SEPTEMBER 2023

DISCUSSION PAPER SERIES NO. 2023-13

Endline Study Report and Policy Study for the ConVERGE Project

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September 2023

Abstract

The Department of Agrarian Reform (DAR), in partnership with the International Fund for Agricultural Development (IFAD), implemented the project "Convergence on Value Chain Enhancement for Rural Growth and Empowerment" or Project ConVERGE with the goal of empowering Agrarian Reform Beneficiaries (ARBs) to drive rural economic growth across 10 provinces spanning three regions. DAR engaged the Philippine Institute for Development Studies (PIDS) to undertake baseline and endline studies, serving as a crucial assessment tool for the project's performance and providing insights to inform the comprehensive ARC Cluster Development (ARCCD) Strategy aimed at advancing smallholder agriculture in the Philippines.

This Endline Report provides the analysis of the baseline and endline datasets. It discusses the following key points: i) results of the impact evaluation study; ii) result of final process evaluation; and iii) recommendations for the Agrarian Reform Communities Cluster Development (ARCCD) Strategy.

The quantitative analysis part of the study indicates a significant 41% average treatment effect from the Project, validating its Theory of Change in boosting income for ARC cluster households through value chain interventions. The process evaluation generally confirms the assumptions and impact pathways, with some deviations and shortfalls. Beneficiaries express satisfaction with the Project but have limited understanding of its rationale.

The clustering method, which links small farmers to value chains by forming agrarian reform beneficiaries (ARBs) into lead and participating ARB organizations (ARBOs), appears to enhance government support efficiency for organized groups. The paper underscores the importance of additional capacity building for both LARBOs and PARBOs, and it recommends a more active engagement of other government agencies to address value-adding technologies, food processing standards, credit accessibility, and market facilitation.

Keywords: agrarian reform beneficiary organizations, ARBOs, ARBs, DAR, IFAD, ConVERGE, value chains, treament effects, endline, baseline, Agrarian Reform Communities Cluster Development, ARC, ARCCD, Mindanao, clustering, cluster, impact evaluation, difference-in-difference, regression, process evaluation

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1. Introduction

1. The Department of Agrarian Reform (DAR), with support of the International Fund for Agricultural Development (IFAD), is implementing a Convergence on Value Chain Enhancement for Rural Growth and Empowerment (Project ConVERGE). The Project aims to enable Agrarian Reform Beneficiaries (ARBs) to become highly productive and competitive entrepreneurs and to achieve broad-based rural economic growth. The project covers 10 provinces in three regions, namely: Zamboanga del Norte, Zamboanga del Sur and Zamboanga Sibugay (Region IX); Misamis Oriental, Camiguin and Bukidnon, (Region X); and Agusan del Norte, Agusan del Sur, Surigao del Sur and Surigao del Norte (Region Caraga).
2. The Project is funded by loan proceeds of about USD 25 million (equivalent to EUR 22.8 million, PHP 1.088 billion), along with national and local government counterpart of USD 9.6 million (PHP 417.6 million), and beneficiary contribution of USD 18 million (PHP 783 million).[1] The loan took effect on 26 October 2015, and was scheduled for completion on 31 December 2021 (with closing date of 30 June 2022). The Project was extended to 31 December 2022 with closing date of June 2023.
3. Project ConVERGE is the first project that focuses on the development of Agrarian Reform Communities (ARC) Clusters using the value-chain (VC) approach and National Convergence Initiatives (NCI) as platform of implementation (ConVERGE Project Implementation Manual (PIM), p. 1). The project has three components: (i) Participatory Value-Chain Analysis and Planning; (ii) Integrated Smallholders Agricultural and Rural Enterprise Development; and (iii) Project Management, Monitoring and Evaluation.
4. DAR has contracted the Philippine Institute for Development Studies (PIDS) to undertake baseline-midline and endline studies of Project ConVERGE. ConVERGE Management and DAR will use the results of the blended baseline-midline and endline studies to validate the project's ability to deliver on its targets. At the same time, DAR, NEDA, and other key policy stakeholders will use the results of the studies to validate and refine the broader ARC Cluster Development (ARCCD) Strategy, given the latter's importance to the effort of promoting inclusive value chain development as a strategy for modernizing smallholder agriculture in the Philippines.
5. The baseline study, completed in May 2020, documented the Evaluation Plan, as well as the conduct and findings of a baseline survey. The Evaluation Plan covered a process evaluation, as well as an impact evaluation, of which the baseline survey, conducted last 25 July to 30 August 2019, was a first step. The second step was the conduct of an endline survey, conducted last 14 September to 10 October 2022. Between the two

[1] 1 USD=PhP 43.50 (During design date)

surveys, three years had elapsed between the respective reference periods (2018-19 vs 2021-22).

6. This endline report provides the analysis of the baseline and endline datasets. It discusses the following key points: i) results of the impact evaluation study; ii) Result of final process evaluation; iii) Recommendations for the ARCCD strategy.

2. Related literature

7. Smallholder farmers are the largest contributor to agricultural production; however, they capture the smallest share of market value and are often at a disadvantage when bargaining with other market actors (IFAD, 2020). The **Value Chain Approach** takes a comprehensive view of the agricultural commodity chain from producers to consumers. It highlights the importance of interventions beyond the production stage, which can have an even greater impact on poverty compared with on-farm productivity improvements. Whereas the traditional entry point for IFAD projects is at the capacity building of farmers and related IFAD target groups, the VC approach opens multiple entry points, i.e. production, collection, processing, transportation, wholesaling and retailing. For instance, expanding capacity and improving efficiency of processors can benefit farmers by raising demand for crops. From a low of just 3 percent in the 2000s, by 2014 well over half of IFAD projects had a VC component. (Camagni and Kheralla, 2014). By 2018, the volume of loans with value chain element accounted for 81 percent of the total.

8. Admittedly however, analytical gaps remain. Overall, available evidence suggests that VC development can benefit the poor, and even the poorest; the following have been identified as contributory factors for inclusion (IFAD, 2019):

   - Commodity selection – support commodities that are labor-intensive rather than capital-intensive;
   - Conditionality – make inclusion of the poor a requirement for participation of agribusiness;
   - Community-based – mobilize producer groups at the community level and focus on linkages with processors and traders.

9. However, VC interventions are notorious for their complexity and resistance to straightforward impact evaluations. Such interventions are time-, place-, and commodity-specific, which complicates generalization of evaluation conclusions. For such interventions a mix of methods are more likely to yield valuable insights (Ton, Vellema, and de Wildt, 2011).

10. One of few impact evaluation studies of VCs within IFAD looks at the Agricultural Value Chains Support Project of Senegal (French acronym PAFA). The VC interventions targeted included a production support package targeted at maize, millet, sorghum, cowpea, roselle, aviculture, and vegetable gardening. The package consists of certified inputs (seeds, fertilizer, and pesticides), agricultural machinery, training on production best practices, postharvest management and quality control, and market agreement with a buyer. The package was financed over three years. The evaluation method is an endline with-project/without-project comparison with propensity score matching to account for selection effects. The evaluation found that PAFA raised productivity for some of the crops, encouraged farmers to diversify away from the

traditional crop (groundnut), commercialize their produce, and receive a higher crop income (Garbero, Diatta, and Olapade, 2018).

11. The selected method however is prone to some criticism owing to lack of control for fixed effects, and potential problems of the quasi-experimental method adopted, namely propensity score matching. However, this problem is far from unique; a review of twenty evaluations of VC interventions found that most of them rely on propensity score matching to estimate treatment effects. The majority of the studies limit the interventions being evaluated; instrumental variables and difference-in-difference are common strategies to mitigate selection bias.

3. Project description

3.1 Project components

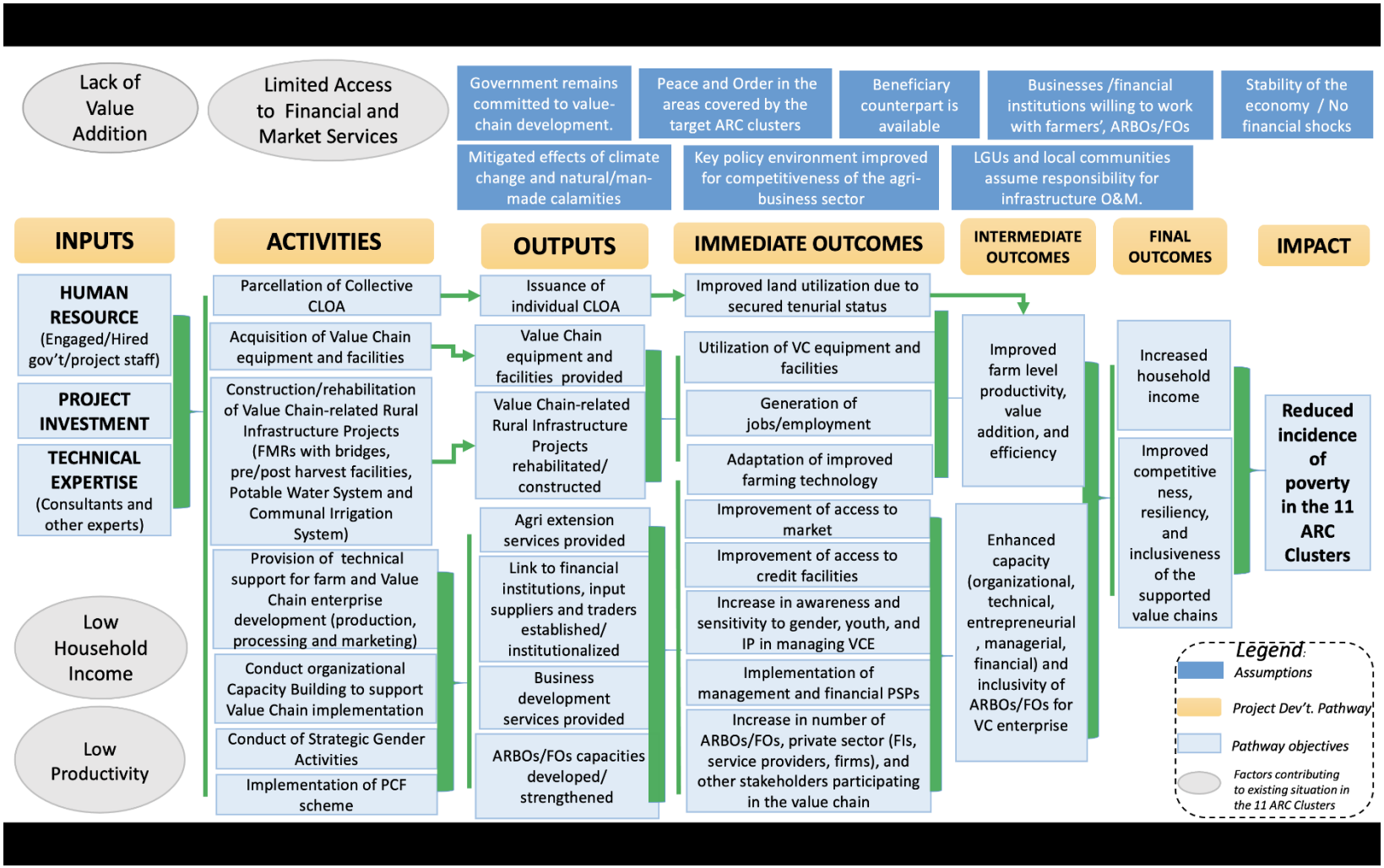
12. The Project is divided into four components:

