capacity building*

Capacity building of value chain participants is a core objective of the project and has underpinned the introduction of the clean seed scheme. As outlined in the project design, the focus under this objective was to:

- build the capacity of participants in existing or emerging sweetpotato supply chains in commercial production, business management and market orientation through farmer field/business schools
- enhance the capacity of community members to define and develop the support needed to enable them to participate in value chain opportunities
- build capacity of NARI and FPDA staff in value chain analysis and facilitating interventions.

During implementation, key project personnel recognised the central importance of building the capacity of FPDA extension staff to engage effectively with farmers, traders and communities through a community-led model. Accordingly, the farmer capacity building component of the project focused on enhancing the extension service capacity within FPDA and demonstrating a community-led model for community engagement. This involved targeting the PNG National Standard for CDWs to train, assess and accredit FPDA extension officers. It also included hosting National Apprenticeships and Trade Testing Board (NATTB) workplace assessor training, policy development within FPDA, and working with national government and peak bodies to develop national policy and technology associated with the Standard.

The project developed material for training of grower groups involved in commercial *kaukau* production using clean seed. The training program was designed to meet the CDW standards set by NATTB and was accredited through NATTB. A new technical training package covering business development skills was produced by the project in 2019–20.

#### FPDA staff

The project supported several FPDA extension staff with the development of research and value chain analysis skills. FPDA extension staff were involved in the development and design of research tools, and undertook direct engagement with growers and stakeholders as part of research processes. Four FPDA staff undertook training in the use of CommCare, and FPDA was examining the potential to implement the technology for a range of processes where efficiency improvements were likely to result.

One of the more significant outputs was the upskilling of FPDA extension staff as CDWs. Three FPDA members of the team completed the 2-week nationally accredited CDW training, enabling them to be accredited to deliver training and provide recognition for participants, such as village extension workers, as CDWs.

### NARI staff

NARI staff at Aiyura significantly increased their skills in virus diagnostics, with accompanying skills in nursery management, herbaceous indexing and trial design. QDAF staff worked with 3 key staff at the NARI Aiyura station providing technical support, advice and mentoring in the development and management of clean seed material at the station. The culmination of this work was the development of the draft *Clean Seed Scheme Laboratory Manual*.

Some NARI facility staff undertook training in Australia on virus diagnostics. One staff member was awarded an ACIAR John Allwright Fellowship Scholarship and is undertaking a Master of Philosophy on sweetpotato virus management focused on the use of LAMP technology in PNG. It is expected that she will guide the use of LAMP technology at the NARI facility on her return.

### Growers, grower groups and community members

Capacity-development activities have supported selected commercial growers operating screenhouses, along with grower groups and community members. As part of establishing the clean seed scheme, commercial seed propagators have been trained in the management of seedbeds for the multiplication of clean vines. They also received training (through other related sweetpotato projects) in agronomic practices, including soil fertility and pest and disease control. These growers, along with FPDA and NARI staff, also participated in a study tour to Australia in 2019 to learn from Australian growers and gain firsthand experience with production practices such as vine grading and *kaukau* packing.

Community development training was carried out in 14 communities in the PNG highlands. **An organisational approach to community engagement supports these communities to identify their goals, aspirations and training needs**. The objective of the training was to coordinate inputs to strengthen the community resolve for addressing technical problems they identified and document these in a Community Development Plan. The plan identified Road A – actions the community can take themselves, and Road B – activities that cannot be delivered internally by the community. Key areas identified as requiring support (Road B) have included markets and marketing, crop agronomy, farm management, downstream processing into stockfeed, livestock management, and livelihood skills in home food processing and preparation. The non-technical support the project delivered to farmer groups followed an organisation cycle and built the capacity of farmer groups to follow an organisation cycle themselves. FPDA staff who have achieved accreditation as CDWs facilitated this training for communities. This training assisted the commercial growers engaged in the project to develop their businesses, and their communities to develop plans incorporating commercial sweetpotato production.

## Adoption

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 20.

### *New scientific knowledge*

#### Information on sweetpotato value chain and value chain interventions

The information generated through the sequenced research, including social economic analysis of the sweetpotato value chains and value chain mapping, enabled the project team to identify a number of commercial sweetpotato growers whose value chains hold significant potential to advance the economic and social welfare of their communities. It assisted in identifying areas for further research including post-harvest management strategies and marketing. One example of application of this research is the provision of training to growers in grading and washing roots prior to transport to higher value markets. This follows the identification of issues with existing post-harvest practices of packing sweetpotatoes into 100 kg bags, which commonly causes damage to roots and diminishes product quality and market value.

### *New technologies or practical approaches*

#### Establishment of the clean seed scheme and uptake of clean planting materials

Establishment of the clean seed scheme involved close work and collaboration with NARI, FPDA and selected commercial growers to produce virus-free planting material at primary and secondary sites. Fourteen commercial growers were operating propagation facilities or screenhouses with the support of project staff. They successfully multiplied and distributed clean vines for 6 varieties of sweetpotato (Gimani, Wanmun, Wahgi Besta, Beauregard, Korowest and Rachel).

All stakeholders reported strong take-up and use of *klin kaukau* planting materials by commercial growers and other smallholders in the community, including family-based growers and grower groups across the target regions, with growing interest in neighbouring communities. It is reported that during 2017–18, some 7,000 clean vines were established in propagation facilities, generating over 5,000 first cut and 3,000 second cut vines for crop planting. More than 1,500 vines were distributed to other farmers to demonstrate the potential of clean planting material (Brown et al. 2018a).

**Table 20** Levels of adoption of key project outputs

| Category | Output | Users | Level of adoption |
|---|---|---|---|
| **New scientific knowledge** | • Information on sweetpotato value chain in PNG highlands, and gaps and capacity development needs of value chain participants | • Initial user is project team (including FPDA) to assess priorities and inform value chain interventions<br>• Final users will be FPDA into the future | Nf* |
| | • New information on value chain interventions | • Used by project team to design value chain interventions, including training and outreach<br>• Final users will be FPDA in design of future interventions | Nf* |
| **New technologies or practical approaches** | • Clean seed scheme providing access to virus-free sweetpotato plant materials | • Commercial growers are initial users<br>• Broader grower groups and smallholders are subsequent and final users | NF |
| | • New package of CDW training | • FPDA is initial user<br>• FPDA and other agriculture extension services are final users | Nf* |

Notes:
* Given the project is yet to conclude it is too early to assess uptake of final users for this output
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

As a result of participation in the project, FPDA has now approved the establishment of a program focused on supporting commercial sweetpotato production. FPDA has employed a manager to guide implementation of this program.

### Production and post-harvest practices

Larger-scale commercial farmers have been supported with production practices such as irrigation and post-harvest activities to maximise productivity benefits from the use of *klin kaukau*. Some of these activities have been undertaken through 2 other related ACIAR sweetpotato projects in PNG focused on improved crop protection (HORT/2014/083) and soil fertility (SMCN/2012/105).

Growers who participated in the 2019 study trip to Australia have adopted production practices observed in Australia including irrigation, vine grading and packing. The project has provided basic support to some of these growers who have, since the visit, established irrigation infrastructure on their farms. Further, some growers have also adopted grading and washing of roots prior to transport to higher value markets and are testing alternative packaging to reduce the damage to roots caused by packing into 100 kg bags.

### CDW training and approaches

A community-led model for engagement founded on CDW skills is now embedded in the FPDA approach to engagement with growers and communities. The project, through its strong focus on building the capacity of FPDA extension workers and CDW training within FPDA, supported a shift in how the FPDA approaches its engagement with growers and communities. The training program developed as part of the project will allow FPDA to become a training provider, embedding a 'bottom-up' training capacity in the PNG agriculture sector.

The training has been adopted by FPDA more broadly to train extension workers and inform the development of village extension workers. Two significant development actors, Oil Search and Ok Tedi Development Foundation, are adopting the CDW standard and complementary technology, including training materials on the organisational planning approach to community development.

## Outcomes

### *Scientific outcomes*

The scientific knowledge gained through the project increased the understanding of sweetpotato value chains, including production, distribution and marketing of sweetpotato in the 3 main commercial growing areas of the PNG highlands. This knowledge has been used by the project team and FPDA to develop targeted training and support for growers and communities engaged in sweetpotato production in the region. The studies, including a forthcoming endline study, will be used to assess the changes in the sweetpotato value chain across production, distribution and marketing.

It is too early to fully assess the extent to which these scientific knowledge outputs will influence key institutions such as NARI and FPDA into the future. At this stage, the project's research outputs highlighted the potential of commercial sweetpotato production in PNG, leading to the FPDA establishing a new program focused on commercial sweetpotato production.

Experimental research and trials supported by the project have also been used to inform best practice approaches and protocols for virus testing and laboratory processes at the NARI facility, and the development of a manual for the management of *klin kaukau* shade houses and seedbeds.

### *Innovation enabled through use of technologies, practices and processes*

#### Increased sweetpotato production, quality and market access

The project – principally through the clean seed scheme along with changes in agronomic practices – has increased in the value of commercial sweetpotato production. Greater levels of production and increasing yields of sweetpotato in the targeted communities are enabling a shift towards more market-oriented production. *Klin kaukau* is reported to have a superior taste, leading to an increased demand in the marketplace. Endline studies are being undertaken by the project and will attempt to quantify the overall changes in production levels from the respective regions of the highlands.

Higher yields and improved sweetpotato appearance are beginning to deliver grower access to new, higher value markets, including direct sales to supermarkets in centres such as Port Moresby, although matching supply and demand and addressing logistics remain issues to be addressed. Potential new markets for *kaukau*, and transport logistics options to improve post-harvest management, have been identified as a result of promoting the project through the media and the project's Facebook page. Development of export markets for sweetpotato is at a very early stage and has not been a focus of the project to date.

Interest in clean planting material has continued to grow with requests for access to *klin kaukau* from regions outside the program and other provinces interested in establishing screenhouses for clean planting material.

> *'This project has made huge gains with growers first to establish trust in the new* kaukau *and then an understanding of how this new material can form the basis for higher value markets locally and in supermarkets in urban centres.'*
>
> – Mid-term review (ACIAR, 2019)

### New business opportunities and increased incomes

The project established a new product in the form of clean vines, which commercial growers responsible for their multiplication can sell. Commercial growers participating in the project established new income sources through the sale of clean sweetpotato vines. For example, Chris Bugajim (personal communication) reported a Jiwaka grower sold over PGK4,000 worth of *klin kaukau* vines since the project installed a vine multiplication screenhouse in her village. Supplying growers with clean vines led to monthly sales of clean vines from the scheme of PGK500–1,000 for commercial growers. With growing interest in the clean seed scheme through social media, vines have been distributed to other provinces including Enga, Southern Highlands and Morobe.

Lead farmers producing sweetpotato are benefiting through increased income from higher yields, faster sales and better returns from *klin kaukau*, which is recognised as better quality in the marketplace. Some stakeholders reported that some farmers are shifting to become farmer traders. As farmer traders, they work with the community and other growers to establish a cooperative or group arrangement under which smallholders grow for the farmer trader who aggregates the sweetpotatoes for sale to the market. This is viewed as a new mode of operation that did not exist (or at least at the current scale) before the project.

Training and support to other value chain participants, including grower groups and community members, has led to the emergence of new sweetpotato-related businesses. Training provided to communities in food processing and preparation has led to one community in Jiwaka initiating a commercial venture drying *kaukau* to produce flour, and making cakes, biscuits and noodles for sale. In other communities, farmers are taking advantage of the higher yields obtained in clean *kaukau* crops. They are diversifying by feeding roots and vines to animals to improve the quality of poultry and livestock – generating a new income stream. Women growers and women's groups have successfully improved incomes through production and value-add product sales.

#### *Capacity built*

These outcomes are underpinned by the improved capacity of key project stakeholders, including PNG partner organisations, growers and communities. The key capacities are summarised in Table 21.

#### *Community social, health and environmental benefits*

Project reports and stakeholder feedback referred to other benefits associated with improved sweetpotato production and income. Farming families reportedly have improved nutrition through increased consumption of sweetpotato, reducing reliance on rice and noodles, which have lower nutritional value. Additional income has also enabled growers to improve housing.

One of the findings of the crop agronomy studies has been that the *klin kaukau* crops mature faster than conventional *kaukau* crops. This may lead to more crop rotation opportunities for growers and longer fallow periods to sustain soil health. It was also noted that the clean seed scheme enabled the establishment of a 'seed bank', which provides access to planting materials during times of drought and crop recovery in the event of severe drought or other adverse climatic events.

**Table 21** Capacity built relevant to project objectives

| Who | Skills and knowledge |
|---|---|
| **NARI Aiyura research facility staff** | • Virus diagnostics, with accompanying skills in nursery management, herbaceous indexing and trial design |
| **Commercial sweetpotato farmers** | • Management of seedbeds for multiplication of disease-free vines<br>• Enhanced production and post-harvest practices for production of sweetpotato<br>• Business planning and management |
| **FPDA extension staff** | • Community-based research capabilities<br>• CDWs (community-driven development) |
| **Grower groups and community** | • Business planning and enterprise development |

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

### Factors influencing adoption and outcomes

Table 22 provides key findings against the categories and factors influencing adoption and outcomes as part of the ACIAR evaluation framework. It should be noted that no systematic research was undertaken about the factors influencing adoption of the project outputs, so the findings are primarily based on what key stakeholders and the evaluator perceive to be the factors.

**The clean seed scheme has been the key driver behind increasing production levels and yields of sweetpotato in the TEAM sites**. This is consistent with past evidence of clean seed schemes in Australia, and trials in PNG and other countries. There were a number of key activities that underpinned the establishment of the scheme, from working with NARI staff in laboratory facilities to selecting and supporting commercial growers. Some of the more central factors contributing to change are discussed below.

**Table 22** Factors influencing adoption and impact

| | Factor | Key findings |
|---|---|---|
| **Knowledge** | Do potential users know about the outputs? | • Not identified as a constraint for this project. |
| | Is there continuity of staff in organisations associated with adoption? | • There were several changes in staff at FPDA, however the project has benefited from new staff commitment to adoption of CDW training components. |
| | Are outputs complex in comparison with the capability of users? | • Not identified as a constraint for this project, noting that the project involved significant capacity development with commercial growers, as well as FPDA and NARI staff involved in the project. |
| **Incentives** | Are there sufficient incentives to adopt the outputs? | • There are strong commercial incentives for commercial growers to produce clean planting materials, and for growers of differing scales to use clean sweetpotato planting materials. |
| | Does adoption increase risk or uncertainty? | • Not identified as a constraint for this project. |
| | Is adoption compulsory or effectively prohibited? | • Not identified as a constraint for this project. |
| **Barriers** | Do potential users face capital or infrastructure constraints? | • Growers are purchasing clean planting material or receiving it for free from commercial growers. The project funds the purchase of clean planting materials from NARI by FPDA, for provision to commercial growers. There are issues with the sustainability of this model beyond the life of the project if lead growers are not willing to purchase directly from NARI. |
| | Are there cultural or social barriers to adoption? | • While female smallholders are adopting the use of clean planting material, further research is required to understand the impact of increased market-oriented production on the role of women in sweetpotato production, marketing and sales. |

**The project's focus on targeting a select group of commercial growers as the entry point to introducing *klin kaukau* was an important success factor**. The project team was aware of the farmers' perception of risk in introducing new planting material. Project reports refer to initial apprehension about clean planting materials within some communities, based on a belief that the failure of the potato crop in the region (due to late blight outbreaks) had been caused by introduction of certified potato planting material. Farmers therefore feared that construction and operation of the new propagation facilities might lead to sweetpotato crops being wiped out. Using elements of a lead farmer model, the project team was guided by research on value chains and FPDA advice on the selection of 14 commercial farmers who were willing to participate in the clean seed scheme as secondary propagators of clean planting material. It took a while to establish trust in the clean planting material and for lead growers to be satisfied before distributing material to the village. Resistance was gradually overcome, with demonstration of the potential yield and quality benefits from using clean planting material leading to strong demand for vines.

**Stakeholders credit FPDA extension officers as playing a critical role in encouraging adoption of clean planting materials**. This occurred in a context where there were staff changes and significant management changes due to other donor activities in the area. The key FPDA extension staff working on the project were seen as essential in selecting farmers to work with, engaging with farmers, building trust, providing ongoing support, and progressing the roll-out of the clean seed scheme and adoption by growers, grower groups and other smallholders across the region. One notable area of support was facilitating distribution of *klin kaukau* beyond discrete villages. The project had assumed that commercial growers with screenhouses would distribute and sell *klin kaukau* vines more widely; however, in the early stages, distribution occurred only within the villages of the lead famers, and largely for free. With the assistance of FPDA, the project has facilitated wider distribution from the 14 commercial grower sites to different villages across the region.