- Component A: **Participatory Value-Chain Analysis and Planning to Link Smallholder Farmers to Existing Value-Chain Systems.** This component aims to deliver VC business development plans for selected crops in 11 ARC clusters, resulting in ARC value chain investment plans covering priority crops, along with secondary crops.
- Component B: **Integrated Smallholders Agricultural and Rural Enterprise Development (I-SHARED).** This component is implemented based on the plans formulated under Component A. The Project will finance development along the value chain, from primary production (seeds, seedlings, fertilizers, tools and equipment, capacity building of farmers), to value addition. This includes product development, branding, packaging, logistics, certification/accreditation, technology upgrading and training on post-harvest handling and storage, food safety and product quality, market and investment facilitation. The Project will also provide matching grants, and assist ARBOs to access formal sector finance. Finally, this Component includes investment in value-chain related rural infrastructure, such as farm-to-market roads (FMRs), access roads and bridges, drainage crossings, rehabilitation/restoration of communal irrigation systems (CIS), post-harvest facilities, and water supply required for the processing of local products.
- Component C: **Subdivision of Collective Certificates of Landownership Award (CLOA) and Facilitation of Land Transfer Program**. To stabilize ownership and property rights in the project areas, this component seeks to subdivide CLOAs currently held by groups of ARBs, into individual ARB CLOAs.
- Component D: **Project Management, Monitoring and Evaluation and Knowledge Management.** This component covers project administration, coordination, reporting, monitoring and evaluation (M&E), along with knowledge management, as well as policy studies, consultations, and other events.

3.2 Theory of Change

13. A schematic TOC for ConVERGE is shown in Figure 1 derived from the latest project document. The problem affecting small hold farmers and rural workers is **low household income** and **low productivity**, in turn due to **lack of value addition** and **limited access to markets**.

Figure 1: Schematic of the Theory of Change (as of January 2022)



Source: DAR

14. These two are interacting factors: Lack of value addition may be due to low quality of outputs (leading to low prices); and limited scope of value creation within in the community - hence, products have to be transported to another area where value adding takes place, e.g. a city center or even overseas. Limited scope of value creation is due to limited access of a community-based agri-enterprises to downstream markets, i.e. the export market. Some of the barriers to entry may be regulatory, e.g. obtaining the appropriate food safety or product quality certification, whether from government or private certifiers.

15. To address the value chain problems, the project undertakes a set of activities, resulting in tangible (measurable) outputs, namely:

- parcelization of collective Certificate of Land Ownership Award (CLOA), with output of *issuance of individual CLOA;*
- provision of value chain facilities and equipment, with output of *value chain facilities and equipment provided*;
- construction/rehabilitation of value-chain related rural infrastructure such as farm-to-market roads (FMRs), with output, *value-chain related infrastructure projects completed*; technical support for farm and value chain enterprise development;
- organizational capacity building; strategic gender activities; and implementation of a production capitalization fund (PCF) scheme, with outputs: *agri enterprise services provided; link to financial institutions, input suppliers and traders established; business development services provided; and ARB/FOs capacities developed/strengthened*.

16. The outputs in turn generate immediate outcomes (which serve as solutions to the original problems, namely: increased farm level productivity and efficiency; increased competitiveness, terms of trade, and market share of ARBs. These in turn lead to greater incomes and reduced poverty, and other related effects, e.g. improved nutritional status of household members as diets improve together with increased purchasing power.

17. Realization of the TOC hinges on several assumptions, namely:

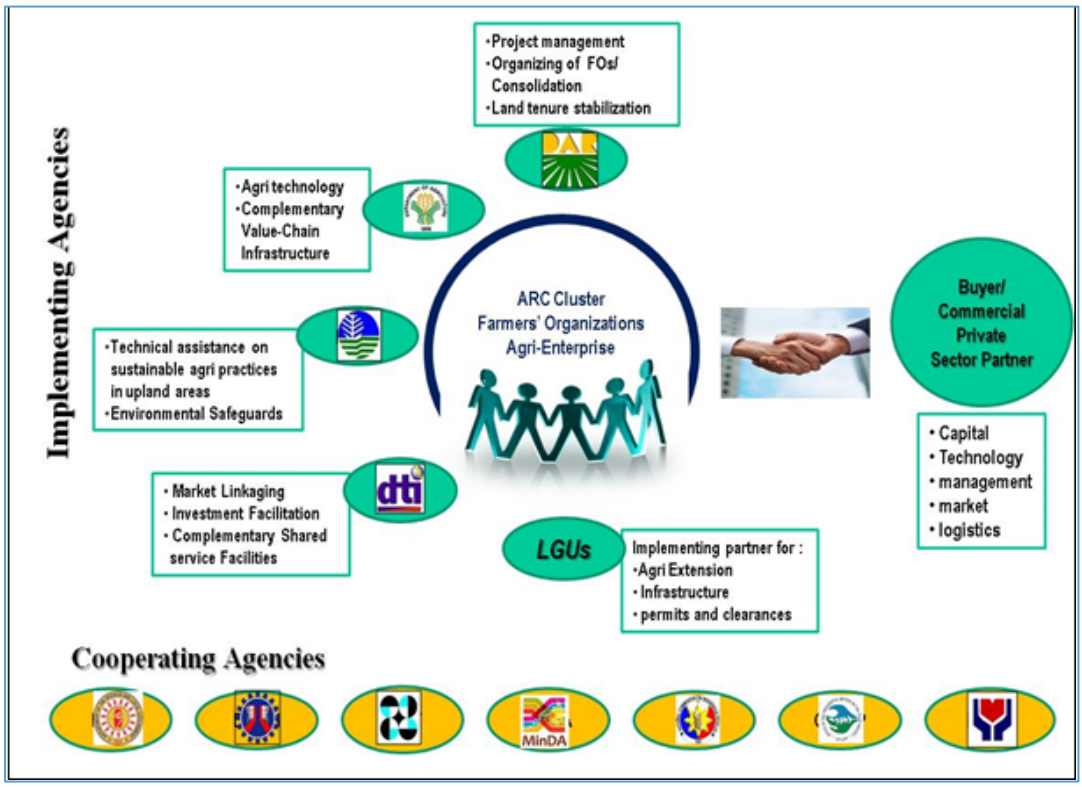
- Government remains committed to value-chain development
- Peace and order in the areas covered by the target ARC clusters
- Beneficiary counterpart is available
- Business/financial institutions willing to work with farmers, ARBOs/FOs
- Stability of the economy/no financial shocks
- Mitigated effects of climate change and natural/man-made calamities
- Key policy environment improved for competitiveness of the agribusiness sector
- LGUs and local communities assume responsibility for infrastructure O&M

18. The validity of these assumptions will be checked in the evaluation.

3.3 Conceptual Framework of ConVERGE

19. Complementing the ToC is the Conceptual Framework of the Project, as discussed in the PIM (Figure 2). Central to the Project is the ARC Cluster, a strategy that extends the ARC development strategy for integrated area development first introduced in RA 6657. Establishment of ARCCs is a strategy for realizing ARC connectivity, to help "create a thick web of relations that will facilitate access to input sources, production and market information and facilities, markets, technology, social processes and institutions, and accelerate the development of these areas for agri-business" (DAR Memorandum Circular 13-2009, Section II).

Figure 2: Conceptual framework of ConVERGE Project



Source: DAR PIM.

20. The PIM furthermore provides for tapping Agrarian Reform Beneficiary Organizations (ARBOs) as conduits of services and interventions, and to enable collective operations in production, harvesting, storage, processing, and marketing. Among the ARBOs, a lead ARBO will be selected to manage the agribusiness in cooperation with the other ARBOs. The lead ARBO will be supported to act as catalyst in establishing business interaction among ARBOs, and will serve as conduit to improve and consolidate production and marketing of commodities, and establishing partnership with the private sector. The cooperating ARBOs may serve as producers and suppliers of raw materials or semi-processed products, inputs, or services or as buyers of inputs.