**As has been discussed, a key shift in the project design was increasing the focus on developing the skills and capability of FPDA extension staff in community development**. This has led to significant capability development in FPDA extension staff and broader institutional commitment to community-led engagement. Important factors in this success included:

- Drawing on the expertise of community development professionals with significant experience in PNG. Through their guidance, the project was able to draw on established training and development processes, including the existing national standards for CDWs and the ward planning process to guide engagement and training for farmers, growers and communities.
- Embedding 2 local officers with community development experience in FPDA to pass on these skills and knowledge in an informal mentoring and one-on-one process.

As noted in project reports, training for farmers and their communities facilitated community ownership of commercial sweetpotato development. This ownership, along with production of resource materials and capacity building within partner PNG agencies, has established a foundation for continuation of project outputs beyond the life of the project.

**The 2019 study tour to Australia was also seen as a significant factor in motivating the commercial farmers who participated in the tour to develop their enterprises and adopt improved production and post-harvest practices**. The 14 growers had the opportunity to learn from Australian growers and gain firsthand experience with production practices such as vine grading and *kaukau* packing. The training reportedly resulted in most of the growers adopting new practices (Brown et al. 2020). During interviews, stakeholders elaborated on the interest of PNG growers in establishing irrigation systems to support sweetpotato production. At the request of several farmers, the project provided support to establish basic irrigation infrastructure and systems on farms. Given the study tour occurred later in the project (after growers had started using clean planting materials and developed their businesses), this was considered an important factor for its success – growers had seen results and were ready to take on new ideas and approaches.

> *'When I came back everyone was excited to see me and eager to hear about my experience and what I learned from my trip. I am a proud woman now and I am pushing for further develop* kaukau *in Jiwaka. I want to go into mechanisation. I will establish a big nursery to supply the demand.'*
>
> – 2019 study tour participant and commercial grower in Jiwaka

The mid-term review noted that the participatory research methodology chosen by the project team was the right choice for this project and was well executed. The review discussion reaffirmed the need to take on farmers as research partners and recognise that they are active decision-makers and have the best knowledge of the complex systems in which they work.

The program has led to the establishment of a sweetpotato program within FPDA, recognising the opportunities but also a need for ongoing development, particularly in respect to post-harvest management, marketing, and supply chains for higher value markets. In discussions with stakeholders, some issues were identified about sustainability of the project's impacts. These related to sustainability of the FPDA commitment to the CDW approach, potential costs of maintaining screenhouse and related on-farm infrastructure, and costs associated with the provision of clean planting material to commercial propagators. The last of these is seen as more significant. The concern is that the project currently funds the purchase of clean planting material from NARI and distribution to commercial growers by FPDA, and that this will cease at the end of the project. Supporting growers to continue to sell clean planting materials and use these funds to purchase them directly from NARI is important for sustainability of the scheme. The mid-term review alluded to this issue, recommending that the clean seed system needed a simple strategy for renewal of virus-free sources not reliant on lengthy and costly testing to establish virus infection status. It suggested that the project needed to develop a commercial business case for the supply of virus-free material and for cleaning up new varieties that will be needed by growers in different regions to respond to market demands across PNG.

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

### Gender equity

The project design had a secondary focus and enabling strategy to create economic opportunities for rural women through small enterprise development. More specifically, the project planned to support women-led village enterprises in value-added sweetpotato product development. The proposal outlined an intention to adopt the methodologies developed in the Family Farm Teams (FFT) project (ASEM/2014/095), focused on family teams training, financial literacy education, banking and saving training, and agricultural planning techniques, as well as the training of village community educators to deliver training developed in the FFT project.

While it was not discussed in the design document, stakeholder interviews and project publications referred to the important role of women in traditional sweetpotato production. Sweetpotato, as a staple food, has traditionally been considered a women's crop. Its cultivation from planting to harvest is predominately in the hands of women. Women are also generally responsible for selling sweetpotato at markets. The men's role in the cultivation of sweetpotato is confined to land preparation and other pre-planting roles such as digging drainage channels, building mounds and clearing new land.

Women's participation in project activities was evident in several areas. The project supported the small team of 4 people (2 of whom were women) responsible for production of clean planting material at the NARI research facility. Project staff also supported one of these female staff members to undertake postgraduate study in Australia on pathogen testing. Two women growers were part of the group of 14 commercial growers selected to manage screenhouses and propagate clean planting materials on their farms. These particular women were chosen by FPDA staff because of their standing in the community, and ability to provide community leadership and influence other women. Endline studies in progress suggest strong levels of participation by women in training and community development workshops. Women and women's groups have received training and support on establishing value-added sweetpotato enterprises.

Like their male counterparts, women commercial growers participating in the technical training have introduced new methods of planting to improve sweetpotato yields and benefited from business development support. They are also earning income from selling clean planting materials. At the community level, women growers have benefited from increased income from the sale of clean sweetpotato, with women – particularly single mothers – being able to send children to school, meet expenses and better provide for their families. There is also evidence of more fledging female-led small enterprises being established. A number of women in Jiwaka developed a business producing and selling sweetpotato flour and related products. Other women's groups have focused on using the improved and higher yield sweetpotato to feed pigs and poultry, and increasing the value of these livestock and poultry for sale.

The project has had some observed impacts on the role of women in the growing and selling of sweetpotato. On the positive side it was noted in reports that because *klin kaukau* sells faster, women (who are nearly always responsible for selling produce at markets) are required to spend less time at the markets, which commonly present safety and security issues for them. On the other hand, it was observed by stakeholders that as production moves to a more commercial scale, men are likely to take responsibility for production, distribution and marketing. A key area where further evidence is required is in assessing whether improved income for women means that they are more empowered, that is, they have control over this income. It is also important to understand whether engagement in enterprise activities has negative impacts in terms of the increased workload of women.

Stakeholders recognised that greater analysis could have been undertaken at the project design stage to understand the community social and gender dynamics and how these would influence, and could be influenced by, project delivery. This is particularly critical given the information to hand about the traditional role of women in farming sweetpotato and how this may shift to men with increased commercial production. There is a real possibility, for example, that if men take on a greater role in production of commercial sweetpotato, then they may also gain greater control over income from sweetpotato sales. **To strengthen gender equity outcomes, in-depth gender analysis undertaken in project design should form the basis of a strategy of how the program will both ensure women's active participation in the project, but also contribute to improved gender equity and women's empowerment, and at a minimum do no harm**. Implementation of this strategy should be closely monitored to ensure identification of intended and unintended gender-related consequences of the project. This monitoring is particularly critical in the PNG context where rates of gender-based violence are so high, and efforts to positively influence gender norms can have unintended consequences.

## Social inclusion

There are no specific references in the project design to targeting other vulnerable community members including youth, people with disability, and other commonly excluded community members. The project targeted those growers on the more commercial end of sweetpotato production. However, this was done with the intention that these lead farmers and their actions would enable opportunities for participation by other community members who were involved in subsistence farming. The project also adopted participatory community development approaches to engage all community members. There is no known evidence that this resulted in the inclusion of people with disability or other commonly excluded community members. Future projects could consider strategies to ensure existing inequalities experienced by youth, people with disability, and other marginalised groups are not further entrenched, and how project activities can include and provide benefits for these community members.

A smallholder market stall selling sweetpotato.
Photo: Conor Ashleigh, ACIAR

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

Central Queensland University (CQU) was the lead organisation. CQU project leader, Professor Phil Brown, had primary responsibility for overall project coordination. Research and development activities were to be led by NARI, CQU and QDAF, while enterprise development activities were to be led by FPDA and the Australian National University (ANU). Broadly, the roles were:

- CQU provided project leadership and research components on value chain assessment and commercial opportunities.
- ANU was part of the initial phase of the project with responsibility for technical capacity development, community training and enterprise development.
- FPDA coordinated PNG partner inputs and provided support and connection with growers through extension officers involved in research activities relating to value chain, training and community development.
- QDAF worked with NARI to support the development of the *klin kaukau* scheme and build the capacity for virus diagnostics.

The project leader showed a strong commitment to empowering PNG partners, in particular FPDA, to drive the project and largely letting each partner take leadership of their respective areas. An evident strength of the project was its participatory and adaptive approach, working with communities to identify priorities and needs and responding flexibly to these community development needs. Specific examples include the shift in focus to building capacity of FPDA extension workers to work with community members and growers, and responding to commercial grower aspirations to establish irrigation systems after their field visit to Australia in 2019.

The project's first annual report noted concerns on role clarity for project partners and project coordination within PNG. These issues were addressed at the annual project review and planning meeting, but it is evident that communication between NARI and FPDA remained an issue and could have been improved through more frequent communication and coordination meetings. There were also some signs that the project's Australian partners worked in silos, with their PNG counterparts left without knowledge of the actions of other project team members. Stakeholders suggested that more regular project coordination meetings may have enhanced communication, coordination and delivery of the project.

While ANU was involved in the project from the start, a clear difference of approach and direction emerged between key ANU project members and CQU, with ANU subsequently ceasing formal involvement in the project. Some members of the ANU team were contracted by CQU to continue work on the community development activities within the project, minimising the impact of this decision on project implementation and outcomes.

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

The project aligned with, and contributed directly to, 4 of the 5 Transformative Agriculture and Enterprise Development Program (TADEP) goals:

1. **To sustainably increase agricultural productivity, quality and value.** Sweetpotato is a staple crop, which is in demand across PNG, and less impacted by external market forces than other commodities that are produced for international markets. The project assisted commercial growers lead growth in the production of sweetpotato, and improved quality through the use of clean planting material. *Klin kaukau* is better quality, in greater demand and can be sold at better prices than traditionally grown sweetpotato.
2. **To improve access to markets and strengthen value chains**. The focus of the project was on expanding market-oriented sweetpotato value chains and consequently improving the livelihoods of sweetpotato producers and their communities in the PNG highlands. With the growth in production and improvements in quality, new businesses are emerging as part of the sweetpotato value chain. Access to higher value markets is in the early stage of development as commercial growers scale up production of higher quality sweetpotato. Further elements of the value chain relating to marketing and post-harvest production need future intervention to support sustainable market access and strengthening of the value chains.
3. **To promote gender equity and women's empowerment in rural communities**. The project was intended to support economic opportunities for rural women. Women commercial growers have been part of the project and other women have participated in project training opportunities, leading to the establishment of women-driven enterprises in value-add products.
4. **To build individual and institutional capacity**. The project has built the capacity of staff in partner agencies, NARI and FPDA, and supported the development of institutional capacity in these organisations. The project has also built the capacity of growers, grower groups and community members in a range of areas, including propagation and use of clean vines, and developing commercially oriented sweetpotato businesses, including for value-added products.

Stakeholders based in Australia and some PNG stakeholders were aware of TADEP and its objectives. For Australian project team members beyond those at CQU, the only level of engagement in program-level activities was participation in the annual meeting, providing information to support program reporting and reading program-level newsletters and updates. Staff based in Australia highlighted some marginal benefits of the project being part of TADEP.

The program was conceived with the intention of engaging with and drawing on the work of other TADEP projects, particularly the FFT project for approaches to empowering women and increasing their business skills, and the TADEP umbrella for 'approaches to developing participatory impact pathways and assessing impacts on livelihoods'. While the project has supported the delivery of FFT in some communities where this has been requested, there was generally very limited collaboration with other TADEP projects. The different focus of the projects, dispersed geographies and differing challenges faced by the projects were raised as possible reasons for this lack of collaboration. The sweetpotato project was perceived as quite different to the galip nut and cocoa projects and therefore an outlier to an extent. Notably the project has operated concurrently to 2 other ACIAR-funded PNG sweetpotato projects focused on soil fertility, and pest and disease control. A mid-term review of the 3 projects conducted in early 2019 highlighted the need for this project to engage more and collaborate with the other 2 (non-TADEP) sweetpotato projects. While the projects worked in the same communities with key growers, the research focus of the other 2 projects, compared to the commercial focus of this project, meant that more frequent collaboration and engagement was more difficult.

There were several key benefits of participation in TADEP identified by Australia-based stakeholders:

- **Information sharing**. Team members gained value from participating in the annual TADEP workshops to learn about other projects and develop connections with project leads and members. Some team members would have liked the opportunity to bring additional staff to these meetings, recognising the potential value to be gained by project staff and other employees of the collaborating organisations. ACIAR investment in promoting and marketing the program, including via newsletters, was considered valuable and assisted in developing sharable public information on the project and program more broadly.
- **Informal mentoring from other projects**. Project staff with different roles including team leaders could engage with and access advice and support from staff on other TADEP projects.
- **CommCare app**. The CommCare app made available through the program was used in the research conducted by the project. FPDA staff were trained in using the app and there were intentions on the part of FPDA to use the app more broadly.
- **Traction with PNG partners**. It was observed by one key stakeholder that being part of the broader TADEP umbrella meant that the project had greater prominence. This assisted the project gain traction and political leverage with the key PNG partners, FPDA and NARI.

There were very few negative aspects identified related to being part of TADEP. While the time demands associated with program-level meetings and bi-monthly reporting were noted as the downsides of being part of a program, the benefits of these processes, in particular connecting with other project leads and hearing of challenges, made the time and effort involved worthwhile.

Some stakeholders referred to opportunities to leverage the programmatic approach more effectively and strategically, beyond basic collaboration between projects, to achieve broader impact. The question posed was how the program could work collectively in a more forward looking way to harness the investments to achieve greater impact. One area identified as an example was institutional capacity building. The projects commonly work with PNG institutions such as NARI and FPDA, but the focus tends to be on building individual capacity. There is an opportunity for a more strategic and coordinated approach to working with PNG partners to build greater institutional capacity.

# Conclusions and lessons learned

Since its commencement in February 2016, the sweetpotato project has achieved significant results in terms of establishing the foundations of a scheme to provide clean planting materials, and enabling commercial growers to expand production through the use of higher yielding and better quality *klin kaukau*. Lead farmers are taking on increased roles as farmer traders, coordinating and aggregating produce from growers in their communities, and encouraging the expanded use of *klin kaukau*. These farmers have also established new sources of income through the sale of clean planting material, and new enterprises in the sweetpotato value chain are emerging. Access to higher value markets has commenced, underpinned by research identifying challenges and opportunities with the value chain relating to post-harvest practices, distribution and marketing. This is an area requiring further research, and strategic interventions and investment.

Significant effort has been invested in capacity development of staff within Papua New Guinea (PNG) partners – National Agricultural Research Institute (NARI) and Fresh Produce Development Agency (FPDA) – farmers, grower groups and communities. The project has taken an adaptive approach responding to identified capacity-building needs within partners and communities more broadly.

## Lessons learned

The project has now concluded and endline studies will provide comparative 'hard' data on changes to the sweetpotato value chain, including production levels and business development. General lessons for ACIAR in relation to implementation of research-for-development projects and the programmatic approach include:

1. **The project design made some implicit assumptions about the capacity of partner organisations, particularly FPDA, to engage effectively with farmers and communities using a community-led development approach**. This project highlights the importance of identifying and assessing assumptions about the capacity of partner organisations, including their internal operating environments, at the design stage and developing appropriate strategies to address these development needs. **A strength of the project was the willingness to respond to capacity-development needs** by initially focusing on building the capacity of FPDA staff in community-led engagement.
2. **This project illustrates the value of drawing on existing knowledge, and local structures and standards**, for instance, for the community development workers (CDWs). Developing training compliant with the PNG standards, building internal policy to support the change, and accrediting staff has led to broader institutional adoption and impact in FPDA and adoption by other key development actors.
3. **Gender analysis, social inclusion analysis and development of a targeted gender equality and social inclusion strategy would assist projects in developing a more strategic approach** to influencing gender equity and women's empowerment, and ensuring people with disability and other marginalised groups can also benefit from the project. This needs to be monitored during implementation. This observation is common across a number of TADEP projects considered by the evaluation team.
4. **There are opportunities to enhance the value of a programmatic approach more broadly**. While collaboration between projects is one element, there are broader opportunities for considering more strategic whole-of-program investment in key enablers, such as capacity development of common project partners, NARI and FPDA.

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Brown P, Hainzer K, Best T, Wemin J, Aris L and Bugajim C (2019) 'Commercial sweetpotato production in the highlands of Papua New Guinea', *Acta Horticulturae*, 1251, 65–72.