3.4 ARC Clusters supported by ConVERGE

21. The ARC Clusters and corresponding priority VC enterprises under ConVERGE are summarized in Figure 3.

Figure 3: The 11 ARC Clusters of ConVERGE Project

Source: ConVERGE Annual Report 2019, p. 1

22. Region 9:

i) ZN Resettlement Cluster, Zamboanga del Norte: municipalities of Tampilisan, Salug; VC enterprise: VC enterprise: Integrated Rubber Enterprise

ii) Salug Valley Cluster ARC, Zamboanga del Sur: municipalities of Aurora, Dumingag, Josefina, Mahayag, Molave, Ramon Magsaysay and Tambulig; VC enterprise: Intensified Rice Production, Milling and Marketing

iii) Salipyasin Agrarian Reform Community (ARC) Cluster, Zamboanga Sibugay: municipalities of Kabasalan, Naga, Ipil, R.T. Lim, Tungawan, and Titay;

23. Region 10:

iv) Misamis Oriental Eastern Towns Agrarian Reform Community Cluster (MISORET ARC CLUSTER), Misamis Oriental: municipalities of Balingasag, Lagonglong, Salay, Kinoguitan, Sugbongcogon, and Binuangan; VC enterprise: Coco Sap Sweetener Production and Processing

v) LABACO ARC Cluster, Camiguin: municipalities of Mambajao, Catarman, Sagay; VC enterprise: Abaca Fiber Production and Marketing

vi) North Bukidnon ARC Cluster I, Bukidnon: municipality of Manolo Fortich, Libona; VC enterprise: Cassava Production, Processing and Marketing of Granules

vii) South Bukidnon ARC Cluster, Bukidnon: municipality of Don Carlos; VC enterprise: Bukidnon Muscovado Processing and Marketing

24. Region Caraga:

viii) VETREBUNS ARC Cluster, Agusan del Sur: municipalities of Veruela, Trento, Bunawan, and Sta. Josefa; VC enterprise: Rice Production, Processing, and Marketing.

ix) TUJAKITSAN ARC cluster, Agusan del Norte: Tubay, Jabonga, Kitcharao and Santiago; VC enterprise: Integrated Enterprises Enhancement for Abaca Value Chain

x) BATA ARC Cluster, Surigao del Sur: municipality of Barobo and Tagbina; VC enterprise: Coffee Production, Rejuvenation, Processing, and Marketing

xi) CLAGIBAPLA ARC Cluster, Surigao del Norte: municipality of Claver, Gigaquit, Bacuag and Placer; VC enterprise: Coconet and Bio-fertilizer Enterprise. Note that in addition to the value chain enterprises stated here, secondary crops were also identified for development within the ARC Clusters. These will diversify sources of income, minimize risks brought about by shocks and seasonality, and expand commodity scope of the Project.

4. Evaluation design

4.1 Original evaluation design

4.1.1 Overview

25. The study is part of a blended baseline-midline study to assess the impact of the Project on target beneficiaries. The baseline aims to assess the current situation of potential project beneficiaries. The baseline assessment should be able to establish the current situation of households (including but not limited to income level, asset ownership, household size, sources of income, nutritional status, food intake, food security, etc.) engaged in farming in terms of access to and utilization of production technologies, production inputs, credit, agriculture support infrastructures (e.g., post-harvest, cold storage, transport, roads and irrigation) information and market, and policy environment. The baseline study will also assess the extent of gender participation in all project activities but more specifically in the VC component. The endline study meanwhile will assesses their situation along these dimensions at the end of the project. The measured change in living standards of beneficiaries will be used as basis to evaluate the impact of the project.

4.1.2 Process evaluation

26. The process evaluation is a comprehensive assessment of the actual implementation of the Project ConVERGE as compared to its original Theory of Change (ToC), logical framework (Logframe), and Project Implementation Manual (PIM).

27. It uses both qualitative analysis and the identified indicators to gauge how well the Project was implemented. Process evaluation is conducted using secondary

information, key informant interviews at the project level, and field interviews at the ground level. Key informant and group interviews cover the following:

- Project implementation at the national (DAR Central Office) level, Regional (RPMO), level, and selected Provincial (PPMO), and Cluster Project Operations Team (CPOT);
- Officers and members of lead and participating Agrarian Reform Beneficiary Organizations (ARBOs);
- Other stakeholders in the VC such as institutional buyers.

28. Issues to be covered in the process evaluation are patterned after other process evaluation conducted for other government projects. Sample questions to guide the interviews and desk review include the following:

- Program Logic and Plausibility: What are the objectives of Project? What are the stakeholders' understanding of the Project in terms of its aims and strategies? Do stakeholders find these aims and strategies realistic? Are there better ways to achieve project objectives?
- Service Delivery and Utilization: How are the components of the project being implemented? How do implementers identify beneficiaries of the policy? Are these beneficiaries being reached by the program? How are benefits delivered to intended recipients? How satisfied are stakeholders with the project? How is information about the project communicated to stakeholders?
- Program organization: Are budget appropriations sufficient, and disbursed in time? What adjustments in the original procedures and systems were needed in the course of implementation? How are elements of the Theory of Change monitored and evaluated by implementers? What opportunities were provided for consultation and feedback from stakeholders?

4.1.3 Quantitative evaluation

29. *Sampling.* The quantitative evaluation was initiated late in the Project (2018), hence ARBOs that were already receiving I-SHARED interventions (except for trainings) were excluded from the survey. Lead ARBOs in all the ARC Clusters, all of whom already received I-SHARED intervention, were not part of the sampling, leaving only participating ARBOs in the survey.

30. The impact evaluation adopts an experimental design based on randomized phased-in. The The two treatment arms are initial and succeeding. The initial group, corresponding to the treatment group of participating ARBOs, will receive interventions in the early stage of the project (immediately following the baseline survey). The succeeding group, corresponding to the control group of participating ARBOs, will receive project interventions toward the latter stage of the project. The ConVERGE interventions that address short-term VC constraints will, according to the TOC, supposedly cause annual agriculture-related incomes to increase in the short run. This hypothesis forms the basis of the impact evaluation design. The treatment group is identified as those exposed **earlier** to the intervention and a control group as those exposed **later** to the intervention. The estimation of the impact will use difference-in-difference (DID).

31. The sampling frame of participating ARBOs was compiled by ConVERGE facilitators in coordination with the PMO Monitoring and Evaluation (M&E). A full description of

the sampling process is found in the Baseline Report. It is important to note that the ARBOs are randomly selected into initial and succeeding groups. The Project implementer agreed to prioritize the treatment group in the initial phase of post-baseline operations, while covering the control group only in the final phase of operations, in accordance with the experimental design. If successful, the randomization provides the control needed to attribute differences between the two groups to the ConVERGE project and not to any extraneous factors.

32. Power calculation was done using Family Income and Expenditure Survey (FIES) since there is no available primary data on households participating in ARBOs. Households included in the estimate are those residing in rural areas and belonging to deciles 1 to 7. The target household participants are the poorer households although not exclusively the poorest households. The primary outcome of interest is household welfare as indicated by per capita expenditure. The mean effect size on household welfare is based on estimates given in the Project Logframe.

33. The clustering will be using the primary sampling unit (PSU) of FIES, which usually is a barangay or group of barangays. We assume the following:

    - Significance level = 0.05;
    - Statistical power = 0.8;
    - Mean effect size (as a ratio to mean per capita expenditure) = 0.20.

34. The mean per capita expenditure is 27,020 and standard deviation 13,001. The intracluster correlation is 0.2704. At the effect size of 0.20, the required sample size is 880 or 22 clusters, 20 households per cluster, and two treatment arms. Hence, from a list of qualified ARBOs (to be further discussed in the latter sections), 22 ARBOs had been randomly selected to be part of the initial group, and another 22 ARBOs had been randomly selected to be part of a succeeding group. ARBOs not included in the evaluation study may be covered by the project anytime. Accounting for financial and time constraints, and a 4% attrition rate, the total number of households to be surveyed equal 1,144 (=22 ARBOs * 26 households * 2 groups). On September 26, during the Baseline-midline Inception Meeting, a list of ARBOs to be covered by the project was finalized by the project monitoring and evaluation (M&E), in conjunction with field facilitators. The list included 63 ARBOs that were left. A total of 44 ARBOs had been selected as primary samples for evaluation, i.e. 22 Initial Group ARBOs and 22 Succeeding Group ARBOs. The sample ARBOs for the initial group and succeeding groups are shown in the Annex.

35. *Data analysis.* The data generated by baseline and endline surveys will be analyzed by cross-tabulation (especially breakdown by Treatment group and Control group). However, tabular comparisons do not control for other factors, hence a more statistical analysis will be undertaken using regression analysis based on a model for explaining an outcome variable. Let i index households, and t index periods, t = 0, 1; the outcome variable is denoted y_{it}, alternatively referring to household per capita income, or household per capita expenditure. The dummy variable for intention-to-treat is denoted ITT_{it}, while $\mathbf{x}_i$ denotes a vector of other variables explaining the outcome variable (fixed at t = 0). Finally, β-terms denote parameters to be estimated by regression analysis, while ε_{it} denotes the error term. The first set of regression models separates the baseline and endline data:

36. $$y_{i0} = \beta_{00} + \beta_{10} ITT_{i0} + \mathbf{x}_i \boldsymbol{\beta}_{x0} + \varepsilon_{i0} \quad (1)$$

$$y_{i1} = \beta_{01} + \beta_{11} ITT_{i1} + \mathbf{x}_i \boldsymbol{\beta}_{x1} + \varepsilon_{i1} \quad (2)$$

37. Estimation makes use of ordinary least squares. The impact of ConVERGE is simply β_{11}; note however that parameters in (1) already differ from those in (2), hence time period may be a confounding factor. This leads to an alternative regression model:

38. $$y_{it} = \beta_0 + \beta_1 t_i + \beta_1 ITT_{it} + \beta_2 t_i \cdot ITT_i + \mathbf{x}_i \boldsymbol{\beta}_x + \varepsilon_{it} + \nu_i \quad (3)$$

39. Here ν_i denotes household-specific component of the error term. The panel data format can be addressed by a random effects estimation. In this case the impact of ConVERGE is simply β_2.

4.2 Expanded evaluation design

4.2.1 Theory-based approach to evaluation

40. The evaluation design at the baseline was heavily oriented towards evaluation of outcomes, supplemented by some process evaluation. In this endline study, we have expanded the original evaluation design to incorporate a **theory-based approach**. It is based on an explicit TOC, which posits the theory behind a development intervention; the evaluation approach then attempts to test the theory. Rather than a specific method or technique (such as "randomized controlled trial"), theory-based evaluation denotes a way of structuring analysis, by validating the plausibility of linkages between intervention and intended impacts, account for other contributory factors, and capture unintended effects (IFAD, 2022). An example of a theory-based approach is **contribution analysis**. This approach aims at checking credibility of claims about intervention as a contributory cause of an outcome. A contribution claim is checked by confirming the impact pathway, the assumptions underlying hypothesized causal links, and a narrative to justify inference to causality (Mayne, 2019).

41. The theory-based approach can be divided into two parts: the first part involves translation of inputs into activities and outputs; the question to be answered is **to what extent did the Project adhere to its design and targets** (as documented in the PIM) ? The second part involves translation of outputs into outcomes and impact; the question to be answered is **to what extent were the expectations of the ToC and logframe realized?**

4.2.2 Expanded quantitative evaluation

42. The abovementioned experimental design assumes consistency between intention-to-treat and actual treatment. In terms of our experimental design, deviation can occur in two ways: one is crossover (a respondent in the initial group actually receives the intervention at the latter stage, or a respondent in a succeeding group actually receives the intervention in the initial stage); the other is sheer omission, i.e. a respondent never actually gets to participate in ConVERGE interventions. Such deviations are lead to potentially biased estimates; a meta study found that trials that deviated from the intention-to-treat analysis showed larger intervention effects (Abraha et al 2015).

43. The expanded analysis accounts for potentially large omissions (see Section 5) by running additional models based on actual treatment, denoted AT_i, with $AT_i = 0$ when a respondent was never a ConVERGE beneficiary, and $AT_i = 1$ when the respondent at any time was a ConVERGE beneficiary:

$$y_{i0} = \beta_{00} + \beta_{10} AT_{i0} + \mathbf{x}_i \boldsymbol{\beta}_{x0} + \varepsilon_{i0} \quad (4)$$

$$y_{i1} = \beta_{01} + \beta_{11} AT_{i1} + \mathbf{x}_i \boldsymbol{\beta}_{x1} + \varepsilon_{i1} \quad (5)$$

44. The DID version of the model is specified as follows:

45. $$y_{it} = \beta_0 + \beta_1 t_i + \beta_1 AT_{it} + \beta_2 t_i \cdot AT_i + \mathbf{x}_i \boldsymbol{\beta}_x + \varepsilon_{it} \quad (6)$$

46. The problem with specification (6) is that the AT_i is endogenous. Correction of this involves a two-step estimator discussed in Woolridge (2002), in turn based on Heckman (1978), based on an instrumental variable. First is to run a probit estimation with an instrumental variable *z* which is correlated with the with-project variable, but uncorrelated with the outcome variable. The fitted parameters are then used to generate predicted probabilities of treatment, which becomes the instrumented version replacing AT_i in (6), which is estimated using random effects regression as in (3).

5. Findings of the process evaluation

5.1 Translating inputs into activities and outputs

5.1.1 Participatory value chain appraisal

47. *Beneficiaries were identified according to Project design*. At the outset, beneficiaries were identified as ARBs and other rural workers in 11 ARC Clusters in 10 provinces. The target beneficiaries among ARBs is 38,724, while among other rural workers is 261,788, for a total of 300,512. The latter is composed of small hold farmers, unemployed or underemployed rural youth, indigenous peoples (IPs), women, and members of eligible ARBOs. Based on the original timeline of 2020, ConVERGE reach 41.6% of target number of household members. However, based on the extended timeline of end-2022, ConVERGE exceeded its target number of household members by 8.1% (324,945); this is the same number of individuals reached by the project. Majority of beneficiaries were males (211,240). In terms of household beneficiaries, the total number of direct household beneficiaries is 39,511. The share of female-headed, IP-headed, and youth-headed households are 20%, 9%, and 5% , respectively.

48. As for ARBOs, the target was to reach 70 of them. Based on the approved revised post-midterm logframe, the target number of ARBOs is 142. In fact, as of December 2022, the Project achieved this target. Out of 142, 91 ARBOs received 963 units of value chain equipment. These and many more were reached with trainings, while numerous ARBOs not part of the Project benefited from FMRs.

5.1.2 Subdivision of collective CLOAs

49. *By December 2019, the Project had completed its target for subdivision of collective CLOAs.* The Projected target was 1,791 approved survey plans, covering 6,204 ha, and 5,277 ARBs conferred individual CLOAs, located in Regions IX, X, and Caraga. By December 2019, this part of the Project had been completed. Note though that this did not draw on Project Funds but were part of regular activities of DAR (ConVERGE Annual Report 2019).

50. As of Dec. 31, 2022, the total number of hectares covered under subdivision survey is 11,712 hectares or 97.6% of the targeted 12,000 hectares. The number of hectares issued with individual CLOA is 11,245 has or 112% of 10,000 hectares. There are 7, 327 ARBs issued with individual CLOAs or 109% of 6,700 ARBs.

5.1.3 Acquisition of value chain equipment and facilities

51. *As of 2nd quarter 2022, the Project had exceeded its original funding allocation for VC equipment and facilities.* No physical targets were set for VC equipment and facilities, simply that 11 ARC cluster VC investment plans be prepared, and VC equipment and facility needs thereby identified. Based on Project Design document, of the total Project cost of PHP 2.3 billion, PHP 146 million was allocated to VC equipment (5.5%), By end of Project a total of PHP 150.9 million[2] had been expended, slightly above the amount allocated – this increase was in response to the demand of the ARBOs to efficiently operate their respective agri-enterprise, thus the request for fund reallocation.

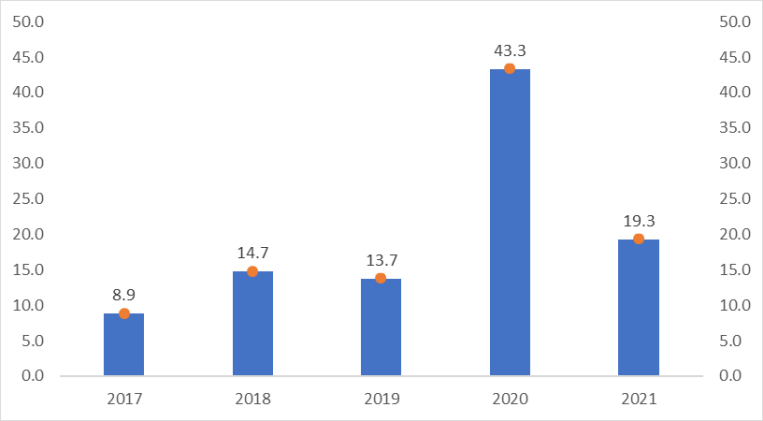
52. *The bulk of VC interventions were delivered toward the ending phase of the project*. Among the VC interventions, only VC equipment had been tagged with date of turnover in the M&E database (Figure 4). Total by Q2 2022 was approximately PHP 100 million. In the first year of VC equipment implementation (2017), 8.9% was disbursed, by the second year another 14.7%, and by the third year, 13.7%, for a total of 37.3% more than halfway into the project. Then in the fourth year, 43% was disbursed, greater than all previous years combined. The last year accounted for a final 19.3%. It is clearly unrealistic to expect that turnover of equipment will immediately lead to dramatic improvements in household incomes; hence, for the bulk of ARBOs, there was relatively little time for beneficiaries to realize improved postharvest handling, and better integration into value chains.

53. *Beneficiary participation in project cost was limited, which was favorable for inclusiveness of the project.* For VC equipment, cash counterpart from ARBOs was usually nil; occasionally, on paper their counterpart took the form of existing land and facilities. For a few ARBOs (20 out of VC equipment interventions), the cash counterpart accounted for 3% to 5% of project cost (though in one case the counterpart reached 15%). In one case (SAMPCO in Agusan del Sur), the LGU shouldered the 12% counterpart. Lastly for VC facilities (warehouse, dryers, etc.) the overall counterpart

[2] 1 USD=PHP 43.50 (During design date) used in calculating expenditure against budget. Exchange Rate; 1 USD=50.70PHP (November 1, 2021 UNDP) used in 2022 AWPB.

was 8.2%. The modest cost outlay demanded from beneficiaries posed no entry barrier for their participation in the project.

Figure 4: Cost of VC equipment delivered, by year



Source: DAR.

54. Equity arrangement for other interventions of the Project are as follows:

- For FMRs, the standard requirement is a 12% counterpart, for account of LGUs.
- Trainings are provided as grant, as are other technical support, and market facilitation, provided by the Project.
- For inputs, see 5.1.5.

55. *Participation of ARBOs in procurement of equipment and facilities was also minimal.* Procurement was implemented by DAR as per PIM, except for value chain infrastructure for which procurement was delegated to LGUs. Under the procurement law, projects mostly funded by government, with minimal cost participation of beneficiaries, require government procurement. The ARBOs were able to input into the equipment and facility specifications, during the business planning stage. In at least one case, that of Agusan del Sur, the lead ARBO (SIUFMULCO) provided cash counterpart for procurement of a 10-wheeler hauling truck; during the Bids and Awards Committee (BAC) meetings, attendance of the ARBO was observer was recorded. However, for the other ARBOs, participation in the actual bidding was minimal. Instead, they simply inspected the equipment/facility upon delivery, and signed acceptance document as warranted. Those ARBOs with strong leadership were able to verbalize their concerns regarding the quality of tools, equipment, and infrastructure being turned over to them. Others were too shy to speak up and just decided to accept them since they consider these kinds of support as grants. As discussed below, this did not always lead to the best results.

5.1.4 VC Infrastructure

56. *Provision of VC infrastructure was mostly below target.* Based on the logframe (as of December 2022), only 32.1% of the original target km of FMR was provided; about 62.7% of original target 150 ha of irrigation projects were provided[3]; and 2 out of 3 original target potable water supply (PWS) systems were provided[4]. However, the Project reportedly provided 28 linear meters of bridges, compared with the recalibrated target of 20 linear meters. Total cost of VC infrastructure was PHP 386.1 million (approximately USD 7 million), far in excess of the original funding allocation.