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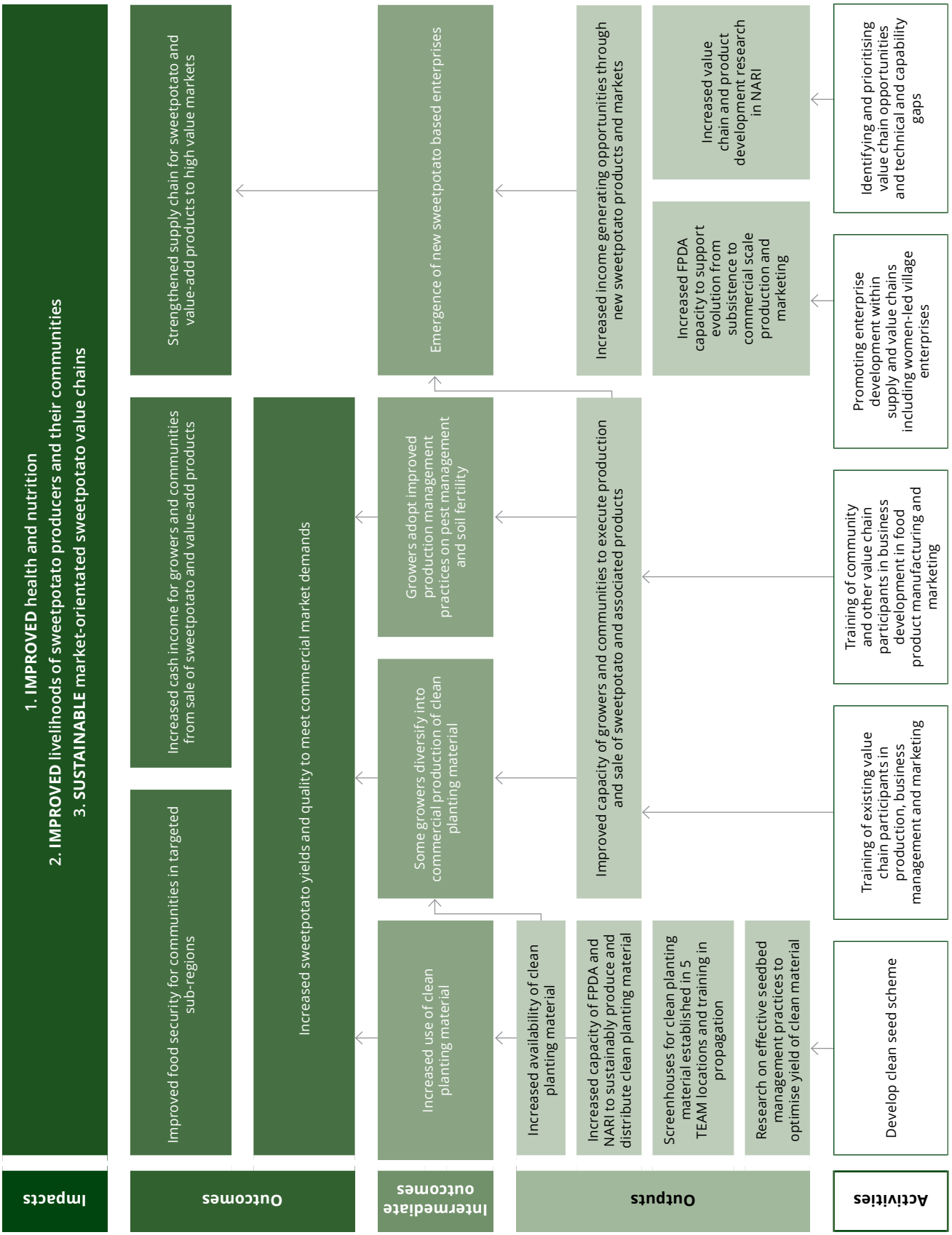
Hainzer K, Best T and Brown PH (2019) 'Local value chain interventions: a systematic review', *Journal of Agribusiness in Developing and Emerging Economies*, 9(4):369–390.

# Appendices

## Appendix 5.1: Stakeholders consulted

| Name | Role | Organisation |
|---|---|---|
| **Professor Philip Brown** | Professor in Agricultural Ecology (Project Leader) | Central Queensland University |
| **Mr Kirt Hainzer** | Research Fellow | Central Queensland University |
| **Mr John Kewa** | Manager, Research, Policy and Communication | Fresh Produce Development Agency |
| **Mr Chris Bugajim** | Project Officer | Fresh Produce Development Agency |
| **Mr Bennie Atigini** | Project Officer | Fresh Produce Development Agency |
| **Dr Birte Komolong** | Program Director, Agricultural Systems | National Agricultural Research Institute |
| **Ms Winnie Maso** | Research Scientist | National Agricultural Research Institute |
| **Mr Mike Hughes** | Farming Systems Development Officer | Queensland Department of Agriculture and Fisheries |
| **Mr Chris Gard** | Community Development Consultant | Independent consultant |

# Appendix 5.2: Theory of change



## Appendix 5.3: Project team members

| # | Team member | Gender | International/National Researchers |
|---|---|---|---|
| 1 | Professor Phil Brown | M | International |
| 2 | Mr Craig Henderson | M | International |
| 3 | Mr Michael Hughes | M | International |
| 4 | Dr Talith Best | F | International |
| 5 | Dr Mike Bourke | M | International |
| 6 | Mr Chris Gard | M | International |
| 7 | Ms Sandra Dennien | F | International |
| 8 | Ms Rachael Langenbaker | F | International |
| 9 | Mr Eric Coleman | M | International |
| 10 | Ms Jean Bobby | F | International |
| 11 | Mr Bill O'Donnel | M | International |
| 12 | Dr A Ramakrishna | M | National |
| 13 | Dr Sim Sar | M | National |
| 14 | Ms Winnie Maso | F | National |
| 15 | Ms Myla Deros | F | National |
| 16 | Mr Kud Sitango | M | National |
| 17 | Mr Johannes Pakatul | M | National |
| 18 | Dr Matthew Kanua | M | National |
| 19 | Mr Mark Worinu | M | National |
| 20 | Mr Robert Lutulele | M | National |
| 21 | Mr Johnny Wemin | M | National |
| 22 | Mr Noel Kuman | M | National |
| 23 | Mr Chris Suya | M | National |
| 24 | Mr Chris Suya | M | National |
| 25 | Ms Lornica Harris | M | National |
| 26 | Mr Thomas Kol | M | National |
| 27 | Mr Conrad Anton | M | National |
| 28 | Ms Regina Malie | F | National |
| 29 | Ms McKenzie Zikian | M | National |
| 30 | Mr John Kewa | M | National |
| 31 | Ms Debbie Kapal | F | National |

## Appendix 5.4: Research outputs

| Publication | Peer-reviewed | Author (gender, nation) |
|---|---|---|
| Brown P, Hainzer K, Best T, Wemin J, Aris L and Bugajim C (2019) 'Commercial sweetpotato production in the highlands of Papua New Guinea', *Acta Horticulturae*, 1251, 65–72. | Yes | Brown (Male, Australia)<br>Hainzer (Male, Australia)<br>Best (Female, Australia)<br>Wemin (Male, Papua New Guinea)<br>Aris (Female Papua New Guinea)<br>Bugajim (Male, Papua New Guinea) |
| Brown P, Hainzer K, Best T, Wemin J, Aris L and Bugajim C (12–16 August 2018) 'Commercial sweetpotato production in the highlands of Papua New Guinea' [conference presentation], 30th International Horticultural Congress IHC2018: II International Symposium on Root and Tuber Crops: Value Added Crops for the Next Generation, Istanbul Turkey. | | Brown (Male, Australia)<br>Hainzer (Male, Australia)<br>Best (Female, Australia)<br>Wemin (Male, Papua New Guinea)<br>Aris (Female Papua New Guinea)<br>Bugajim (Male, Papua New Guinea) |
| Hainzer K, Best T and Brown P (2019) 'Local value chain interventions: a systematic review' *Journal of Agribusiness in Developing and Emerging Economies*, 9(4):369–390. | Yes | Hainzer (Male, Australia)<br>Best (Female, Australia)<br>Brown (Male, Australia) |
| Hainzer K, O'Mullan C, Bugajim C and Brown P (2021) 'Farmer to farmer education: learnings from an international study tour', *Development in Practice*, 31:5, 665–675. | Yes | Hainzer (Male, Australia)<br>O'Mullan (Female, Australia)<br>Brown (Male, Australia)<br>Bugajim (Male, Papua New Guinea) |
| Best, Axtens, Hainzer, Wemin, Ovah and Bugajim (in preparation) 'Leveraging Social Cognitive Theory to understand value-chains in semi-subsistence sweet potato farming in Papua New Guinea'. | Yes | Best (Female, Australia)<br>Axtens (Female, Australia)<br>Hainzer (Male, Australia)<br>Wemin (Male, Papua New Guinea)<br>Ovah (Male Papua New Guinea)<br>Bugajim (Male, Papua New Guinea) |

# Part 6: Family Farm Teams project

An evaluation of the ACIAR Transformative Agriculture and Enterprise Development Program Family Farm Teams project

# Abbreviations and acronyms

| | |
|---|---|
| **ACIAR** | Australian Centre for International Agricultural Research |
| **ASLP** | Agriculture Sector Linkages Program |
| **BWF** | Bougainville Women's Federation |
| **DFAT** | Department of Foreign Affairs and Trade (Australia) |
| **DoE** | Department of Education (PNG) |
| **DPI** | Department of Primary Industries (PNG) |
| **FAITH Garden** | Food always in the home |
| **FFT** | Family Farm Teams |
| **FPDA** | Fresh Produce Development Agency |
| **IATP** | Integrated Agriculture Training Program, University of Natural Resources and Environment |
| **NARI** | PNG National Agricultural Research Institute |
| **PAU** | Pacific Adventist University, PNG |
| **PD** | Professional development |
| **PNG** | Papua New Guinea |
| **TADEP** | Transformative Agriculture and Enterprise Development Program |
| **UC** | University of Canberra, Australia |
| **UniTech** | University of Technology, PNG |
| **VCE** | Village community educator |

# Acknowledgements

The evaluation team would like to thank Professor Barbara Pamphilon, the project leader, for her time and effort in supporting the evaluation. The efforts of Professor Pamphilon to link the evaluation team with stakeholders in Papua New Guinea (PNG) were particularly appreciated.

The evaluation team would also like to thank Australian Centre for International Agricultural Research (ACIAR) staff who supported the evaluation.

The evaluation team would like to express its appreciation of all the project stakeholders who gave their time to be interviewed and to review the evaluation findings.

# Part 6 contents

# 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 'Improving opportunities for economic development for women smallholders in rural Papua New Guinea' (ASEM/2014/095), commonly known as the Family Farm Teams (FFT) project.

This project sought to **support women's economic development in order to improve gender equality, family livelihoods and food security**. The aim was to enhance the economic development of PNG women smallholders by building their agricultural and business acumen. The project was implemented from June 2015 to March 2019.

The budget for the project was A$3,000,000.

Family Farm Teams participants Maureen Trison and her son Richard Trison inside their poultry shed, holding lanterns they use to keep young chicks warm. Photo: Conor Ashleigh, ACIAR

The FFT project followed on from a previous pilot, which involved FFT training[11] alongside training on financial and business management, and agricultural planning techniques, as well as training of village community educators (VCEs) to deliver peer education. During the pilot, this training enabled women (and men) farmers to improve their agricultural and family farming business practices. The FFT project built on the findings of that pilot by expanding these strategies into 5 new areas of PNG, using different types of community partners and focusing on new commodity crops.

The FFT project had 5 objectives, noting that the fifth objective was added to the project scope after the mid-term review in recognition that partner agencies required significant capacity development to effectively implement the approach:

1. To examine the capacity development of women as community-based agricultural leaders.
2. To explore ways in which communities can develop partnerships with the private sector, schools and training providers that are relevant to the local context and culture.
3. To further develop the peer education model of agricultural extension.
4. To examine the uptake and impact of a FFT approach to farming for women and girls.
5. To explore the capacity development of PNG agricultural-focused agencies in gender inclusive and gender sensitive extension delivery.

This project evaluation is Part 6 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).

A similar evaluation was conducted on the Agriculture Sector Linkages Program (ASLP) and is reported in ACIAR Outcome Evaluation No. 1.

A separate synthesis report, ACIAR Outcome Evaluation No. 3, will summarise lessons from the 2 ACIAR programs, ASLP and TADEP.

11 FFT training comprises 4 modules focused on working as a family team for family goals; planning your family farm as a family team; feeding your family team; and communicating and decision-making as a family farm team.

## Key findings

1

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

The project design was underpinned by an impact pathway which gave a strong articulation of change pathways at the village level. The project's localised, adaptive approach meant that the impact pathway was appropriate across diverse locations. The notable area where assumptions require greater evidence and testing is the extent to which the project contributed to reducing family violence.

The scope of the impact pathway meant that it reflected the research questions which focused on the village level, rather than the changes required to institutionalise new approaches, which were out of the scope of this 3-year project. This meant that institutional change components were not addressed, such as the institutionalisation of the FFT approach by partners. The introduction of the fifth objective after the mid-term review was in some part a mechanism to begin addressing this priority. Pathways to training agencies, the private sector and schools adopting and institutionalising new training approaches were also not explored in the impact pathway. A longer project timeframe may have enabled the impact pathway to encapsulate these areas, noting they lend themselves to more development-oriented interventions, and would contribute to the sustainability of project outcomes.

2

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

The project has demonstrated significant **scientific achievements**, with extensive use of the FFT model and concepts, as well as financial literacy and business skills resources by researchers, practitioners and other development partners. By refining and testing the FFT model in new locations and with new commodities, the project has demonstrated the applicability of these approaches in diverse contexts. Refining the model of peer education has shown how this approach can support the acquisition of skills and knowledge by female farmers. Trials of brokered training by a variety of partners has provided insight into how training providers can best work with communities to maximise capacity development. Driving uptake of the new knowledge generated through this project by government agencies has been more challenging.

The project has also delivered important **economic outcomes**. There was evidence of widespread adoption by VCEs of family team-based farming practices, new agricultural practices and business-like approaches to farming, which led many farmers to increase their incomes and food security. New family-based farming practices contributed to women's economic empowerment by leading families to make joint decisions about money more regularly. There was some evidence that other farming families have begun to adopt these practices from VCEs, and ripple effect mapping undertaken on previous pilot locations suggests some uptake is likely. As this productivity grows, it will be important that farmers have access to markets to translate their improved productivity into increased income and realise their family and farming goals.

## Key findings (*cont.*)

The project contributed to **capacity development at multiple levels**. First, female and male VCEs built their capacity as peer educators, training more than 2,500 farmers (60% were women) during the project, mainly through their wantok and existing community networks.

Not all VCEs developed the confidence to deliver training independently, with previous skills and the level of support provided by project partners key factors influencing this. Also, it is unclear how many or to what extent VCEs will continue as peer educators beyond the project. Training of FFT trainers has built individual capacity to deliver the FFT approach, and evidence that these trainers have integrated this knowledge into broader work indicates it is likely they will continue to employ the FFT concepts into the future. Leadership training for women also built their skills and capacity as leaders, with some women taking up community leadership roles. Training providers built their capacity in areas such as participatory research, and designing and delivering training in low-literacy contexts. Development and piloting a professional package for teachers has led to new agricultural teaching materials being incorporated into teaching resources in East New Britain and New Ireland.

As a project focused on empowerment of women smallholder farmers, the project delivered strong **gender equity outcomes at the individual, household and community level**. Many farming families improved communication within their households and began to better understand and re-balance gender roles around household and farming labour. There were many examples of women broadening their goals and taking up leadership roles following their participation in leadership training. In all project areas some women indicated that they gained respect in their village due to their new skills and knowledge, and some men shifted their attitudes towards women's leadership, though it is important to note that many women continued to face barriers and resistance. While these were very positive steps to improve family dynamics and relations, there were mixed reports on whether, and the extent to which, this led to a reduction in family violence and further exploration of this is required.

**Policy influence was not a focus of the project**, with the primary focus remaining at the village level rather than institutionalisation of new approaches. While several government stakeholders indicated they were interested in the FFT model, there is no evidence that it has been integrated into agricultural extension policy. There is evidence of some new teaching materials being used by teachers involved in the project but no evidence of broader uptake as yet.

3

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

Key factors influencing adoption and project outcomes were the **localised, participative approach**, which meant project activities were tailored and responsive to farming families' needs and contexts. The explicit focus on context-appropriate approaches also empowered VCEs to further adapt the modules during delivery to meet participant needs. Education levels of VCEs influenced their adoption of new approaches, despite resources being adapted to low-literacy contexts. The **importance of partner agency capacity and buy-in** to achieving project outcomes was evident in many components of the project, particularly in their level of support for VCEs during and beyond the project. Engaging beyond individual staff to have a concerted strategy for building partners' institutional capacity and commitment to embed the FFT concepts into their policies and practices is key to sustainability.

**Gender and cultural norms** were a strong influence on project results, particularly given the explicit focus of the project on shifting gender norms. Gendered conceptions of women's roles were embedded in the design of the FFT approach and its focus on working in family teams, and also underpinned the risks, barriers and opportunities for women to take on peer educator and leadership roles. Wantok obligations and relations were determinative in terms of how knowledge was shared by VCEs and the capacity of different women to act as leaders.

4

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

The project achieved outcomes for women farmers across 3 domains of gender equity: **improving gender equity at the household level, advancing women's economic empowerment, and increasing women's participation and leadership**. There was evidence that the gender impacts of the project were closely monitored and that risks which emerged during implementation were followed up. However, given high levels of gender inequality and family violence in PNG, it is recommended that all projects undertake gender analysis and develop a gender strategy at their outset to mitigate risks and maximise benefits of projects for women. While the project was not informed by a social inclusion strategy, there were several examples of marginalised groups (widows and youth) being included in the project. There was no reference to inclusion of people with disability. Developing a social inclusion strategy at the outset of the project could have provided a concerted approach to reaching diverse groups.

## Key findings (*cont.*)

5

### How did management arrangements impact delivery of the project?

Partners welcomed the **respectful, collaborative relationships** between the University of Canberra project team and implementing partners. While donor partners Department of Foreign Affairs and Trade (DFAT), Pacific Women, and ACIAR were supportive of the project and its outcomes, coordination arrangements needed to be clarified at the outset to avoid confusion during implementation. The **large number of implementing partners meant that management and coordination requirements were extremely intensive**, especially given mixed levels of buy-in and capacity of partners to deliver on their responsibilities. Establishing an in-country project lead could have helped to address these issues.
In addition, while minimising engagement between partners in order to assess their different approaches was a deliberate research strategy, it is important to note that the consequence is limited whole-of-project understanding, relationship building and peer learning between partners. These types of development benefits need to be considered side by side with research aims in the future.

6

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

The **FFT project was central to TADEP**, collaborating with all other projects in some way. As a participatory research project, the FFT project contributed both materials on the FFT model, as well as knowledge of participatory research, monitoring and evaluation, and approaches to building capacity in the education sector. As the FFT project pre-dated TADEP's inception, the strategic value of TADEP to this project was less evident. However, key points of value highlighted by stakeholders include **knowledge and learning opportunities, the availability of collaborative research grants to pursue activities outside of the scope of existing projects,** and **demonstrating the value of the FFT approach to other agricultural initiatives**. National partners in particular gained a lot from participation in annual learning events and consideration should be given to how any future umbrella programs can facilitate ongoing engagement between these stakeholders. Reporting requirements were overly burdensome for all stakeholders.
Any future program should consider what strategic value can be delivered at the programmatic level, focusing on knowledge and learning across projects and also potentially a strategic capacity development approach for core partners engaged across multiple projects.

## Conclusion and lessons learned

**The FFT project has demonstrated the value of the FFT model in encouraging more effective, sustainable and gender-equitable farming practices in PNG**. The project demonstrated how the FFT approach can advance women's empowerment through agricultural development programming and also support uptake of new knowledge and practices by women and men farmers, particularly in low-literacy contexts. All projects engaging with smallholder farmers in PNG should engage with farming families to ensure approaches are sustainable and gender-equitable, and the FFT approach offers a valuable model for how this can be done effectively.

The approach should also form a central component of any future program that follows TADEP in PNG given its broad relevance and applicability.

Building on these findings, it is now important to extend the approach beyond village level to address the systemic institutional changes required to sustain delivery of the FFT approach into the future. It is also important to address broader systemic factors to ensure that farmers can translate their increased productivity into increased sales and income from commodity crops to provide the incentives to continue new family-oriented and business-oriented farming practices.

### Lessons learned

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

1. **Institutionalising the FFT approach to embed it into ongoing practice is challenging and concerted efforts are required to engage and build the capacity of partners in order to achieve this**. This requires engagement with relevant agency leaders in a co-design process to build a shared commitment to the approach, as well as institutional capacity building at multiple levels. Given the important role of community organisations such as churches in uptake of the FFT approach, further exploration of how these partnerships could support uptake of the FFT approach would also be valuable.
2. As production grows due to new farming practices, **it will become increasingly important that market access and market development programs are delivered to complement the FFT approach** so increased production can be translated into greater sales and income generation. This will be central to enabling farming families to achieve their family and farm goals and will provide a key incentive for continued adoption of new practices.
3. Given the high levels of gender inequality and family violence in PNG, **all projects should undertake gender analysis to inform their design and develop a gender strategy to guide their approach throughout implementation**. Similarly, developing a social inclusion strategy at the outset of projects would be highly valuable to ensure that projects maximise inclusion of diverse groups, including youth and people with disability, in their design and implementation.
4. **Consideration should be given to establishing in-country project teams** to co-lead project implementation, particularly in light of new limitations and risks posed by COVID-19. In particular, where projects involve larger numbers of implementing partners with mixed buy-in and capacity, having a local lead institution can provide critical support. While limiting engagement between partners may be warranted for research purposes, it is important that this is balanced with the development and sustainability benefits of peer learning, networking and collaboration between partners. In many ways this relates to larger considerations for ACIAR (and others) about the scope and objectives of research-for-development projects.
5. The value of a programmatic approach would derive from **consideration of the common objectives across subsidiary projects – such as institutional capacity building of common project partners** – that could be implemented more strategically at a programmatic rather than project level. Importantly, this does require designing the program in advance of projects, and resourcing it accordingly. In addition, a greater focus on sharing learning across all levels of project partners and minimising reporting requirements would be valuable.

# 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 23 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 Family Farm Teams project.

### Purpose

The project-level evaluation has 2 key purposes:

1. Compile performance information from each project under TADEP 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 23** 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 *Canarium* 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 'Improving opportunities for economic development for women smallholders in rural Papua New Guinea' (ASEM/2014/095). 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 and field-based program managers and coordinators.

# Methodology

## Data collection and analysis

Data was primarily drawn from existing project reports, reviews and evaluations, supplemented with semi-structured interviews with key stakeholders. Stakeholders were intentionally selected in consultation with Australian Centre for International Agricultural Research (ACIAR) and the project leader (see Appendix 6.1). Interviews were conducted online using Zoom, and via telephone calls. 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 24). In addition, economic and gender equality outcomes were assessed in line with the project design. Preliminary findings were shared and tested in a project verification workshop involving key project stakeholders and ACIAR. 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. While overall the evidence base was strong, it was difficult in some instances to ascertain how widespread change was amongst the populations involved in the project. For example, several evaluations and reports tended to describe the proportion as 'some farmers', 'most farmers' or simply 'farmers' and provide examples to illustrate the type of change experienced. In addition, in some reports it is not possible to identify whether results relate to changes for village community educators (VCEs) or changes for farmer families who were trained by VCEs.

Conducting online interviews presented limitations as the evaluator had limited ability to build rapport with participants or interpret non-verbal communication in phone or Zoom interviews.

Direct consultations mostly focused on the project team and implementing partners. The evaluator was unable to visit project sites or speak with direct beneficiaries of the project. Given the lapse of time since the project finished, stakeholder reflections may be less accurate, and several stakeholders had difficulty separating the results of this project from follow-on projects currently being implemented.

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 24** ACIAR project outcome assessment terminology

| Outputs | Next users | Outcomes |
|---|---|---|
| **Scientific knowledge:** New knowledge or current knowledge tested in other conditions, locations, etc. | • Individual scientists/researchers/ agricultural professionals<br>• Individuals responsible for the management of research or a government institution<br>• 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<br>• Public and private extension service providers<br>• Public policy actors<br>• Public and private value chain operators<br>• Consumers | **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 | | **Capacity built:** Project partners or stakeholders use enhanced capacity to do something differently |
| **Practices:** New practices and processes | | **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 | | |
| **Capacity building:** Short courses, academic training, coaching and mentoring | | |

## 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.

Waiting for community members to arrive for a Family Farms Team meeting. Photo: Conor Ashleigh, ACIAR

# Overview of project

| Project number | ASEM/2014/095 |
|---|---|
| **Project title** | Improving opportunities for economic development for women smallholders in rural Papua New Guinea |
| **Collaborating institutions** | University of Canberra<br>National Agriculture Research Institute<br>Pacific Adventist University<br>Baptist Union<br>Bougainville Women's Federation<br>Fresh Produce Development Agency<br>Oxfam<br>CARE PNG<br>New Ireland Department of Primary Industries<br>University of Technology<br>Voice for Change |
| **Project leaders** | Professor Barbara Pamphilon<br>Associate Professor Katja Mikhailovich<br>Dr Jo Caffery<br>Dr Deborah Hill |
| **Project duration** | June 2015 to March 2019 |
| **Funding** | A$3,000,000 |
| **Countries involved** | Australia and Papua New Guinea |
| **Commodities involved** | Sweetpotato, coffee, vegetables, *Canarium* and cocoa |
| **Related projects** | ASEM/2010/052 |

## Context

Women smallholders are key to the livelihoods of Papua New Guinea (PNG) families; they produce essential subsistence crops while undertaking valued social roles such as family care. However, women smallholders face significant agricultural constraints including limited access to productive resources, low banking rates, limited financial skills, lack of access to credit, poorly developed transport systems, lack of understanding of and access to markets, unequal gendered family roles and division of labour, restrictions to mobility, and overall safety. They have educational disadvantages due to low school completion rates and limited access to training or extension services.

The Australian Centre for International Agricultural Research (ACIAR) pilot 'Examining women's business acumen in Papua New Guinea: Working with women smallholders in horticulture' (ASEM/2010/052) (conducted by the implementers of this project) identified that although most women have strong aspirations to improve their family livelihoods, and invest in their children's education and wellbeing, very few women smallholders have the business knowledge and acumen to improve their family livelihoods. The pilot demonstrated that Family Farm Teams (FFT) training, financial literacy, banking and saving education, agricultural planning techniques as well as the training of village community educators (VCEs) to deliver peer education can support participants to improve their agricultural and family business practices. The pilot supported families to move to more business-focused agriculture in targeted vegetable growing communities in Western Highlands and East New Britain.

## The project

The FFT project (ASEM/2014/095) investigated the expansion of the strategies that had been piloted in 'Examining women's business acumen in Papua New Guinea: Working with women smallholders in horticulture' (ASEM/2010/052) by scaling out into 5 areas of PNG and focusing on new commodity crops. It was structured around 2 hubs:

- Highlands Hub (Eastern Highlands, Jiwaka, Western Highlands), with a focus on sweetpotato, coffee and vegetables.
- Islands Hub (Autonomous Region of Bougainville, New Ireland), with a focus on *Canarium*, cocoa and traditional vegetables.

This project aimed to improve women's agricultural productivity through agricultural extension, improve banking, saving and skills in financial management for agricultural small business activities, increase capability to access micro-finance, and build gender inclusive decision-making capacity within the family and community through the FFT training approach.

The project had 5 objectives, noting that the fifth objective was added to the project scope after the mid-term review in recognition that partner agencies required significant capacity development to effectively implement the approach:

1. To examine the capacity development of women as community-based agricultural leaders.
2. To explore ways in which communities can develop partnerships with the private sector, schools and training providers that are relevant to the local context and culture.
3. To further develop the peer education model of agricultural extension.
4. To examine the uptake and impact of a FFT approach to farming for women and girls.
5. To explore the capacity development of PNG agricultural-focused agencies in gender inclusive and gender sensitive extension delivery.

The research questions that framed the project were:

- What are the critical skills, knowledge and processes needed to develop women's leadership in rural agricultural settings?
- What are the opportunities and challenges in the development of private sector, school and training partnerships with farming communities?
- What is the uptake and impact of the family teams approach for women and girls?
- In what ways does peer-based agricultural extension support the development of women as learning facilitators?

### The Family Farm Teams (FFT) approach

One female and one male family head from a household is provided with a series of workshops and family activities that will enable them to work as a family team and to plan together the further development of their agricultural activities. The approach can be used with full family teams (adults, young adults and youth) and with other types of families, such as a widow and adult son, or with polygamous families. The FFT approach helps men and women to look at the work done by women, men and youth and to work towards making it equal and shared. It also helps families to learn to plan and make decisions together. There are 4 modules:

- Module 1: Working as a family farm team for family goals
- Module 2: Planning your family farm as a family team
- Module 3: Feeding your family farm team
- Module 4: Communicating and decision-making as a family farm team

## Project methodology

The project used a participatory action research, asset-based community development approach. Capacity building was key and the project focused on understanding the success factors and challenges in the development of women's leadership teams and the local teams of VCEs. The FFT modules aimed to enable women and men to move to more gender-equitable agriculture while providing an opportunity to research the enablers and challenges for women smallholders' economic development. Local training, private sector and extension providers were subcontracted to deliver specific training to connect communities to local resources and enabled an analysis of the brokered training model and scale-out issues.

## Project partners

In each region, the project worked with different partners to explore how to widen the range of agencies engaged in agricultural development and to provide capacity development.

A number of PNG partners contributed significantly to the research, as shown in Table 25, Table 26 and Table 27.

**Table 25** Communities and partner agencies, Highlands Hub

| Region | Districts | Partner agencies |
|---|---|---|
| **Eastern Highlands** | 6 communities in Goroka and Daulo districts | Fresh Produce Development Agency (FPDA), an agricultural training and extension agency |
| **Jiwaka** | 6 communities in North Wahgi, South Wahgi and Anglimp districts | Voice for Change, a feminist human rights agency |
| **Western Highlands** | 6 communities in Alona ward (Lumusa), Mul-Baiyer district | Baptist Union, a church organisation |

**Table 26** Communities and partner agencies, Islands Hub

| Region | Districts | Partner agencies |
|---|---|---|
| **Autonomous Region of Bougainville** | 10 wards in Halia constituency | Bougainville Women's Federation (BWF), a women's network agency |
| **New Ireland** | 4 communities in Ward 7 and Ward 11 | Tikana Local Level Government<br>New Ireland Department of Primary Industries |

**Table 27** Partner agencies and their contributions

| Partner agency | Contribution |
|---|---|
| **CARE PNG** | • Ripple effect study |
| **PNG National Agricultural Research Institute (NARI)** | • Baseline and end-line surveys (hard copy and digital)<br>• Farm observations<br>• Regional agricultural data |
| **Our Lady of the Sacred Heart School (New Ireland)** | • Teacher professional development and resources |
| **Pacific Adventist University (PAU)** | • Independent evaluation end-line interviews<br>• Farmer financial literacy<br>• Teacher professional development and resources |
| **University of Technology (UniTech)** | • Master student projects (women's adoption of new practices; poultry production uptake)<br>• Farmer-to-farmer learning facilitation study (Jiwaka)<br>• Advanced VCEs study (Baiyer Valley) |

# Findings

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

### Project theory of change

The project **goal** was to support women's economic development in order to improve gender equality, family livelihoods and food security. The **aim** was to enhance the economic development of Papua New Guinea (PNG) women smallholders by building their agricultural and business acumen.

The impact pathway that underpinned the project's design and implementation is provided at Appendix 6.2, noting that this pathway describes the assumptions at the beginning of the project rather than in light of what was learned about change pathways through the project. At a high level, this impact pathway is:

- If more women hold community leadership roles, this will contribute to women's economic empowerment in villages and farming families. In order for this to take place, women need to have:
  - local networks to support their leadership
  - skills and knowledge to underpin their leadership
  - recognition and support from male community members for their leadership.
- Women's economic empowerment relies on peer education approaches that empower women. This requires:
  - Women and men peer educators being able to work as a team, facilitate and evaluate training.
  - Women and men peer educators having the skills and knowledge to be role models in their communities.
  - Women and men peer educator teams being able to engage women farmers in trainings.
- If family farm planning, communications and decision-making are increasingly shared between women and men, this can result in greater household gender equity and reduced family violence. This requires:
  - Greater understanding and a more equitable division of household labour for household and farming work.
  - Women and men to understand and increasingly work together as family teams.
- The shift towards a family-based, more gender-equitable approach, combined with financial, business and agricultural training, can lead to overall improvements to families' food security and livelihoods, families' financial viability and the business viability of farms. This requires:
  - Women and men to jointly plan and diversify food and commodity farm production.
  - Women and men to jointly plan savings and budgeting goals, and to use banking and financial services to achieve these goals.
  - Women and men having the skills to keep business records, understand and plan marketing, and engage in entrepreneurial activities to increase their income.