57. *For FMRs, most of the funded sub-projects were completed, although original target number of kilometers was not reached.* As of December 2022, 76 of 85 funded SPs were completed, for a weighted average accomplishment of 94%. However, total length of FMRs fell short of the target owing to change in costing brought about by new government policy affecting all FMR projects.[5] DPWH Department Memorandum no. 11, series of 2014 states that all FMRs to be constructed should be concreted. The PIM Annex 2 (page 24, Table 2) set the cost parameter for FMR construction at PHP4M/km (as of 2017). In fact as of 2021, average cost of concrete FMRs was around PHP10M/km (Accomplishment Report of Duterte Administration). Although DAR had requested realignment of project funds to meet original physical targets, the request was not approved.

5.1.5 Provision of agricultural inputs

58. *Input subsidy was converted to a revolving fund scheme.* Up to Project midterm (2018), support was provided as a grant for temporary crops, and a 90% subsidy for abaca, coffee, and rubber. However, the Midterm Review Mission evaluated subsidies as having a limited effect on generating strong enterprises, and perpetuates a hand-out mentality.

59. Instead, in 2020, the Supervision Mission Report recommended the launching of a Production Capitalization Fund (PCF) for abaca, coffee, and rubber. The scheme involves provision of inputs delivered as grant to ARBOs, but to be converted into a revolving fund for inputs financing with cost recovery from input users. As of end-2022, the Project has delivered PHP 50.655 million of agri-inputs to 59 ARBOs covering 4,768 households and 3,623 hectares The Project has also set up a PHP 44 million PCF covering 5 ARCCs with 1,324 farming households and 1,267 hectares. The PCF combines the need to avoid hand-outs and manage project cost, while still financing the working capital needs of farmers, particularly in ARBOs that were not mature enough to access credit from available facilities such as LBP.

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[3] According to DAR Project Management Office, as of Dec. 31, 2022, there are 94 hectares of service area in the 1 unit of communal irrigation system (CIS) rehabilitated by the Project. This is 100% of the recalibrated target in the revised logframe.

[4] DAR provides additional note that in the recalibrated targets in value chain-related infra, the number of targeted PWS is 2 units and not 3 units. Thus, accomplishment rate is 100%.

[5] DAR clarified that based on the revised logframe target of 47.13 kilometers, the project was able to complete 45.13 kilometers or 96% accomplishment. Furthermore, it should be noted that the target for FMRs is reduced from 136 km in the original LF to 47.13 in the ICC approved post midterm logframe.

5.1.6 Technical support for production, marketing, and finance

60. The Project provided an extensive package of technical support and training, of which the most appreciated by beneficiaries were those related to business management and proper production. Training programs include modules related to optimal cropping schedules, organic farming, water management and distribution, and post-harvest management, good agriculture and manufacturing practices. There were also considerable trainings on cooperative organization, bookkeeping and accounting, and management systems. Beneficiaries all expressed great appreciation for these trainings, of which the most useful related to financial management, good agricultural practices (e.g. pruning, rubber tapping, use of organic fertilizer, etc.), as well as proper postharvest handling (e.g. procedures for obtaining quality rubber cup lumps.)

61. *To boost profitability, the Project funded the hiring of Supply Chain Managers (SCM), or "shadow managers".* Whereas the PIM anticipated that VCEs be self-governing, the 2017 Supervision Mission Report broached the idea of engaging SCMs. The SCM will be managed by the end buyer of the commodity to ensure timely delivery of required quantity and quality. Salary of the SCM will be subsidized by the Project, at 90% in year 1, and declining Project share, down to 30% by year 4. The 2023 Supervision Mission credited two shadow managers as instrumental in turning around two lagging VCEs. The evaluation team encountered two cases of engagement of a shadow manager, all based in the respective lead ARBOs, namely: BATA ARC cluster – Coffee, for PARBEMCO; and CLAGIBAPLA ARC Cluster Coconut and bio-fertilizer. In MISORET ARC Cluster – Abaca for GFMPC, there was a shadow manager mentioned by the LARBO during the focus group discussion conducted, although this person was later clarified by DAR to be a Value Chain specialist/ consultant for abaca who was hired by the project.

62. Marketing agreements are practiced in all ARC Clusters but agreements are largely verbal, which occasionally is disadvantageous to ARBOs. All lead and participating ARBOs interviewed agreed that their supply arrangements were guided by a marketing agreement, whether from lead ARBO to institutional buyer, and from participating ARBO to lead ARBO. However, in most cases, neither lead nor participating ARBOs could recall a written agreement. In general, ARBOs also did not have key documents ready to hand, despite the fact that they had been furnished copies of these, such as turnover documents, usufruct agreements (for use of land), and the like. It should be noted that a Purchase Order represents a one-off transaction and not a marketing agreement, which is the contractual basis for an on-going marketing relationship.

63. The consequence is that in instances of deviation from custom, both parties simply apply discretion in adjusting, rather than imposing agreed penalties or countermeasures. For instance, in the abaca value chain in MISORET, the institutional buyer (NewTech) is alleged by the consolidator (GFMPC) as arbitrarily refusing to purchase lower abaca grades. This is unfortunate as the consolidator had already advanced payments to its supplying farmers; fortunately, they were able to find an alternate buyer, but they had to go all the way to Caraga region (SIUFMULCO). There was also the experience of payment delay, in which NewTech kept their stocks without grading them in excess of two months, leading to downgrading of abaca fiber (owing to deterioration of stocks), and inability to recover working capital in a timely way.

5.1.7 Project Management

64. Project implementation was delayed necessitating an extension, though the Project caught up with most disbursement targets by end of implementation. In 2017, cracks were already beginning to show in the rate of implementation, with only 16% of the allocated budget actually obligated. As of 2019, however, financial utilization was only 27.2%. Procurement performance deteriorated. Some critical rural infrastructure and VC facilities only had not been delivered to ARBOs. There was catch-up in physical targets in 2020 – 21, notwithstanding the operational constraints brought about by the COVID19 pandemic. Philippine Government and IFAD agreed to extend project implementation to 2022; by end-2022, utilization had reached 91%.

65. The initial set of delays were related to Project preparatory activities. In one of the FGDs with project staff, it was suggested that the timetable for preparatory activities should be finished prior to actual implementation schedule. Hiring of staff should also be done at the onset so that the necessary groundwork will be completed before the rollout of the interventions.

66. *The Project revised the Theory of Change in view of adjustments made in implementation.* The ToC 2022 version (Figure 1) differs from the original ToC as of 2018. In the former, outcomes are now disaggregated into immediate, intermediate, and final outcomes. One outcome was removed, namely "Target group vulnerability reduced through crop diversification and increased farm income." Moreover, implementation of PCF scheme was added as one of the activities.

67. Within the ARC Clusters, secondary crops became increasingly prominent after the Project Midterm. As the Project needed to catch up in its timeline (see below), secondary crops become more prominent. Secondary crops led to additional value chain enterprises namely: abaca production for MISORET ARC Cluster; corn production and processing for the North Bukidnon ARC Cluster; and the corn value chain for the South Bukidnon ARC Cluster.

68. The role of lead ARBO was also adjusted in pursuit of active cluster development. With each secondary crop, a new lead ARBO was assigned to spearhead development of each new value chain enterprise. Moreover, in some of the primary crop VCEs, there were also adjustments in cluster leadership:

- In BATA ARC Cluster – Coffee, MKGC was replaced by PARBEMCO owing to the relatively stronger financial standing of the latter;
- In CLAGIBAPLA ARC Cluster – coconet and bio-fertilizer, CLACOFARMCO was replaced by MAUNFACO in 2018.
- In Salipyasin Zamboanga Sibugay - rubber, more lead ARBOs were designated in addition to GARBEMCO, namely: a) Timbabauan Agrarian Reform Beneficiaries Cooperative (TIMARBENCO) in Tungawan Municipality; b) Lumbia Rubber Producers Association (LURPA) in Ipil Municipality; c) Silingan Rubber Farmers Association (SIRFA) in R.T. Lim Municipality; d) Malagandis Indigenous Farmers Association (MIFA) in Titay Municipality.
- In ZDN resettlement, co-lead ARBOs have been identified (CATAMCO and GUFAMUCO). Although CATAMCO is still listed as co-Lead ARBOs in the cluster, it is currently a supplier to TIMARBENCO, and has lately been disqualified from the auction scheme until further notice, for failure to meet delivery specifications. This

was part of the learning scheme on the "marketing through bidding" practiced by TIMARBEMCO. As of this report, CATAMCO is negotiating with another institutional buyer for the marketing of their consolidated produce.

5.2 Realization of expectations from ToC and Logframe

5.2.1 Economic and environmental factors conditioning outcome and impact

69. *The TOC assumption of normal economic conditions was violated by the COVID19 pandemic and subsequent world price shocks.* As discussed previously, the COVID19 pandemic brought about an economic crisis in 2020, affecting prices of inputs, outputs, as well as purchasing power of households in the Project communities. However, even during the economic recovery phase of 2021 to present, there are lingering effects of the pandemic, together with world price shocks affecting fuel and fertilizer prices. Hence for instance, abaca processing costs have escalated owing to high cost of diesel; crops that require fertilizer, i.e. rice, coffee, corn, sugarcane, and rubber, have also experienced increased production cost. On the other hand, there have been offsetting trends in product price especially for rubber (whose price increased owing to higher price of synthetic substitute).
70. *Environmental factors continue to adversely affect primary production.* In the case of coffee in BATA ARC Cluster, although area is mentioned in its Sustainability Plan as mainly rolling, farmers shared that coffee farms are often found in relatively flat areas that are affected by rains that occur year-round. In these farms, water is unable to drain, which affects health and even survival of coffee plants. What they need is a drainage system.
71. *The VC enterprise must offer competitive terms relative to other traders operating in Project areas.* Other traders remain active in Project areas, which continue traditional purchasing from individual farmers; there is no way to sustain the VC enterprise unless the latter offers better incentives (such as higher price) than these traditional outlets. This is clearly the case for abaca in LABACO ARC Cluster, where NMPC serves as the only abaca trader in Camiguin accredited by PhilFIDA; and TIMARBEMCO in Zamboanga Sibugay, whose auction scheme offers a price PHP 7 to 8 higher than traders owing to their ability to enforce high quality standards. Meanwhile in Salug Valley ARC Cluster for rice, the lead ARBO offers a unique profit-sharing arrangement, where 20% of its net income, depending on the volume of palay procured for every cropping season. .