## Analysis of the theory of change

The scope of the impact pathway reflects the design of this project as **a research-for-development project, rather than a development project per se**. It describes the research questions that were being tested through the project rather than the development process which is required to institutionalise these changes. The impact pathway is positioned at the village level, mapping the expected impacts of the Family Farm Teams (FFT) approach for farming families and communities. Several project activities extended beyond the official impact pathway:

1. During implementation it became apparent that implementing partners did not always have the gender awareness and capacity to effectively deliver the FFT approach. **Consequently, a fifth project objective was added to the project scope: 'To explore the capacity development of PNG agricultural focused agencies in gender inclusive and gender sensitive extension delivery'**. This involved training agency staff in the FFT modules and approach. The training was also provided to staff of other agencies who were interested and whose work aligned with the FFT approach. While there is evidence that activities delivered under this fifth objective did lead to uptake by multiple other programs, stakeholders indicated that a more comprehensive approach to capacity development is required to build institutional commitment and capacity to deliver gender sensitive extension services in the long-term.
2. The project sought to trial and assess how training providers, private sector organisations and schools could partner with communities to support adoption of new farming practices.

The **causal logic set out in the impact pathway was strong**, and accurately described the change process towards more gender-equitable and productive farming practices by families in the project sites. The project's core assumption was upheld – that supporting semi-subsistence farmers to move towards more planned, equitable and effective family farming requires 3 key and complementary components: working as a family farm team; financial literacy and business skills, and agricultural production skills. While adaptations were made throughout the project, these tended to be changes to the delivery approach. For example, in response to evaluation of the Highlands Hub engagement with communities, the training schedule was extended from 12 to 18 months as it was found to be too intensive for farming families.

**One assumption in the impact pathway that was not clearly demonstrated through the project was that adoption of the FFT approach would result in reduced family violence**. As detailed in Section 3, while there is evidence that some families adopted improved communication approaches and more inclusive decision-making, there is mixed evidence on the impacts of these changes on levels of family violence. Further analysis and exploration of the pathways to reduce violence, and the potential for FFT-style interventions to address this, are required.

**At the village level, the localised, community driven approach meant that the project was inherently grounded in and adapted to each context**. Significant changes to the overarching impact pathway were not required between project sites and the approach was readily adapted to a diverse range of contexts, including more and less remote communities, matrilineal and patrilineal contexts, and across commodities. While results varied across sites, these appear to be related less to the assumptions about how change happens in different contexts and more to contextual factors such as inter-tribal relationships, implementing partners' capacity and previous experience of farming families with training programs.

**While stakeholders acknowledged the effectiveness of the project in bringing about change at the village level, project results and stakeholder interviews revealed questions over the sustainability of some changes** beyond the project's conclusion. There were 3 main areas where this was raised:

- The extent to which shifts in household-level gender relations would be sustained or would revert to pre-existing norms.
- The extent to which peer-based educators would continue to share knowledge and learning.
- Whether changed approaches to commodity cropping and the increased incomes this should generate could be sustained without complementary market access and market development programming to address demand-side constraints.

Ripple effect mapping undertaken on the previous pilot areas provides an indication of the possible longer-term results in these areas. In villages that participated in the ASEM/2010/052 pilot project, the ripple effect mapping indicates that production of food for selling by some farmers did increase, and subsequently these families earned additional income. It identifies that some farming families considered selling larger quantities of produce outside their immediate locality, but that is not common practice and support to access larger formal markets would be required (Nema 2018).

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

### Outputs

*Scientific knowledge*

A full list of research publications is included in Appendix 6.4. **The project trialled and refined the FFT model. Results from the Highlands and Islands Hubs indicate that the approach is broadly transferrable across diverse contexts** and relevant for a broad range of contexts and with different commodities. The FFT model was compiled and documented in a public manual (Pamphilon, Mikhailovich and Gwatirisa 2017). **Project evaluations demonstrate that the FFT approach was effective in beginning to reorient women and men towards a gender-equitable and more planned approach to farming**.

They also reported that it is an effective approach for families to assess the work done by women, men and youth in households, and for family farms, and to work towards a more equitable distribution of agricultural and household work. By assisting farming families to plan and make decisions together and foster women's income-generating activities, the FFT approach advances opportunities for women to have access to their own income and promotes the wider benefits of women having a voice within the family and community.

**Pilots were conducted to assess whether the FFT materials could be adapted to different delivery formats and contexts**, both associated with other Transformative Agriculture and Enterprise Development Program (TADEP) projects and outside the TADEP umbrella. While project reporting indicates that the pilots found that training materials could be adapted, there is not yet evidence of how the different formats would influence the impact of the FFT approach for training attendees. The pilots were:

- Bougainville cocoa project (HORT/2014/094). The aim was to train key staff in the cocoa project who could then deliver the training to farmers attending the resource hubs developed as part of that project.
- PNG cocoa project (HORT/2014/096). The aim was to determine how to deliver intensive training for farmers.
- Training for fishing families. This trial assessed whether the FFT modules could be adapted to meet the needs of fishing-based communities.
- Family farm planning concepts for farmers. This trial assessed whether one-day introductory FFT training run at a local agribusiness would be appropriate for the business and of interest and value to farmers (Pamphilon et al. 2017a).

**The project refined the model for peer education as a means of agricultural extension for women farmers**. Village community educators (VCEs) were provided with training on the FFT approach as well as training to facilitate their role as peer educators (designing training programs, planning and facilitating training sessions, group dynamics and evaluating training sessions). This peer education model and associated resources were compiled into a public manual (Pamphilon 2017).

The project also **trialled approaches for brokering training for communities by training providers and the private sector**. The project identified that community learning plans can be an effective tool for communities to determine their learning needs. It identified that financial literacy, business management and agricultural training for women and men are highly complementary with FFT training in both reinforcing women's empowerment by building their skills and knowledge and enabling uptake of new skills and practices. It found that the financial, business and agricultural training should be delivered after the FFT training so that household gender roles have begun to shift before households take on additional workloads and generate additional income, and that FFT training should be followed by financial literacy training to enable better uptake and impact of new business practices. Further, it identified that agricultural agencies are most effective in delivering agricultural training, drawing on tools such as the seasonal cropping calendar. The training materials and approaches used were compiled into a public manual (Vanua with Simeon et al. 2019).

*Capacity building*

**The project equipped selected male and female farmers to act as peer educators in their villages**. In the 5 areas, a total of 266 farmers were trained as VCEs (165 female, 101 male). Around half of VCEs in Eastern Highlands and Bougainville, and almost all VCEs in Jiwaka, who completed the full training course went on to deliver training in their communities and participated in reporting and evaluation. Due to a lack of records this data is not available for New Ireland.[12] Attrition of VCEs was largely attributed to the level of support for VCEs by partner agencies, indicating the important role partner agencies play in VCE success.

**There is some evidence that VCEs assessed that their skills as peer educators had increased**. However, data on this is more limited because respondent numbers were low in the end-line surveys in the Eastern Highlands and Jiwaka, and an apparent misunderstanding of evaluation questions in New Ireland which meant the data had little validity. Unsurprisingly, those VCEs with previous experience as trainers were more confident and skilled (ACIAR 2019). Key stakeholders also reported that some VCEs had the skills and confidence to adapt the training to different contexts and participants, demonstrating their skills development as peer educators. **It is important to note that not all VCEs developed the confidence to deliver training in their villages** and many indicated that follow-up refresher trainings and skills development were required. Through brokered training from service providers, VCEs also received training on 4 areas of farm business development:

- agricultural livelihood concepts
- basic business skills
- financial literacy
- income-oriented agricultural development.

This training demonstrated how training resources and delivery could be effective in diverse low-literacy contexts, where female and male farmers had low education levels. The use of games-based and pictorial resources was particularly effective.

Approximately 100 women undertook leadership training as part of the program, with each woman leading a team of approximately 6 VCEs who delivered the peer education activities in their own village.[13] These women leaders were supported by a project leader from the implementing partner. Evaluations of each hub indicate that these **women built an understanding of their own leadership capacities and developed their leadership skills through the training**. A key outcome of the training for women was new networks, and roles and aspirations as leaders. All women were able to name their strengths as leaders in their family and a number of women indicated that they had used their leadership skills in their communities and churches (Pamphilon et al. 2017 and AISC 2017). Project reporting indicates that beginning with women-only leadership training and then moving to mixed-gender sessions was more effective.

Following the mid-term review **the project added an additional training of trainers activity to build the capacity of agencies to implement the FFT approach**. A total of 98 people (45 female and 53 male) from Fresh Produce Development Agency (FPDA), Oxfam and other agencies funded by Pacific Women Shaping Pacific Development (Pacific Women) and Pacific Governance Facility were trained as FFT trainers. There is not comprehensive data on how many, or how effectively, trainers went on to apply the training, however there are multiple examples of the FFT being applied as a result of the training.

In recognition that most children in rural communities of PNG only complete primary education, and mostly become farmers, **the project trialled and developed a professional development (PD) package for teachers on culturally relevant practices for agricultural and livelihood learning**. A total of 193 female and 180 male teachers were involved in trialling and developing the materials. Once the resources were developed, secure digital cards that can be used with low-cost mobile phones were pre-loaded with agricultural and livelihood teacher materials as well as additional teaching resources. The PD package was launched in July 2018 with the New Ireland, East New Britain and national departments of education.

12 According to the Highlands and Islands Hub reports, Certificates of Completion were awarded when VCEs attended all modules, rolled out the training in their community, and contributed to the reporting and evaluation processes. Certificates of Participation were awarded to all those who completed part of the training and to New Ireland participants.

13 In Bougainville, equal numbers of female and male leaders were appointed and trained (16 female, 13 male) to align with the community governance structure that mandated equal numbers of female and males in all committees. In addition, at the request of the Bougainville Women's Federation the leadership training was also provided to young women from a separate project (5 females) and women community government committee representatives (7 females). At the request of the New Ireland Department of Primary Industries, the first 2 New Ireland leadership trainings involved both female Department of Primary Industries staff (4), and VCEs and leaders (16). However, all women VCEs were unexpectedly invited to the last 2 trainings, reaching a total of 46 women VCEs. See Islands Hub Report.

**The project built the capacity of some researchers in participatory action research, as well as supporting some researchers to gain qualifications**. Four researchers based in PNG gained Master qualifications (2 each at University of Technology (UniTech) and Pacific Adventist University (PAU)) through the project. Stakeholders also valued the networks they developed through the project, which they felt provided a foundation for potential future collaboration.

### *Policy*

Two aspects of the project – the FFT approach and teacher professional development resources and materials – have significant potential for policy uptake. There were limited activities undertaken through the project to support embedding outputs into relevant policy frameworks or building institutional capacity to implement them. For example, the *Educating Children for Farming Futures Report* (Simoncini and Pamphilon 2018) indicates that inviting PNG Department of Education (DoE) officials to pilot trainings and arranging meetings with departmental officials to discuss the project with them in person would have helped promote uptake (Simoncini and Pamphilon 2018). Future projects should be designed (in terms of duration, resourcing and so on) to maximise the uptake of high-value knowledge and resources generated through TADEP projects by government policy and programming.

## Adoption

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 28.

### *New technologies or practical approaches*

**In all project areas both men and women farmers reported increasingly working as a team after the project**. For example, in Bougainville there was a 60% increase in the number of women who reported 'always' or 'often' working in a team at the end of the project. Greater understanding of the inequality in workloads between men and women, and some changes of roles and sharing workloads, were evident in all areas (Pamphilon et al. 2017a). Reports also indicate that **in some instances the project increased women's burden of work** as women undertook the majority of labour on farms on top of a challenging training schedule, which placed high demands on women's existing farming and household responsibilities, and this was not matched by a redistribution of roles within the family (Pamphilon et al. 2017b). In all areas women reported that they retained the responsibility for marketing, and one evaluation suggested that this was likely because women preferred to retain this role as it provides them with access to cash (Pamphilon et al. 2017a and 2017b). A critical factor influencing changes in household relations was having at least 2 participants from a household involved in the training, and ideally the husband and wife. The Highlands Hub evaluation indicated that having pre-agreement on roles for women, men and youth should be a prerequisite for families' participation in project activities. In addition, shifting gender norms is a very slow process and several interviewees felt that changes would not be sustained within farming families without ongoing engagement and support.

**In all sites, a high percentage of farmers (both VCEs and farmers trained by them) indicated that they had developed goals for their farms and families and were planning both subsistence and commodity crops**. Common family goals are listed in Table 29. Evaluations also found that **women's planning of home gardening and knowledge of nutritional eating had improved across all project areas**. In the Island Hub, VCEs reported that 'nearly everyone' now has a FAITH garden[14], and that women who had been purchasing vegetables now tend to grow them in their own garden. Interviews highlighted the uptake and impact of these gardens for producing food for families during the COVID-19 pandemic when access to markets had been limited.

14 A FAITH garden stands for 'Food Always In The Home'. This was a central concept of FFT training.

**Table 28** Levels of adoption of key project outputs

| Category | Output | Users | Level of adoption |
|---|---|---|---|
| **New technologies or practical approaches** | Family team-based farming practices | • VCEs are initial users<br>• Other farming families are final users | Nf* |
| | New agricultural practices | • VCEs are initial users<br>• Other farming families are final users | Nf* |
| | Business-like approaches to farming | • VCEs are initial users<br>• Other farming families are final users | Nf* |
| **New scientific knowledge** | Family Farm Team model | • Individual researchers and practitioners who were involved in the project are initial users<br>• Use of these approaches and materials beyond the project constitutes final users | NF |
| | Business in farming approaches and training materials | • Individual practitioners who developed and delivered the training materials are initial users<br>• Use of these approaches and materials beyond the project constitutes final users | NF |
| **Knowledge or models for policy and policymakers** | Teacher professional development and curriculum | • Teachers involved in developing the approaches and resources and trained to use them are initial users<br>• Uptake of the approaches and resources into broader education policy or programming constitutes final users | N |
| | Agricultural extension policy | • Work areas involved in the project are initial users<br>• Uptake of the approaches or ideas into broader policy or programming constitutes final users | O |

Notes:
* While there is evidence that some families have taken up these approaches, there is insufficient evidence of the level of uptake
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 final users
NF Demonstrated and considerable use of results by the initial and final users

**Table 29** Common family goals across all project sites

| New assets | Farm production | Family life | Cultural |
|---|---|---|---|
| • Permanent / semi-permanent house<br>• PMV (bus)<br>• Sewing machine<br>• Set up a food bar<br>• Build a guesthouse<br>• Trade store | • Vehicles to transport produce<br>• Feed mill for animal feed<br>• Piggery and/or poultry<br>• Vegetable nursery<br>• Increase food crop volume<br>• Set up local market | • House renovations<br>• Electricity/solar<br>• Water tank<br>• Generator<br>• Fridge<br>• School fees<br>• Adult education courses | • Set money aside for bride price, funerals, compensation<br>• Contribute to community feasts<br>• Contribute to the church every week |

*Source:* ACIAR 2019

**The majority of farmers' households (both VCEs and farmers trained by them) reported that they had diversified their crops and farming practices to grow new crops specifically for sale**, rather than simply selling any surplus. This included significant increases of women growing new crops.[15] In the Highlands Hub some participants had bought new equipment since becoming involved in the project though it is not clear whether this was directly attributable to the project. Reports indicate that **moving from subsistence to commercial crop production was very challenging for farmers**. Importantly, farmers indicated that they require continued training, particularly in the use of fertilisers and pesticides, and that they are concerned about the viability of these expenses to continue their use in commercial crop production on their farms (Pamphilon et al. 2017b). This reflects findings in the ripple effect mapping from the ASEM/2010/052 pilot, where farmers reported that they needed ongoing technical agricultural extension and training to continue implementing new practices (Nema 2018).

In all project sites, **training on budgeting and savings goals led to an increase in budgeting by VCE families, with greater increases in the Highlands Hub than the Islands Hub** (see Table 30). While increases are lower in the Islands Hub, the overall rates of VCE savings were higher in that Hub as more were already saving prior to the project. This data was not available for the Islands Hub. **Access to and use of bank accounts by VCEs also increased as a result of the project**. In the Highlands Hub where access to banks was more limited, training project members as Nationwide Microbank agents enabled some women and families to conduct banking in their own villages. Nationwide Microbank reported the majority of the transactions in both Eastern and Western Highlands were by women, noting that agents were not yet active in Jiwaka at the time of data collection (Pamphilon et al. 2017b).

Changes in **record keeping and bookkeeping practices were more challenging and reported to be not as readily implemented by VCEs**. Reports indicate that this was primarily due to low numeracy among participants. That said, in the Highlands Hub, 69% of VCEs reported keeping records individually or as a couple after the project, noting there is not a baseline to compare this against. In the Islands Hub, fewer VCEs reported that they keep records and there were also inconsistent responses about who is the household record keeper, indicating the lack of a clear or shared approach (Pamphilon et al. 2017a).

**Changes in VCE marketing practices were evident in households that participated in the project**. In the Highlands Hub, many households had changed where they sold their crops (46.7% in Eastern Highlands, 42.3% in Jiwaka, 65.4% in Western Highlands) and all areas reported selling more often. Marketing practices were reported to have changed less uniformly in the Islands Hub, with a similar percentage of households reporting an increase in market sales as those that reported a decrease in market sales (Pamphilon et al. 2017b). The Islands Hub evaluation attributes this to farmers increasing their commercial cropping and selling whole harvests less frequently, as opposed to selling small surpluses frequently.

**Table 30** Changes in VCE budgeting practices

| Location | Change in VCE budgeting practices |
|---|---|
| Highlands Hub | • 22% increase in monthly budgeting<br>• 46% increase in weekly budgeting |
| New Ireland | • 17% increase in budgeting |
| Bougainville | • 7% increase in budgeting |

*Source:* Pamphilon et al. 2017a and 2017b

15 In the Islands Hub a majority of households (83% in New Ireland and 86% in Bougainville) reported growing new crops. Exact figures are not provided for the Highlands Hub but graphs in the *Islands Hub Report: Developing farming families through training and development activities* indicate significant increases in the numbers of men and women who 'often' and 'always' grow new crops.

*Knowledge or models for policy or policymakers*

**There is limited evidence that the project has been integrated into agricultural extension policy and approaches by FPDA and Department of Primary Industries (DPI)**. Project reports indicate that the FFT approach was anticipated to be integrated as a formal component of the FPDA village extension worker program and incorporated into extension policies, however this appears to have been driven by one key stakeholder within FPDA and has not proceeded since that individual left the organisation (ACIAR 2019). Stakeholders within DPI indicated that there is awareness of the FFT approach and a commitment by some individuals to incorporating the approach into their work, however this has not yet happened in practice. According to an interview, policy influence appears to have been heavily reliant on individual champions within these organisations, which has limited uptake as staff turnover and the lack of broader organisational buy-in stalls momentum.

At this stage there is limited evidence available to assess the extent to which teaching PD resources and new approaches have been adopted. However, of the 373 teachers involved in piloting the resources, 19 stakeholders were interviewed to assess uptake (these interviews were not undertaken as part of this evaluation) and all 19 had implemented ideas from the PD workshops (Simoncini and Pamphilon 2018). While the PD package was officially launched in July 2018 with the New Ireland, East New Britain and national DoE, there is no evidence that the teaching PD resources have been incorporated into education policy as yet. Turnover of key champions of the resources has also hampered progress. As with agricultural agencies, this highlights the risk to sustainability of reliance on individuals to drive uptake of project outputs rather than an institutional capacity development strategy.

## Outcomes

*Scientific achievement*

In demonstrating the effectiveness and adaptability of the FFT model in diverse contexts, the project supported its uptake by a range of organisations as an effective model of gender-inclusive agricultural extension. Other programs that integrated the FFT approach include:

- The 'PNG Women and Extractives' project uses the 4 FFT modules and the games-based financial literacy and business training developed by PAU as the foundation for community development activities.
- The 'FHI 360' pilot of a savings and loans model in communities in the Western Highlands province includes foundational training by PAU using the games-based financial literacy and business skills trainings developed through this project.
- The 'From Gender-Based Violence to Gender Justice and Healing in Bougainville' project's economic pilot is using the FFT modules.
- The International Fund for Agricultural Development 'Markets for Village Farmers' project included FFT modules as foundational training for 23,000 farming households.
- The World Bank's new 'Papua New Guinea Agriculture Commercialisation Development' project references the FFT approach.

Other TADEP projects have integrated the FFT approach into their programming:

- Developing the cocoa value chain in Bougainville (HORT/2014/094)
- Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland and Chimbu provinces of Papua New Guinea (HORT/2014/096)
- Supporting commercial sweet potato production and marketing in the PNG Highlands (HORT/2014/097)
- Enhancing private sector-led development of the *Canarium* nut industry in Papua New Guinea (FST/2014/099).

The games-based financial literacy and business skills training developed through the project is being used by multiple Pacific Women partners, including:

- The 'Women and Extractives' project, which used the FFT modules as the foundation activities for community development projects to generate support for women's decision-making roles in mine-agreement making forums.
- The Kommuniti Lukautim Ol Meri, and Gender Justice and Healing projects, which are using the family-based approach and basic business skills training manual developed through the FFT project for their economic empowerment pilots (Pacific Women Support Unit 2020).

*Capacity built*

Key project stakeholders including VCEs, PNG partner organisations and communities achieved greater capacity throughout the project, as summarised in Table 31.

**The extent to which VCEs continued to be active as peer educators and share their knowledge with others in their villages during the project varied between project sites**. VCEs reported having trained 2,541 other farmers across all 5 areas (noting these should be considered estimates). Importantly, 63% of the farmers trained were female, demonstrating the effectiveness of this approach in reaching women farmers. Most VCEs offered training to members of their family, wantok and neighbours, and in some cases church groups (ACIAR 2019). Sharing knowledge outside of the wantok was a common challenge in the highlands due to inter-clan jealousy. VCEs in the Islands Hub reported sharing their learning far more widely, including through ward committees, churches, community events and with other non-government organisations. It would be valuable to explore how more formal partnerships with these community groups could be incorporated into future programming to promote more widespread sharing of learnings by VCEs, particularly as these groups may be well placed to provide ongoing support and mentoring to VCEs. **It is not clear how many VCEs continued to act as peer educators beyond the project duration**. The evidence above and several stakeholder interviews for this evaluation indicate that some VCEs did embed the FFT approach and continue to deliver trainings. Other interviews indicate that VCE activities ceased once the project concluded and that key changes such as shifts in gender relations at the household level are likely to revert back to pre-existing norms.

**Reports indicate that training providers have built their capacity in areas such as participatory research, and designing and delivering training in low-literacy contexts**. Reports indicate that several universities are applying knowledge gained through the project in the extension arms of their departments, both in terms of delivering activities but also teaching students new research and training techniques. Examples include:

- A researcher from the Integrated Agriculture Training Program (IATP) at University of Natural Resources and Environment who was involved in the project and is now integrating the FFT approach into training modules at the IATP.
- PAU academic staff have built their capacity in place-based and low-literacy teaching in rural communities and are using this in their teaching curriculum and extension arm.
- PAU School of Business academics have been trained in the FFT First Steps to Financial Literacy 'games-based' training and are developing other modules based on this approach.

Reflections of training partners on capacity built through the project:

> *'We built our capacity working alongside ACIAR partners … we were learning at the same time and they were learning from us.'*
>
> *'[the organisation] has taken on the FFT, we are doing it on our own … we've picked up everything from ACIAR and what is online and we are adopting and using it.'*

**Table 31** Capacity built relevant to project objectives

| Who | Skills and knowledge |
|---|---|
| Village Community Educators (VCEs) | • Peer education and facilitation skills<br>• Leadership skills<br>• Greater understanding of the importance of a more equitable division of household labour<br>• Agricultural livelihood concepts<br>• Basic business skills<br>• Financial literacy<br>• Income-oriented agricultural development |
| Male and female community members | • Greater understanding of the importance of a more equitable division of household labour<br>• Agricultural livelihood concepts<br>• Basic business skills<br>• Financial literacy<br>• Income-oriented agricultural development |
| Training partners | • FFT approach<br>• Participatory research<br>• Designing and delivering training in low-literacy contexts |

Project reporting indicates that in 2019 the **teaching materials developed through this project were incorporated into New Ireland teaching resources for primary and secondary schools** and provided to primary and secondary schools across the province. Stakeholders indicated that the departure of a key supporting school principal has led to this process stalling. The evaluation was not able to assess the extent to which these resources were used.

*Economic outcomes*

A majority of the **highlands VCEs indicated that they had increased their usual income** from selling food crops and these increases were statistically significant (Pamphilon et al. 2017b). Almost all households surveyed in this hub had increased the amount of crops they grew for sale, but income increases were lowest in Western Highlands where there is more limited access to markets than in Eastern Highlands and Jiwaka (Pamphilon et al. 2017b). It is too early to assess income changes in the Islands Hub, however a high proportion of VCEs reported that they had increased their income from selling cash crops and attributed this to the project (Pamphilon et al. 2017a). Increased income was commonly spent on family, farming and social obligations such as contributing to problem resolution, bride price or church payments. Women and men reported that spending on gambling and alcohol had reduced (Pamphilon et al. 2017b).

A majority of households in both hubs reported that they now **'always' or 'mostly' have enough food in their home to feed the family**. Baseline figures were not available, so it is not possible to assess the extent of change and how the project has influenced this. However, evaluations in both hubs indicated that many participants identified improvements in food availability as a key result of the project and this was also supported by stakeholder interviews conducted for this evaluation (Pamphilon et al. 2017a). In addition, evaluations in both hubs reported that many households had improved their diets (Pamphilon et al. 2019).

**In all project sites there was an increase in families more regularly making shared decisions about money**. While exact data was not available for the Highlands Hub, a similar trend followed across all highlands project sites with a shift towards families more regularly making joint financial decisions (Pamphilon et al. 2017b), as shown in Table 32.

*Gender equity outcomes*

**Men as well as women reported that they had implemented new ways of communicating due to the project** and acknowledged the importance of good communication between all family members. Importantly, this was not the case for all families with some VCEs reporting that little had changed or that change was very slow to eventuate (ACIAR 2019). The project identified that it was important that at least 2 family members (including a male family member) participated in the FFT training in order to influence change, reinforcing the importance of maintaining a gender balance to maximise the impacts of the FFT approach. In the highlands there were a number of reports that communication and family relations also improved in polygamous families due to the project, demonstrating the adaptability of the approach to different family structures.

Project reports, along with interviews conducted for this evaluation, demonstrate that the **skills, knowledge and confidence that some women gained through the project enabled them to take on greater leadership roles** in their communities. Evaluations of both hubs reported that generally women's goals and aspirations had expanded since involvement in the training and that many women spoke confidently about their leadership roles in the community (Pamphilon et al. 2017a). Women took on roles with the school board of management, ward committees, and ran awareness and reconciliation for the local government. The exception to this was New Ireland, where women had not taken on new roles.

> *'I have seen impact on the lives of [people] in terms of how they were able to speak up, speak out, their status in the community, for the women especially.'*
>
> – Project partner

**Table 32** Changes in the proportion of families where women and men make joint financial decisions

| | Location | Baseline | Endline |
|---|---|---|---|
| **Percentage of women who report 'always' or 'often' making decisions about money together with men** | Bougainville | 20% | 80% |
| | New Ireland | 24% | 44% |

**Taking on leadership roles was challenging for some women and many women faced barriers to exercising their leadership** (Pamphilon et al. 2017b). Inter-tribal tensions and resistance from some women and men to women taking on leadership roles were particular barriers (Nema 2018). Those who had previous leadership training and experience, or came from families that were clan leaders reported facing fewer barriers (ACIAR 2019). Managing conflict within their groups was a particular challenge for many women and they highlighted the need for additional training on communication, conflict resolution and handling criticism (ACIAR 2019). Support from partner agencies, including mentoring, was identified as playing an important role in building and sustaining women's leadership, in maintaining linkages with the women, drawing on their skills, and providing continued opportunities and training beyond the project (Pamphilon et al. 2017b).

**In all areas some women reported that they gained increased respect in their village through their training and role as a peer educators**. There is evidence that some men also began to acknowledge and support women as leaders in their villages and recognised their own roles in supporting women to become leaders (Pamphilon et al. 2019 and 2017). There is also evidence that the FFT project helped to create space for women's leadership by equipping them with skills and knowledge which was valued by their communities. For example:

- In Jiwaka, young women were encouraged by the community to build a training shelter.
- In New Ireland, women regularly spoke at 'community day'.
- In Bougainville, many women VCEs were invited to join community committees (ACIAR 2019).

**There is evidence that the FFT approach made valuable progress addressing some contributing factors to family violence and providing avenues for non-violent family relations in project areas**. As described above, this included awareness and adoption of improved non-violent communication approaches by many households as well as greater shared planning and decision-making within many families. By addressing household-level gender norms and behaviours and promoting strong families as a central part of successful farming, the project promoted family cohesion and respect, which may have an impact on reducing violence. However, evidence from project reports and evaluations indicate that while there was a decrease in violence in some families, in other families, men continued to perpetrate violence against women (Pamphilon et al. 2017b).

### *Environmental outcomes*

Project reports indicate that farmers are now more aware of the safe use of chemicals and pesticides and of the importance of maintaining their soil and management of their land. These outcomes were not assessed through this evaluation.

Bernadette Lasin, one of the Family Farm Teams' leaders on Buka Island. Photo: Conor Ashleigh, ACIAR

### The impact of the project on family violence

Family violence was highly prevalent in project areas, primarily perpetrated by men against women but also by women against men and other women, and by adults against children. There is evidence that the FFT approach made valuable progress addressing some causes and triggers of family violence in project areas. This included awareness and adoption of improved non-violent communication approaches by many households, as well as greater shared planning and decision-making within many families. These changes in household-level behaviours were largely attributed to the project's focus on cooperation and teamwork as a family, which promoted family cohesiveness. In addition, the skills, knowledge and leadership opportunities built by women through the project led to women being more respected by their partners and communities.

> *'The FFT program has provided another enabling discourse of gender cooperation and teamwork.'*
>
> – Highlands Hub report (Pamphilon et al. 2017b)

However, reports on the impacts of these changes on levels of family violence were mixed. Some families reported that these changes had contributed to reduced family violence in their households, for example, by avoiding triggers for violence such as control over money.

> *'In the past, every money I earned in a day would be taken and used by my husband. He would ask for the money and I used to be scared so I would give him everything. The training has changed all those practices. My family today plans and works together to make our family budget and we are saving our money. This is the greatest thing that has happened to my family.'*
>
> – ASEM/2014/095 Final Report (ACIAR 2019)

However, both hub evaluations reported that some men continued to perpetrate violence against women, noting that data was not available on the extent to which this violence occurred and its relationship to project activities. Project reports indicated that this occurred when women returned from training – with suggestions both that it was because women returned late or men did not accept women participating in the training – and also due to the demands on women's time of the model farms (ACIAR 2019).

> *'Although family violence continues to be a barrier for women, the project has provided enablers for women through the development of new community roles as peer educators and leaders. Women who have increased knowledge capital from the training potentially have increased power and community status.'*
>
> – Islands Hub and Highlands Hub reports (Pamphilon et al. 2017a and 2017b)

Several examples were provided of women providing support networks for other women who experienced family violence. For example:

> *'I had 6 VCEs and after the first training we conducted some of them were beaten by their husbands. I supported them when their husbands beat them.'*
>
> – ASEM/2014/095 Final Report (ACIAR 2019)

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

### Factors influencing adoption and outcomes

**At the village level, a critical success factor for adoption of outputs was the localised, participative approach that the project was inherently grounded in, allowing adaptation to each context**. The participative approach of working with VCEs to identify their priorities and goals, culminating in a tailored manual specific to each context, was critical. Stakeholders felt that this empowered VCEs to adapt the content to their context to ensure it was relevant and likely to be effective, as well as building their confidence to adapt the materials for diverse training participants. Tailoring project materials to rural, low-literacy contexts was also key in influencing adoption. The use of pictorial-based materials and story books proved highly appropriate, as well as games-based and participatory learning approaches. Results in the Highlands Hub indicated that even trainings using low-literacy resources, participatory methods, and translation into local languages remained challenging for participants who had no previous educational experience (Pamphilon et al. 2017b). While VCEs tended to become more familiar with training processes over time, some VCEs with low education levels did not build sufficient confidence to deliver the training in their villages. In the Islands Hub, selection of VCEs who had completed primary school and had basic Tok Pisin and English literacy proved more effective, particularly in enabling use of written materials.