5.2.2 Stabilization of ownership and tenure

72. There is some evidence to show that productivity of farms under individual CLOAs tend to be greater than those under collective CLOAs. According to Galang (2022), the Baseline survey showed yields to be higher for palay, corn, and coconut under individual CLOA, but not for banana. The latter though is a special case, owing to the pre-existence of a profitable agribusiness venture prior to the CARP, which was simply continued under collective CLOA after CARP.

5.2.3 Value chain equipment, facilities, and infrastructure

73. *FMRs are universally acclaimed as beneficial to business activity*. In all FGDs, FMRs are always regarded as being highly beneficial to business activity by reducing transport cost, and even opening up new public transport routes. The only comment of beneficiaries is that more FMRs are needed to link other production areas to markets.

74. *Low functionality of some VC equipment and facilities is hindering the realization of higher income from VC operations.* The 2021 Supervision Mission estimates under 2% of VC equipment are non-functional. However, there are numerous cases of sub-functional equipment, noted during the field visits, as listed in Table 1. There are numerous other cases in which a VC equipment needed to be repaired, with the support of the DAR Provincial Office.

75. Most if not all of these problems might have been avoided had the ARBOs been the one responsible for procurement of the equipment and facilities. The role of the Project might then be limited to providing reliable technical advice on specification and sources of supply. It was later clarified by DAR that a proposal had been made to do community-based procurement. However, legally this could not be done because of the nature of the loan agreement with IFAD; the bidding procedures had to comply with applicable law, namely Republic Act (RA) 9184[6]. Nonetheless, the ARBOs were responsible for providing the needed specifications to inform the competitive bidding process, and in some cases actively observed the conduct of procurement.

Table 1: Instances of non-functional or sub-functional VC equipment and facilities encountered during field visits

Product	ARBO	Prov	Equipment	Problem encountered
Rubber	CATAMCO	ZDN	Auger	According to farmers, can only be used in flat or level areas (according to DAR, farmers need further training to properly use the augur in sloping areas)
Rice	MAFAMCO	ZDS	Rice mill	First delivery non-functional, replaced; replacement still unable to whiten rice
			Tractor	Consumes too much fuel
Abaca	GFMPC	MO	Warehouse	Warehouse lacks ventilator fans Needs drainage to cope with heavy rain
Coco sap	LAMPCO		Crystallizer	Destroyed in an industrial accident, replaced
Muscovado	BUKIFCARB	BS	Muscovado plant	Does not meet FDA standards; remedial action underway
Cassava	MARBFC	BN	Granulator	Returned to supplier, replacement satisfactory
			Corn sheller	Beneficiaries not satisfied with the equipment; DAR claims this has been rectified
Rice	SAMPCO	ADS	Rice mill	Sometimes breaks down

[6] RA 984 also known as the "Government Procurement Reform Act."

Product	ARBO	Prov	Equipment	Problem encountered
Coconet	MAUNFACO	SDN	Decorticating machine	The mounting of the decorticating machine had to be repaired on the first months. Operates at below capacity
Coffee	UMPC	SDS	Bean sizer	Used only for six months, but broken, not replaced
	BAVILCOGO	SDS	Dehuller	Cannot be used at all, power requirement exceeds power supply at manufacturing site; requires additional PHP 80,000 to install transformer

Source: Evaluation team field visits.

76. Among these examples of shortfall in quality, the most costly is probably the Muscovado plant of BUKIFCARB. A consultant was engaged to provide technical support for the processing facility. The factory however did not meet the standards required by the Food and Drug Administration (FDA) of the Department of Health (DOH) on food safety. About PHP 500,000 (an estimate from University of Science and Technology of Southern Philippines) is needed to retrofit the plant in order to make it compliant, a cost which would have been unnecessary had the plant been designed beforehand with this in mind. Moreover, the factory water supply also fails to meet DOH standards for water safety; construction of sanitary water supply (deep well) will require another PHP 350,000. Currently, the Cluster is limited to small retail outlets and groceries as their License to Operate (LTO) and Certificate of Product Registration (CPR) from DOH-FDA required by large retailers is still in process. The cooperative is now approaching funding sources such as provincial LGU to raise the needed amount.

5.2.4 Input provision

77. *Although well-intentioned, sustainability of the PCF scheme is doubtful*. The ARBOs participating in FGDs that received the PCF report low collection rates. For one, repayment terms were too generous, i.e. two years to pay, hence many farmers are taking advantage of the long deadline. Moreover, some are disappointed by discontinuation of the subsidy, and are still treating the PCF inputs as grants despite explanation to the contrary. These observations on low collection rate (or conversely, high delinquency rate) among ARBOs are consistent with the findings in the Terminal Report on PCF Implementation done by an independent external monitor.

5.2.5 Technical support for production, market linkages, and finance

78. *Some ARBOs fall short of being able to meet the volume and quality requirements of the market*. In the case of SAMPCO, the lead ARBO of VETREBUNS ARC Cluster, is only 1.5% of total rice production in the Cluster can be procured for the rice mill. A major constraint is the low capacity of the circulating and mechanical dryer provided by the Project. Meanwhile, some farmers persist in bad rubber coagulation practice such as use of battery acid – a habit that has led to the disqualification of CATAMCO from the auction scheme in Salipyasin ARC Cluster; similarly, the corn value chain in North Bukidnon continue to deal with the problem of aflatoxin contamination, thus the provision of a warehouse and twelve solar dryers from the project.

79. *In one case, failure to meet quality requirement inflicted serious financial losses on lead and participating ARBOs*. This was the case of South Bukidnon ARC Cluster – muscovado processing; initially sugarcane and other materials procured by Cluster ARBOs could not be converted into saleable product because of the factory could not produce crystal muscovado sugar. They are still indebted to the local electrical cooperative for unpaid bills hence the power has been cut off from main line to the factory; restoration of power is expected to cost PHP 280,000 at the time of the visit made by the evaluation team. Currently the lack of power and familiarity with the technology is limiting the scale of production. It was later clarified that the amount payable to the electric cooperative has been recently reduced to PHP 9,000.

80. *Lack of working capital has in most cases constrained the lead ARBO from expanding consolidation of supply from the cluster.* The lead ARBOs all reported the lack of working capital as a constraint, now or in the future, in expanding their purchases from their respective Clusters. Some of them managed to relax the financial constraint by gaining access to formal finance, mostly from Land Bank of the Philippines (LBP), and in other places a local Rural Bank. However, even an apparently well-financed operation such as that of TIMARBEMCO admits they need PHP 20 million more monthly working capital to be able to accept all applicants into their consolidation scheme.

81. *A key element of a successful VC enterprise is the presence of an experienced and capable leader*. In the case of TIMARBEMCO of Zamboanga Sibugay, NMPC of Camiguin, SAMPCO of Agusan del Sur, and a few others, a leader had emerged that put together a strong team, inspired other cooperative leaders, and earned trust of members. Such leaders are not present in all value chains which raises questions about sustainability.

82. *Efforts to procure the requisite leadership skills has had mixed results.* The Project is well aware of the importance of competent management, hence the decision to procure the services of shadow managers. In fact, our interviews with ARBOs has surfaced misgivings over one of these external Managers. The participating ARBO alleges that the purchase record kept by the shadow manager understated their actual deliveries. The other external manager though performed satisfactorily according to the lead ARBO.

6. Findings of the quantitative evaluation

6.1 Profile of sample households

6.1.1 Overview of the sample

83. Distribution of the samples by province are shown in Table 2. There are a total of 1,144 households in the baseline survey, down to 1,139 households in the endline survey; however, a panel can only be constructed for just 1,107 households, meaning 32 of the 1,139 households were replacements for attrition from the baseline sample. The most number of samples are found in Agusan del Sur, followed by Bukidnon; the least number is found in Zamboanga del Sur. Breakdown of sample households by ARBO, intention-to-treat (i.e. initial versus succeeding group), and by period is shown in the Annex.

Table 2: Distribution of sample households, by period and province

	Baseline	Endline		
	Full sample	Full sample	Panel	Replacements
Bukidnon	264	263	258	5
Agusan del Norte	150	149	143	6
Agusan del Sur	308	307	296	11
Misamis Oriental	244	243	239	4
Surigao del Norte	34	34	34	0
Surigao del Sur	119	118	113	5
Zamboanga del Sur	25	25	24	1
Total	**1,144**	**1,139**	**1,107**	**32**

Source: PIDS Baseline and Endline Surveys.

6.1.2 Household membership

84. Some household characteristics for panel data are summarized in Table 3. Households started out with about five members on average at baseline, but ended with 4.39 members on average at endline. The decline affects both working members and dependents, although the decline is larger for working members. Across age groups, number of members also declines, except for members aged 65 and over. What has happened is that some working members have left the household (migrated), while remaining members have become older. Also striking is that at the baseline, sample workers hold multiple occupations on average (1.33), but the average number of occupations declines by endline (1.16).

Table 3: Characteristics of average sample household, by period, panel data

	Baseline	Endline
Number of working members	2.16	1.63
Occupations per worker (maximum 6 occupations)	1.33	1.16
Number of nonworking (dependents)	2.83	2.77
Number of members aged 15 and above	3.53	3.37
Number of members aged of working age (15-64)	3.16	2.91
Number of members below 15 years old	1.46	1.02
Number of members aged 65 and above	0.37	0.46
Average household size	4.99	4.39

Source: PIDS Baseline and Endline Surveys.

85. Within just one year between baseline and endline, there were significant occupation a movement among working household members. The various occupations are grouped into two broad categories, namely: agriculture and business operators; and workers. In turn, within each category are three types, namely agriculture, agribased business, and other business. Transition of primary occupation of household working members is summarized in Table 4. In this tabulation, a household is tagged with as many occupations as present among the occupations of household members.