**Partner agencies' capacity to implement the FFT approach and the level of support they provided** has been consistently highlighted as critical for VCE success as peer educators, both during the project and beyond. This includes mentoring for women leaders and peer educators, support to build and facilitate networking by VCEs in a community of practice, and ongoing training and capacity development of VCEs in core areas. Project documents and stakeholder interviews identified that whether organisations have a genuine commitment to supporting women's economic empowerment in agricultural development as part of their core business was a critical success factor, as it resulted in higher levels of engagement in the project and would likely be conducive to higher levels of ongoing commitment beyond the project.

> *'If we could put different [VCE] teams together they can empower each other, support each other. This would be good for sustainability.'*
>
> – Project partner

Having the organisational capacity to deliver the FFT approach, including skills, culture and management buy-in, was key for sustainability. The addition of the fifth objective and subsequent delivery of FFT training to some partner agencies was a first step in working beyond the village level with implementing partners to drive increased capacity to deliver the approach. However, **building organisational commitment and capacity to genuinely adopt and embed the FFT approach into policies and practices requires a concerted strategy beyond training individual staff**. This needs to include extended engagement with senior management and policy support to embed the approach into internal systems and practices. While this work was beyond the scope of this project it should be considered for future projects to maximise uptake of the FFT approach by extension service delivery agencies, as well as ensure they are positioned to provide support for VCEs as part of their ongoing agricultural extension activities.

**Gender and cultural norms were a strong and significant influence on every output and outcome delivered by the project**. Given the project's core focus on women's economic empowerment, gender norms were highly influential on project performance. Key learnings were that the family approach and male–female composition of VCE teams (as opposed to all-female teams) were effective approaches in supporting household-level changes in gender roles. The project also identified that supporting changes to household-level division of labour for family and farming responsibilities needed to precede improved farming practices and income generation if women were to benefit from the latter. If not, there is a risk that the approach can add to women's existing workloads. **The most influential cultural norms on project outcomes typically related to wantok relations**. This affected women's leadership, as some women were not able to act as leaders for women outside their wantok, while others were more able to adopt leadership roles because of their family's higher status. In addition, project reports indicate that VCEs tended to provide training to existing community networks, with most working within their wantoks. This demonstrates the limitations of the approach in building knowledge and implementation of new practices across wantoks.

Table 33 provides key findings against the categories and factors influencing adoption and outcomes as part of the ACIAR evaluation framework.

**Table 33** Factors influencing adoption and outcomes

| | Factor | Key findings |
|---|---|---|
| **Knowledge** | Do potential users know about the outputs? | • Peer-based education is an effective method for influencing adoption at village level, significantly driven by the demonstration effect. |
| | Is there continuity of staff in organisations associated with adoption? | • A stronger partnership approach and organisational capacity development (as well as individual staff) of implementing partners would enable more sustainable uptake of the FFT approach. |
| | Are outputs complex in comparison with the capability of users? | • Low gender awareness and lack of skills/experience of agricultural extension services does limit adoption of the FFT approach without ongoing individual and organisational capacity development. |
| **Incentives** | Are there sufficient incentives to adopt the outputs? | • There are strong food security and income incentives to adopt the FFT approach and new farming practices at the village level.<br>• Incentives for VCEs to continue acting as peer educators and share knowledge beyond their immediate family or wantok need to be assessed.<br>• Access to markets to sell commodity crops also needs to be addressed so that demand for produce can influence and enable farmers' farm goals to be achieved. |
| | Does adoption increase risk or uncertainty? | • There is a risk that the approach results in increased workloads for women if household labour is not redistributed between women and men before training, model farming and commodity cropping commences. |
| | Is adoption compulsory or effectively prohibited? | • Not identified as a constraint for these projects. |
| **Barriers** | Do potential users face capital or infrastructure constraints? | • Some farmers questioned the feasibility of buying fertilisers and other inputs beyond the project duration. |
| | Are there cultural or social barriers to adoption? | • Gender norms and community expectations are a key barrier to adoption of the FFT approach. The community-driven, adaptive approach enables it to be grounded in the norms and context of each community, however these norms are slow to change and adoption of new family farming practices will be gradual. Ongoing support is required to ensure that families do not revert to pre-project gender roles and farming practices once the project has concluded. |

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

Gender equity and women's empowerment were central to the project's objectives and approach. As outlined in the impact pathway, this approach comprised 3 interrelated focus areas:

- Improved gender equity at the household level, focusing on building understanding of the burden of work undertaken by women and men within the household and instigating a more equitable distribution of labour.
- Women's economic empowerment, focusing on increasing women's incomes and financial decision-making.
- Women's participation and leadership, focusing on building women's skills, confidence and opportunities to exercise leadership roles in their communities.

There is strong evidence that the project impacted to some extent across all 3 focus areas and contributed to the economic empowerment of women smallholder farmers. The adaptive approach to gender equity was critical to the project's effectiveness. For example, when evidence emerged that VCE teams should be mixed gender, the project adapted to encourage mixed male–female teams rather than all-female.

**It is recommended that future projects include up-front gender analysis and a gender strategy to ensure appropriate measures are in place to manage risks**. This project scaled out a previous pilot which was informed by a 'do no harm' process. Gender indicators were included in the project's monitoring and evaluation framework to assess performance on gender equity. There were incidents of backlash against women for having taken on leadership roles, both from other women in their villages and men, and there was mixed reporting on whether the project contributed to a decrease in family violence or increased incidents of family violence. It was reported that once risks of family violence emerged, the project leadership raised and discussed this issue with project partners across all sites and were advised that peer support networks were in place to support women who experienced violence. Given the high rates of family violence and gender inequality in PNG, it is essential to identify risks and risk management mechanisms at the outset of all projects and put in place strategies to mitigate and manage risks for women.

**Developing a strategy for social inclusion at the outset of the project would have enabled a more strategic approach to be taken towards engagement with diverse groups**. There was no specific social inclusion strategy for the project. However, **project reporting includes some examples of marginalised groups being included in project activities**. The primary examples are in Bougainville where the Halia Widows Association was selected as the project delivery partner, meaning female VCEs in that project area all came from households with females at the head. The final report indicates that this did spark backlash from other groups who were not included in the project. No data was available to assess that concern during this evaluation. **Youth were also involved in some project areas as core members of farming families**. Several stakeholders indicated that a greater focus on youth is warranted and should be considered in future programming. Other examples included a number of VCEs training youth and those with drug and alcohol problems in Bougainville, and provision of a training session for female secondary students with the aim of helping them as future family leaders and to avoid early marriage and/or pregnancy (Pamphilon et al. 2019). There is no reference to people with disability being involved in the project.

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

**Project partners consistently reported that project management arrangements between partners and University of Canberra (UC) were strong and welcomed the highly respectful and engaging approach of project leaders**. Partners reported that relationships with the UC research team were collaborative and based on two-way learning, and felt that the knowledge they brought to the project was valued by the project team. This is particularly commendable given the complexity of project delivery for the UC project leader, who faced **significant challenges coordinating 2 hubs and 5 project locations, 6 major partner agencies, and other partners for specific activities**. All stakeholders indicated that **project timelines were extremely challenging**, particularly given the high number of partners and complexity of the project, as well as the impacts of holiday periods, community events, and obligations on VCE availability.

At the individual partner level, **the commitment and capacity of project partners to implement the FFT approach was mixed**. In some areas, levels of commitment were high, and stakeholders felt there was a strong shared agenda between implementing partners and the project objectives. However, there was evidence of a period of absence of a partner agency in one project area, as well as a lack of commitment and resourcing for the area leader's work in another area, which undermined continuity and effectiveness of project activities. Project documents indicate that greater support for partner agencies and mentoring of area leaders throughout the project was required, including collaboration with partner agencies on key issues such as recruitment or appointment of appropriate project staff (Pamphilon et al. 2017).

> *'At the end of the day, ACIAR only funds projects forward for a certain time, but afterwards someone needs to carry it forward.'*
>
> – Project partner

**There was minimal collaboration or engagement between project implementation partners**. This was a function of the project design, with partners purposefully separated to understand strengths and weaknesses of different organisations in establishing partnerships with communities. As such, stakeholders were brought in to collaborate with the UC research team on pre-determined research objectives and had limited engagement across the project. While this may have delivered benefits in terms of comparing the approach of different partners, several stakeholders reported that they would have appreciated greater understanding of the broader project they were contributing to, and that a more collaborative approach would have increased the quality of their engagement (such as ensuring the right personnel would be available) as well as building learning networks that could endure beyond the project. The limited involvement of institutions in the up-front design of the project meant that while some agencies took great ownership of the activity results and genuinely adopted the learnings for use in their own work, in others the findings were primarily held by an individual and have been impacted by staff turnover. Consideration should be given to engaging partners in the project design process, and promoting collaboration to maximise networking and learning between partners.

**Coordination arrangements with Department of Foreign Affairs and Trade (DFAT) and Pacific Women Shaping Pacific Development (Pacific Women) needed to be clarified at the outset of the project**. There was limited understanding of the role of Pacific Women in relation to DFAT as the project funder, which led to a lack of clarity around project reporting as well as participation in project events. Recognising the value of the FFT approach and its applicability across multiple programs, Pacific Women was well-placed to support uptake of learnings from this project, however again, a lack of clarity around the relationship between the FFT project and Pacific Women meant that these opportunities were not maximised. While there were efforts to share learning across Pacific Women projects (particularly after the addition of Objective 5), this could have been greater if coordination between the 2 project teams had been closer.

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

**Awareness of the TADEP umbrella and its objectives varied significantly across project stakeholders**. While project leaders had a deep understanding of the TADEP objectives and purpose, PNG-based project stakeholders had a more limited awareness of TADEP, if at all. Several PNG-based stakeholders recognised the value in cross-project collaboration and learning – within and beyond ACIAR-funded projects – and recommended greater ongoing engagement throughout implementation.

### Alignment with TADEP objectives and projects

The project aimed to support these TADEP objectives:

- **To create economic opportunities for rural women through small enterprises**. Project activities and collaborative activities enhanced women's engagement in cocoa, *Canarium* and sweetpotato projects.
- **To build capacity across the program, ensure gender equity in all aspects of the program, and create effective monitoring and evaluation**. The project shared data collection methods for gender-specific research questions and impact measures; and shared participatory monitoring and evaluation methods, especially for smallholders with low literacy.

### Collaboration with other projects

The FFT project was central to the TADEP umbrella in that opportunities were identified for collaboration with all 4 other TADEP projects:

- 'Developing the cocoa value chain in Bougainville' (HORT/2014/094). Key staff from this project were trained in the FFT approach in a one-week intensive session in 2018.
- 'Enterprise-driven transformation of family cocoa production in East Sepik, Madang, New Ireland and Chimbu provinces of Papua New Guinea' (HORT/2014/096). Key staff from this project in the New Ireland site were trained in the FFT approach.
- 'Supporting commercial sweet potato production and marketing in the PNG highlands' (HORT/2014/097). Communities that had participated in the Highlands Hub of ASEM/2014/095 were selected for inclusion in this project.
- 'Enhancing private sector-led development of the *Canarium* nut industry in Papua New Guinea' (FST/2014/099). This project provided training on Galip Nut production to the FFT project.

Knowledge and approaches developed through the FFT project and shared with TADEP projects included:

- trialling capacity development of key extension service officers and farming families (men and women) in the FFT modules
- the development of children's books to build knowledge of children and their parents
- approaches to building capacity in the education sector
- participatory research, monitoring and evaluation knowledge.

It is notable that this project provided significant knowledge transfer to other TADEP projects but there is **only one example that knowledge generated through other TADEP projects was applied in the FFT project (galip nut training)**. The key reason for this was the unique focus of the FFT project on participatory research and gender-sensitive approaches to uptake of new agricultural practices, which had relevance across the breadth of the TADEP portfolio.

While project documents indicate that the engagement of multiple projects, including the FFT project, with National Agricultural Research Institute (NARI), DPI and FPDA provides opportunities for greater capacity building, **evidence of a coordinated TADEP-wide capacity development approach was not identified during this evaluation**. This could potentially form a key program-level objective in future iterations of the TADEP umbrella.

### Knowledge transfer and learning

**TADEP reviews and annual meetings were cited as the most effective mechanism for sharing project results and cross-program learning**. Most partner agencies had attended at least one TADEP meeting, which demonstrates a commitment to inclusion and engagement of PNG-based partners in this learning by the project leadership. These stakeholders reported that the events were extremely useful for building knowledge and networks and recommended mechanisms be introduced for ongoing engagement. **TADEP collaborative grants were also valuable in providing a mechanism to undertake program-wide collaboration and learning**, given this was not built into project designs and budgets. Collaborative grants were provided to support collaboration with the Bougainville cocoa and PNG cocoa projects, allowing the FFT approach to be built into those projects.

Several stakeholders reported that **having the TADEP umbrella in place enabled better communication of the results** of the FFT project to other projects and partners. For example, sharing the combined TADEP results, including showcasing the FFT, at Pacific Women learning workshops was reported to have supported uptake of the FFT approach by other Pacific Women-funded projects. In addition, it supported communication of the FFT approach to DFAT as an effective and relevant part of agricultural development programming, rather than sitting separately as a Pacific Women-funded project.

While stakeholders appreciated the approach and efforts of the program coordinator in bringing the TADEP portfolio together, **the fact that TADEP commenced after the FFT project meant that it was not built into the project activities or budgets, and there was insufficient time and resourcing available for TADEP engagement**. Any future programmatic approaches need to be positioned to offer more strategic value and drive efficiencies, and be adequately resourced, primarily by being developed in advance of the projects that sit under them.

## Reporting

All stakeholders indicated that the frequency of TADEP reporting was burdensome. Any future programmatic approaches should seek to align programmatic reporting with project-level requirements to avoid any additional reporting being required by each project at the program level.


Village community educators undertaking Family Farm Teams training.
Photo: Barbara Pamphilon

# Conclusions and lessons learned

Results from this project have confirmed that the **Family Farm Teams (FFT) approach is an effective approach for encouraging more sustainable and gender-equitable farming practices in Papua New Guinea (PNG)**. The general consistency of results across the 2 hubs and 5 sites involved in this project demonstrated the adaptability and applicability of this model across diverse contexts and commodities. This project also demonstrated the value of combining agricultural and business-oriented training with FFT training for empowering women farmers. It provided women with technical skills and knowledge that increased their status in their communities and there are examples in many villages of this opening up opportunities for women to take on leadership roles.

This project has also demonstrated the **effectiveness of peer-based education as a method of building the capacity of farmers, particularly female farmers**, acknowledging its limitations around knowledge transfer beyond peer educators' wantoks and networks. Ensuring that peer educators worked as male–female (preferably husband/wife) family teams was critical for the educators to act as role models in their communities. While village community educators (VCEs) developed significant training and technical skills through their involvement in the project, ongoing support for them is required to sustain these new approaches to family farming and continue their roles as peer educators. This should include careful consideration of the incentives for VCEs to continue these new approaches as well as supporting VCEs to build and engage in a network with other VCEs to enable peer learning and support.

Beyond the village level, 2 key factors were identified as influential to sustainable uptake of the FFT approach. First, **partners' commitment and capacity to implement the FFT approach is critical**, and capacity development and organisational change support is likely to be required to drive and support government partners to take up the model. Second, building on increased agricultural outputs and marketing, **farmers need to have access to larger markets for their commodity crops in order to realise their goals and to provide an incentive to continue uptake of new practices**. This would require positioning implementation of the FFT approach alongside market access and market development programming to address these broader access and demand-side constraints. Given women are largely responsible for marketing and that many indicated they value this role for the access to cash income it provides them, these broader projects should focus on women's specific barriers, capacities and needs.

The **respectful and collaborative approach of the University of Canberra (UC) research team was welcomed by PNG-based partners** and provided the basis for strong two-way learning and uptake of new approaches. However, the number of project locations and partners was a major challenge and establishing an in-country project team should be considered for projects of this complexity, particularly given new risks associated with COVID-19. Consideration should also be given to how organisational capacity development and buy-in can be balanced with research on partners' performance to maximise both research and development outcomes.