Table 4: Distribution of sample households, by transition of members' occupation, panel data

Baseline and endline occupation	Number	% share
Agriculture and business operators		
Agriculture operator to agriculture operator	707	63.9
Agriculture operator to non-agriculture business operator	239	21.6
Non-agriculture business operator, agriculture operator	58	5.2
Agribased business operator to agribased business operator	13	1.2
Agribased business operator to non-agribased business operator	77	7.0
Non-agribased business operator to agribased business operator	24	2.2
Other business operator to other business operator	91	8.2
Other business operator to non-other business operator	172	15.5
Non-other business operator to other business operator	68	6.1
Workers		
Farmworker to farmworker	82	7.4
Farmworker to non-farm worker	189	17.1
Non-farmworker to farmworker	99	8.9
Agribased business worker to agribased business worker	7	0.6
Agribased business worker to non-agribased business worker	64	5.8
Non-agribased business worker to agribased business worker	7	0.6
Other business worker to other business worker	352	31.8
Other business worker to non-other business worker	230	20.8
Non-other business worker to other business worker	145	13.1
Total	1,107	100.0

Source: PIDS Baseline and Endline Surveys.

86. At the baseline, 946 (85.5%) of households had agriculture operators; however, by endline, 239 (21.6%) ceased farming, while only 58 (5.2%) started farming. Likewise, at the baseline, 171 (24.5%) of households had farmworker members. Of these, by endline a striking 189 exited from being a farm worker, and only 99 (8.9%) entered farm work. Likewise, at the baseline only 90 households (8.2%) had agribased business operators; likewise 71 workers (6.4%) were working in agribased business. By endline, a majority (64) of these workers had left for another job, while only 7 were added; likewise, a majority of non-agribased business operators (77) left for other employment, while only 24 were added to the number of agribased business operators. This is contrary to the aim of ConVERGE project to increase employment in agriculture and agri-enterprises.

6.1.3 Participation in ConVERGE

87. Based on intention-to-treat, the panel has 569 households under the initial group, and 570 households under the succeeding group (Table 5). We define **with-project,** as *being a member of an ARBO which received an I-SHARED intervention beyond training*. The remaining households are defined as **without-project**. Only 384 sample households (34% of the panel) belong to treated, based on actual treatment group, while

66%, or about two-thirds of the sample, were effectively not part of I-SHARED interventions (except possibly for training). Apparently, in 2018, the scope of I-SHARED in terms of ARBOs to be eventually covered within the Project duration, was vastly overestimated. Among initial households, only 28% were in the with-project group; the proportion rises for succeeding households (39% with-project).

Table 5: Distribution of panel households, under alternative definitions

	Treated, based on intention-to treat	Untreated, based on intention-to-treat	Total
Treated, based on with-project	160 (28)	224 (39)	384 (34)
Untreated, based on without-project	409 (72)	346 (61)	755 (66)
Total	569 (100)	570 (100)	1,139 (100)

Note: Figures in parenthesis denote percentages.

Source: PIDS Baseline and Endline Surveys.

88. Respondents were asked to recall whether they had received ConVERGE interventions (Table 6). Only 31% of initial group recall receiving an intervention, rising to 66% in the succeeding group, for a total of 49%.

Table 6: Distribution of initial and succeeding group of households, by recall of ConVERGE intervention, panel data

	Initial	Succeeding	Total
Received ConVERGE intervention	178 (31)	378 (66)	556 (49)
Did not receive ConVERGE intervention	391 (69)	192 (34)	583 (51)
Total	569 (100)	570 (100)	1,139 (100)

Note: Figures in parenthesis denote percentages.

Source: PIDS Baseline and Endline Surveys.

89. Respondents were asked about the year in which a ConVERGE intervention (aside from training) was first received (Table 7). Of the total 384 which actually received treatment, 201 (52%) could not recall the year first received; of those who could recall the year, most (116 or 58%) received it in the first two years (2018 and 2019). However, the majority of these (62.5%) fell under the control group, i.e. the experimental design requires these households to receive the intervention towards the latter stage of the Project (2020–22).

Table 7: Distribution of treated households, based on actual treatment

	2018	2019	2020	2021	2022	Cannot recall	Total
Initial	23	23	7	7	1	99	160
Control	31	39	22	23	7	102	224
Total	54	62	29	30	8	201	384

Source: PIDS Baseline and Endline Surveys.

6.2 Household outcomes

6.2.1 Income and expenditure

90. Table 8 summarizes income of sample households by period, and by source. Whether at baseline or endline, median income is much lower than mean income, implying the distribution of income across households is heavily skewed to the right. The most notable finding in the table is that average income – whether based on mean or median – declined between baseline and endline; the fall in mean income was 37%, while that of median income was 43%. The contrast between this finding and the result of the Annual Outcome Survey reported in 2022 is discussed in Box 1.

Box 1. Comparison between PIDS Baseline and Endline survey and 2022 Annual Outcome Survey

The December 2022 Supervision Mission Report states that the in-house 2022 annual outcome survey (AOS) reported an average increase of 14.8% (2021 vs. 2020) on farm income. The same report recommends that a robust analysis of attribution to the Project should be conducted.

Comparison of the PIDS Baseline and Endline surveys and the 2022 AOS shows that the figures generated from the two data sources are not comparable. The difference in the sampling design and characteristics of actual survey respondents are among the reasons for incomparability. For instance, the sampling design employed in the PIDS baseline and endline survey involves a two-stage cluster random sampling, wherein the PARBOs are considered as clusters. The primary sampling units are PARBOs that had not yet received any hard intervention during the drawing of samples performed in 2018, but are expected to receive bulk of the interventions before the closing of the Project with varied timing. As already described in the PIDS Baseline Report, the analysis technique calls for a comparison between treatment and control groups, thus the sample was randomly grouped into Initial and Succeeding groups (21 PARBOs each). Moreover, the secondary sampling units are members of the sampled PARBOs and their respective households. The 1,144-household sample size was distributed proportionately based on the size of the selected PARBOs. This means that more households were interviewed for PARBOs with larger membership, while fewer for smaller PARBOs. In the case of the AOS 2022, the sampling design was a one-stage stratified random sampling, wherein Project-site provinces were considered as strata. The sample size of 1,200 beneficiary households was distributed3 almost equally across Project-site provinces. Unfortunately, the AOS report did not describe in detail the sampling frame they used. As can be surmised from the AOS report, they mainly captured actual beneficiary responses (and they were classified as ARB, smallholder farmer, or farmworker).

Another point of difference is the reference period of the two surveys. The PIDS baseline survey has a reference period of June 2018-May 2019, while the endline survey has a reference period of September 2021-August 2022. The same panel of households were interviewed during the baseline and endline surveys except for a few replacement households. The tables and other statistics produced using the PIDS survey data compares a three-year time period. Per clarification by DAR, the AOS questions captured the current and immediate past year scenarios. Thus, 2022 AOS income and other similar figures compare a one-year difference between 2021 and 2020, both elicited within a multiple-year recall.

Finally, it should be noted that the PIDS Baseline and Endline surveys were further analyzed so as to attribute difference-in-difference to ConVERGE project, using quasi-experimental methods. To some extent, the PIDS evaluation study addresses the need for more rigorous project attribution.

91. The decline did not affect all income sources equally. There was a sharp drop in business income, including net farm income (primary production); however, wage employment income **increased**, with the largest increase in agribased wage employment, consistent with the agri-enterprise development interventions of ConVERGE.

Table 8: Household Income, by source, panel data

	Baseline			Endline		
	Number	Income (PHP)		Number	Income (PHP)	
		Mean	Median		Mean	Median
Primary production (net)	946	34,321	8,221	764	10,584	3,528
Agribased business (net)	90	141,509	43,680	37	78,105	17,000
Other business (net)	263	66,681	27,640	151	46,983	20,000
Farm-related wage employment	271	49,327	28,800	181	52,123	36,000
Agribased wage employment	71	78,221	59,990	14	114,456	104,376
Other business wage employment	582	142,715	90,525	497	156,538	100,800
Other sources	876	31,635	17,910	793	17,313	11,000
Total	**1,107**	**173,834**	**105,980**	**1,107**	**108,975**	**60,000**

Source: PIDS Baseline and Endline Surveys.

92. Similar patterns over time are found for household income measured in per capita terms (Table 9). In percentage terms, the decline in per capita household income for the beneficiary group is 26%; this is eight percentage points lower than the decline in per capita household income of the non-beneficiary group. This already suggests that the favorable effects of participating in ConVERGE, as discussed in the theory of change, allowed household income greater resilience in the face of adverse shocks due to the pandemic, the global price shocks, and climate change. The estimate may be sharpened further once statistical correction is made for endogeneity of the binary treatment variable.

Table 9: Household Income per capita

	Beneficiary				
	Number	**Baseline**	**Number**	**Endline**	**% change**
Beneficiary					
Primary production (net)	485	9,817	389	4,504	-54%
Agribased business (net)	35	24,091	13	8,707	-64%
Other business (net)	110	10,515	69	15,685	49%
Farm-related wage employment	124	11,714	93	14,147	21%
Agribased wage employment	33	12,389	7	21,019	70%
Other business wage employment	288	30,389	235	37,962	25%
Other sources	414	5,658	325	4,139	-27%
Total household income	538	36,649	538	27,280	-26%
Non-beneficiary					
Primary production (net)	461	6,790	375	1,525	-78%
Agribased business (net)	55	22,107	24	28,764	30%
Other business (net)	153	17,056	82	12,062	-29%
Farm-related wage employment	147	10,646	88	10,997	3%
Agribased wage employment	38	13,524	7	20,393	51%
Other business wage employment	294	28,014	262	32,047	14%
Other sources	462	8,999	468	5,159	-43%
Total household income	569	37,660	569	24,908	-34%

Source: PIDS Baseline and Endline Surveys.

93. Table 10 summarizes household outcomes in terms of expenditure per capita, the outcome variable on which the power calculation of the sampling was based. Based on current prices, mean household per capita expenditure slightly increased, while median per capita expenditure decreased. Accounting for inflation, i.e. valuing at fixed 2018 prices, both mean and median per capita expenditure decline. Note that accounting for inflation (11.5% between 2018 and 2021), income declines in Tables 8 and 9 would be accentuated, while income increases attenuated.