**The FFT project was a central component of the Transformative Agriculture and Enterprise Development Program (TADEP) umbrella and TADEP learning events were important for sharing the findings from this project across the portfolio**. A more strategic programmatic approach, which would require the program to be designed in advance of its subsidiary projects, a greater focus on learning and knowledge sharing between all partners, and reduced reporting requirements would enable the umbrella program to provide more value to the FFT project.

## Lessons learned

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

1. **Institutionalising the FFT approach to embed it into ongoing practice is challenging so concerted efforts are required to engage and build the capacity of partners in order to achieve this**. This requires engagement with relevant agency leaders in a co-design process to build a shared commitment to the approach, as well as institutional capacity building at multiple levels. Given the important role of community organisations such as churches in uptake of the FFT approach, further exploration of how these partnerships could support uptake of the FFT approach would also be valuable.
2. As production grows due to new farming practices, **it will become increasingly important that market access and market development programs are delivered to complement the FFT approach** to ensure that increased production can be translated into greater sales and income generation. This will be central to enabling farming families to achieve their family and farm goals and will provide a key incentive for continued adoption of new practices.
3. Given the high levels of gender inequality and family violence in PNG, **all projects should undertake gender analysis to inform their design and develop a gender strategy to guide their approach throughout implementation**. Similarly, developing a social inclusion strategy at the outset of projects would be highly valuable to ensure that projects maximise inclusion of diverse groups, including youth and people with disability, in their design and implementation.
4. **Consideration should be given to establishing in-country project teams** to co-lead project implementation, particularly in light of new limitations and risks posed by COVID-19. In particular, where projects involve larger numbers of implementing partners with mixed buy-in and capacity, having a local lead institution can provide critical support. In addition, while limiting engagement between partners may be warranted for research purposes, it is important that this is balanced with the development and sustainability benefits of peer learning, networking and collaboration between partners. In many ways this relates to larger considerations for ACIAR and others about the scope and objectives of research-for-development projects.
5. The value of a programmatic approach would derive from **consideration of the common objectives across subsidiary projects – such as institutional capacity building of common project partners** – that could be implemented more strategically at a programmatic rather than project-by-project level. Importantly, this does require designing the program in advance of projects, and resourcing it accordingly. A greater focus on sharing learning across all levels of project partners and minimising reporting requirements would also be valuable.

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Nema G (2018) *Opening our family's eyes: The PNG Family Farm Teams Research Report*, University of Canberra, Canberra.

Pacific Women Support Unit (2020) *Pacific Women in Papua New Guinea Performance Report 2019–2020: Pacific Women Shaping Pacific Development*, Department of Foreign Affairs and Trade, Australian Government, Canberra.

Pamphilon B (2017) *The farmer-to-farmer adult learning manual*, Australian Centre for International Agricultural Research, Canberra.

Pamphilon B, Mikhailovich K and Gwatirisa P (2017) *The PNG Family Farm Teams Manual*, Australian Centre for International Agricultural Research, Canberra.

Pamphilon B, Mikhailovich K, Caffery J, Hill D and Gwatirisa P (2017a) *Islands Hub Report: Developing farming families through training and development activities*, University of Canberra, Canberra.

Pamphilon B, Mikhailovich K, Gwatirisa P and Harri S (2017b) *Highlands Hub Report: Developing farming families through training and development activities*, University of Canberra, Canberra.

Simoncini K and Pamphilon B (2018) *Educating PNG rural children for their farming futures: an exploration of the role of teacher professional development*, University of Canberra, Canberra.

Pamphilon B, Mikhailovich K, Gwatirisa P, and Harri S (2017) *Highlands Hub Report: Building the capacity of rural farmers as peer educators and leaders*, University of Canberra, Canberra.

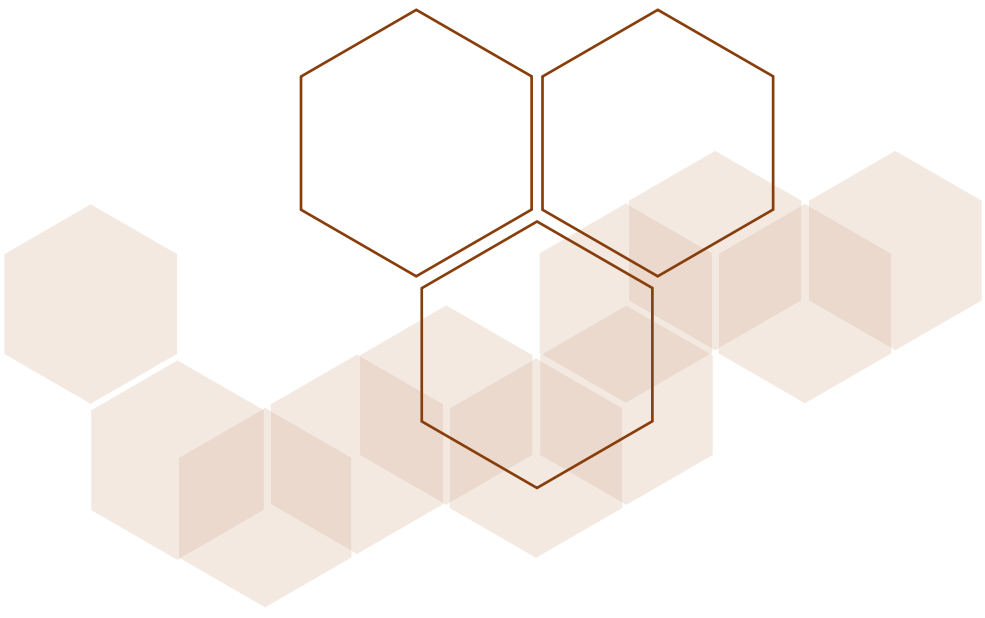
Pamphilon B, Mikhailovich, K, Caffery J, Hill D, and Gwatirisa, P (2019) *Islands Hub Report: Building the capacity of rural farmers as peer educators and leaders*, University of Canberra, Canberra.

Vanua H with Simeon L, Kakap R, Vai C, Flowers E and Pamphilon B (2019) *Business Training for Family Teams A Facilitator's Manual: First steps to starting a small business*, Pacific Adventist University, Port Moresby.

# Appendices

## Appendix 6.1: Stakeholders consulted

- University of Canberra: Katja Mikhailovich, Jo Caffery, Deborah Hill, Pauline Gwatirisa, Sanna Harri, Kila Raka
- National Agriculture Research Institute: Norah Omot/Sim Sar, Jeromy Kavi, Doreen Tunama
- Pacific Adventist University: Lalen Simeon, Elisapesi Manson
- Baptist Union: Susan Trapu
- Bougainville Women's Federation: Judith Oliver, Margarette Kiroha, Ian Viore
- Fresh Produce Development Agency: Robert Lutelele
- Oxfam: Lynn Asaro Ibu
- CARE PNG: Anna Bryan, Gloria Nema
- New Ireland Department of Primary Industries: Gideon Bogosia
- University of Technology: Veronica Bue
- Voice for Change: Lilly Be'Soer



| | Women's leadership training | Village Community Educator (VCE) training | Family Farm Teams training | Business acumen training | Financial literacy training | Agiculture training |
|---|---|---|---|---|---|---|
| **Outcome** ↓ | Enhanced ability to network | VCEs who can facilitate training | Women and men understand and begin to work as a family farm team | Women and men understand planned family livelihoods and income streams | Women and men agree on a family budget and saving goal | Women and men see their agricultural activities as a small family business |
| | Women's local network established | VCEs who can work individually and as a team | Increased number of families working as a family farm team | Women and men have skills to keep business records | Women and men work together on a saving plan | Women and men decide how to diversify and increase income from agriculture |
| | Increased community building skills | VCEs who can evaluate training | Increased family farm planning involving women | Women and men understand how to access and develop markets | Families have a bank account | Women and men plan annual food and commodity crop production |
| | Increased leadership capacity | VCEs who are role models | Women and men understand and apply joint farm planning | Families have a planned approach to marketing | Families use their bank account | Families develop FAITH* gardens for food/nutritional security |
| | Community recognition of women's ability to lead | Increased involvement of women in training | Women and men understand and apply shared communication and decision-making | Families demonstrating business-like approach to farming | Women and men understand the role of formal and informal loans | Women are involved as decision makers for farm production |
| | Increased number of women in community roles | Increased number of village peer educators (women and pairs) | Improved communication and reduction of violence in families | Some women and families engaging in entrepreneurial activities | Women are part of family financial decision-making | Diversified family farm production |
| **Impact** ↓ | Greater gender equity in community leadership | Villages as learning communities | Greater gender equity and cohesiveness in families | Improved family farm business viability | Improved family financial viability | Improved family food/nutritional security and farm livelihoods |
| **SDGs** | • **Achieve gender equality and empower all women and girls**<br>• **Lifelong learning opportunities for all** | | | • **End poverty**<br>• **Sustainable agriculture, healthy lives, food security and nutrition** | | |

* **F**ood **A**lways **I**n **T**he **H**ome.

## Appendix 6.3: Project team members

| # | Team member | Gender | International/National Researchers |
|---|---|---|---|
| 1 | Dr Barbara Pamphilon | F | International |
| 2 | Dr Katja Mikhailovich | F | International |
| 3 | Dr Kym Simoncini | F | International |
| 4 | Dr Jo Caffrey | F | International |
| 5 | Dr Deborah Hill | F | International |
| 6 | Sanna Harri | F | International |
| 7 | Pauline Gwatirisa | F | International |
| 8 | Dr Norah Omot | F | National |
| 9 | Doreen Tunama | F | National |
| 10 | Jessie Abuida-Mitir | F | National |
| 11 | Jeromy Kavi | M | National |
| 12 | Dr Lalen Simeon | F | National |
| 13 | Dr Elisapesi Manson | F | National |
| 14 | Joros Sawi | M | National |
| 15 | Heather Vanua | F | National |
| 16 | Iga Anamo | F | National |
| 17 | Fredah Wantum | F | National |
| 18 | Rose Koiea | F | National |
| 19 | Lilly Be'Soer | F | National |
| 20 | Anna Umba | F | National |
| 21 | Ian Viore | M | National |
| 22 | Sherdrick Nana | M | National |
| 23 | Milton Tenemi | M | National |
| 24 | Stella Itam | F | National |

## Appendix 6.4: Research outputs

| Publication | Peer-reviewed | Author (gender, nation) |
|---|---|---|
| **Monographs** | | |
| Pamphilon B and Mikhailovich K (2016) *Building gender equity through a Family Teams approach: a program to support the economic development of women smallholder farmers and their families in Papua New Guinea*, ACIAR Monograph No.194, Australian Centre for International Agricultural Research, Canberra. | No (internal review only) | Pamphilon (Female, Australia)<br>Mikhailovich (Female, Australia) |
| Pamphilon B, Mikhailovich K and Gwatirisa P (2017) *The PNG Family Farm Teams Manual*, ACIAR Monograph No.199, Australian Centre for International Agricultural Research, Canberra. | No (internal review only) | Pamphilon (Female, Australia)<br>Mikhailovich (Female, Australia)<br>Gwatirisa (Female, Australia) |
| Pamphilon B (2017) *The farmer-to-farmer adult learning manual: a process and resources for the development of farmers as peer educators*, ACIAR Monograph No.198, Australian Centre for International Agricultural Research, Canberra. | No (internal review only) | Pamphilon (Female, Australia) |
| **Books / book chapters** | | |
| Pamphilon B, Bue V and Wantum F (2019) *Research and Learning from the 'Inside Out': Processes, Practices and Pedagogy of a Women's Agricultural Economic Empowerment Project in Papua New Guinea*, in Singh-Peterson L and Carnegie M (Ed.) Integrating Gender in Agricultural Development, Emerald Publishing Limited, Bingley, pp. 135–147 | Editor review | Pamphilon (Female, Australia)<br>Bue (Female, PNG)<br>Wantum (Female, PNG) |
| Pamphilon B, Simoncini K and Veal D (2019) *Maria's Family Team,* Australian Centre for International Agricultural Research, Canberra. | No | Pamphilon (Female, Australia)<br>Simoncini (Female, Australia)<br>Veal (Male, Australia) |
| Pamphilon B, Simoncini, K and Veal D (2014) *Maria's family saves their kina [Femili bilong Maria sevim moni]*, Australian Centre for International Agricultural Research, Canberra. | No | Pamphilon (Female, Australia)<br>Simoncini (Female, Australia)<br>Veal (Male, Australia) |
| Pamphilon B, Simoncini K and Veal D (2014) *Maria's family goes to market [Femili bilong Maria go long maket]*—East New Britain edition, Australian Centre for International Agricultural Research, Canberra. | No | Pamphilon (Female, Australia)<br>Simoncini (Female, Australia)<br>Veal (Male, Australia) |
| **Journal articles** | | |
| Caffery J and Hill D (2018) 'Expensive English: an accessible language approach for Papua New Guinea agricultural development', *Development in Practice*, doi:10.1080/09614524.2018.1530195 | Yes | Caffery (Female, Australia)<br>Hill (Female, Australia) |
| Gwatirisa P, Pamphilon B and Mikhailovich K (2017) 'Coping with Drought in Rural Papua New Guinea: A Western Highlands Case Study', *Ecology of Food and Nutrition*, doi:10.1080/03670244.2017.1352504 | Yes | Gwatirisa (Female, Australia)<br>Pamphilon (Female, Australia)<br>Mikhailovich (Female, Australia) |
| Mikhailovich K, Pamphilon B and Chambers B (2015) 'Participatory visual research with subsistence farmers in Papua New Guinea', *Development in Practice*, 25(7):997–1010. | Yes | Mikhailovich (Female, Australia)<br>Pamphilon (Female, Australia)<br>Chambers (Female, Australia) |

## Appendix 6.4: Research outputs (*cont.*)

| Publication | Peer-reviewed | Author (gender, nation) |
|---|---|---|
| Mikhailovich K, Pamphilon B, Chambers B, Simeon L and Romero Zapata J (2016) 'Exploring the lives of women smallholder farmers in Papua New Guinea through a collaborative mixed methods approach', *Cogent Social Sciences*, doi:10.1080/23311886.2016.1143328 | Yes | Mikhailovich (Female, Australia)<br>Pamphilon (Female, Australia)<br>Chambers (Female, Australia)<br>Simeon (Female, PNG)<br>Romero Zapata (Male, Australia) |
| Pamphilon B (2015) 'Weaving knowledges: the development of empowering intercultural learning spaces for smallholder farmers in Papua New Guinea', *Multicultural Education Review*, 7(1–2):108–121. | Yes | Pamphilon (Female, Australia) |
| Pamphilon B and Mikhailovich K (2017) 'Bringing together learning from two worlds: Lessons from a gender-inclusive community education approach with smallholder farmers in Papua New Guinea', *Australian Journal of Adult Learning*, 57(2):7–32. | Yes | Pamphilon (Female, Australia)<br>Mikhailovich (Female, Australia) |
| Simoncini K, Pamphilon B and Mikhailovich K (2017) 'Place-based picture books as an adult learning tool: supporting agricultural learning in Papua New Guinea', *Adult Learning*, 28(2):61–68. | Yes | Simoncini (Female, Australia)<br>Pamphilon (Female, Australia)<br>Mikhailovich (Female, Australia) |
| Simoncini K, Pamphilon B and Simeon L (2018) 'The 'Maria' books: the achievements and challenges of introducing dual language, culturally relevant picture books to PNG schools', *Language, Culture and Curriculum*, doi:10.1080/07908318.2018.1490745 | Yes | Simoncini (Female, Australia)<br>Pamphilon (Female, Australia)<br>Simeon (Female, PNG) |
| Reports / program manuals | | |
| Nema G (2018) *Opening our family's eyes: the PNG 'Family Farm Teams' research report,* University of Canberra, ACIAR and Care International. | No | Nema (Female, PNG) |
| Vanua H with Simeon L, Kakap R, Vai C, Flowers E and Pamphilon B (2019) *Business Training for Family Teams A Facilitator's Manual: First steps to starting a small business*, Pacific Adventist University, Port Moresby. | No | Vanua (Female, PNG)<br>Simeon (Female, PNG)<br>Kakap (Male, PNG)<br>Vai (Female, PNG)<br>Flowers (Female, Australia)<br>Pamphilon (Female, Australia) |
| Conference paper | | |
| Pamphilon B and Mikhailovich K (September 12–15 2017) 'Bringing together learning from two worlds: Lessons from a gender-inclusive community education approach with smallholder farmers in Papua New Guinea', *Australian Council for Adult Literacy 2017 National Conference*, Darwin, Australia. | No | Pamphilon (Female, Australia)<br>Mikhailovich (Female, Australia) |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