Table 10: Household expenditure per capita

	Current prices		2018 Prices	
	Baseline	**Endline**	**Baseline**	**Endline**
(In PHP)				
Mean	33,030	33,207	32,039	28,890
Median	26,301	24,994	25,512	21,745

Source: PIDS Baseline and Endline Surveys.

94. The reason for the drop in income is likely to be the series of shocks that affected the economy between baseline and endline surveys, namely:

- The rapid economic contraction caused by mobility restrictions due to the COVID19 pandemic starting in early 2020;

- The series of world price increases of fertilizer and fuel, and of agricultural inputs such as feeds, following invasion of Ukraine by Russia in early 2022.

95. Even as the economy as a whole had been recovering from the COVID19 pandemic, the subsequent price shocks continue to worsen the plight of agricultural operators. FGD participants noted on-going difficulties because of high fertilizer prices; high diesel prices also affected cost of abaca harvesting operations; and increases in price of construction materials affected some of the costing of the more recent VC facilities.

96. Another potential source of income decrease is climate change. This, together with the high input cost, may account for changes in yield observed for some crop growers in the survey. For households in Agusan del Sur engaged in rice cultivation, there was a decline in average yield from 3.70 tons per ha at baseline to 2.92 tons per ha at the endline in the case of the treatment group; the downward trend was also observed among the control group (3.24 tons per ha at baseline down to 2.65 tons per ha at endline). For corn however, yield increased slightly from baseline to endline from 2.86 tons per ha up to 2.94 tons per ha. (The number of observations for the target crops in each province were too small be represented and are not reported.)

97. Aside from economic shock and climate change, all other assumptions (except one) of the TOC appear to have been realized during the period of ConVERGE implementation, namely: continued government commitment to value chain development; peace and order in the target ARC clusters; availability of beneficiary counterpart (because equity requirements were minimal and easily complied with); business/financial institutions willing to work with farmers, ARBOs/FOs; and key policy environment improved for competitiveness of the agribusiness sector. The exception is that *LGUs and local communities assume responsibility for infrastructure O&M* which cannot be observed during the ConVERGE period, but can only be validated post-Project.

6.2.2 Land Tenure

98. Table 11 shows the number of landowners at the baseline and endline. During the baseline, 369 treatment households and 390 control households reported to own a land. The average size of land owned by treatment and control households were 1.78 ha and 2.85 ha, respectively. The number of landowners and the size of land owned decreased at the endline. Land owned may be covered by a Certificate of Land Ownership Award (CLOA). At the baseline, the number of treatment households with CLOA was 90, while it was 192 for control households. The number of CLOA holders decreased at the endline—82 for treatment households and 39 for control households.

Table 11: Average number of hectares of owned or cultivated land per household

	With project				Without project			
	Obs.	Baseline	Obs.	Endline	Obs.	Baseline	Obs.	Endline
Owned land	369	1.78	149	1.43	390	2.85	160	1.68
CLOA	90	1.91	82	1.33	192	2.78	39	1.64
Others	302	1.61	69	1.51	255	2.26	125	1.64
Cultivated, not owned	125	1.47	222	1.68	164	2.25	153	2.06

Source: PIDS Baseline and Endline Surveys.

99. Out of 1,139 households in the sample, 73% never had a CLOA, 18% originally had an individual CLOA, 4% had individual CLOA which was from a group CLOA, and 5% had owned a group CLOA. The top reasons for not currently cultivating the land covered by CLOA were 1) they already sold the land (139 responses), and 2) lack of capital (82 responses).

6.2.3 Assets

100. Details about housing assets are provided in Table 12. Wall material and drinking water source improved, while roof materials slightly deteriorated for some treatment households. Control households, on the other hand, had improvements in roof material, wall material, and drinking water source. As for toilet facility, both treatment and control households suffered a decline in quality.

Table 12: Characteristics of housing materials, source of drinking water, and sanitation

	With-project		Without-project	
	Baseline	Endline	Baseline	Endline
Roof				
High Quality	451	433	475	490
Medium Quality	85	99	86	74
Low Quality	2	6	8	5
Wall				
High Quality	311	336	316	360
Medium Quality	131	131	170	149
Low Quality	96	71:	83	60
Drinking Water Source				
High Quality	331	372	336	370
Medium Quality	106	82	160	138
Low Quality	101	84	73	61
Toilet Facility				
High Quality	520	465	542	484
Medium Quality	1	3	3	1
Low Quality	17	70	24	84

House and Lot				
Own	360	425	325	318
Others ownership status	178	113	244	251
Imputed Rent (nominal PHP)	1,069.20	1,439.03	974.25	1,461.92

Source: PIDS Baseline and Endline Surveys

Note: Panel data used (n=1,107). Roof: High - Galvanized Iron/Aluminum, Medium - Half Galvanized Iron and Half Concrete, Bamboo/Cogon/Nipa/Anahaw; Low: Others Wall: High - Concrete/Brick/Stone, Wood; Medium - Half concrete/brick/stone and Half wood, Galvanized Iron/Aluminum; Low - Others Drinking Water: High - Own use faucet, community water system, Water refilling station, Bottled/sachet water; Medium - Shared faucet, community water system, Own use tubed/piped deep well, Shared tubed/piped deep well; Low – Others; Toilet Facility: High - Flush or Pour Flush Toilet: Flush to piped sewer system, Flush to septic tank, Flush to pit latrine; Medium - Flush or Pour Flush Toilet: Flush to open drain, Flush to unknown depository/place; Low: Others.

101. Table 13 summarizes the number of farm animals and tools of sample households. Both treatment and control households had decreasing number of livestock and poultry animal assets. Among the farm tools, more treatment households own two-wheel/hand tractors and irrigation/water pump.

Table 13: Livestock and Poultry Inventory, and Farm Tools

	With-project				Without-project			
	Obs	**Baseline**	**Obs**	**Endline**	**Obs**	**Baseline**	**Obs**	**Endline**
Cattle	109	2.16	90	1.78	52	1.65	50	1.72
Carabao	94	1.17	60	1.33	90	1.28	79	1.37
Swine	227	3.63	118	2.19	245	3.64	80	2.16
Goat	49	3.45	49	2.71	45	2.47	43	3.21
Chicken	341	24.81	259	11.49	338	38.88	217	9.42
Duck	87	29.05	25	9.96	135	33.32	25	8.60
Two-wheel/hand tractor	16	1.19	59	1.42	4	1.00	11	1.18
Four-wheel tractor	2	1.00	4	3.00	-		2	2.50
Irrigation/water pump	18	1.22	36	1.69	6	1.00	4	2.75
Solar dryer	3	1.00	5	2.40	1	2.00	-	
Plow/Araro	133	1.35	116	1.39	44	1.11	29	1.34
Harrow/Suyod	49	1.08	37	1.22	13	1.08	14	1.50
Sprayer/Pambomba	258	1.28	253	1.33	82	1.21	124	1.34
Harvester	2	1.00	2	5.50	2	1.00	6	1.17
Combined Harvester-Thresher	2	1.50	2	4.50	-		2	8.00
Large Thresher/Tilyador	3	1.00	4	6.50	1	1.00	4	4.50
Portable Thresher	10	1.00	3	5.67	4	1.00	-	

Source: PIDS Baseline and Endline Surveys

102. Based on Table 14, with-project households experienced lower reduction in housing asset index and farm asset index than without-project households.

Table 14: Housing and farm asset indices of sample households

	With-project		Without-project	
	Baseline	**Endline**	**Baseline**	**Endline**
Housing asset index	0.7941	0.6292	0.8144	0.6022
No. of observations	538	538	569	569
Farm asset index	0.1386	0.0988	0.1413	0.0539
No. of observations	538	538	569	569

Source: PIDS Baseline and Endline Surveys

Box 2. Asset Index Computation

To compute the housing asset index, five dummy variables were used, namely, **house ownership dummy** (1 if own/owner-like possession of house and lot, 0 otherwise), **roof type dummy** (1 if high quality, 0 if low to medium), **wall type dummy** (1 if high quality, 0 if low to medium), **toilet type dummy** (1 if high quality, 0 if low to medium) and **drinking water source dummy** (1 if high quality, 0 if low to medium).

The farm asset index includes the number of livestock and poultry owned and number of farm tools owned by the household. The following items were included in the calculation: Cattle, Carabao, Swine, Goat, Chicken, Duck, Two-wheel/hand tractor, Four-wheel tractor, Irrigation/water pump, Solar dryer, Plow/Araro, Harrow/Suyod, Sprayer/Pambomba, Harvester, Combined Harvester-Thresher, Large Thresher/Tilyador, and Portable Thresher.

The housing asset index and the farm asset index were computed using the Principal Components Analysis (PCA). It is one of the standard data reduction techniques listed in IFAD's publication titled Measuring IFAD's Impact. The scores based on the PCA technique were then normalized using min-max method. Thus, the index values are now ranging from 0 to 1.

6.3 Result of regression analysis

6.3.1 Overview

103. Household-level variables to explain the outcome variable are as follows:

num_ noeduc: Number of members aged 15 above without education
num_ belowelem: Number of members aged 15 above with some elementary education
num_ elemgrad_belowhs: Number of members aged 15 above who are elementary graduate or finished some high school education
num_ collegeup: Number of members aged 15 above who finished at least college education
roof_strong: dummy variable, equals 1 if roof is made of strong materials (either Galvanized iron/aluminum or Concrete/clay tile), 0 otherwise
wall_strong: dummy variable, equals 1 if wall is made of strong materials (Concrete/brick/stone)

toilet_flush: dummy variable, equals 1 if toilet facility is flush or pour flush, 0 otherwise

water_drink_source: dummy variable, equals 1 if main source of drinking water supply is a safe source (Own use or shared faucet community water system, own use or shared tubed/piped deep well, or water refilling station), 0 otherwise

housing_own: dummy variable, equals 1 if house and lot is owned or with owner-like possession, 0 otherwise

104. The various regression models are distinguished by format (cross-sectional with separate periods, vs difference-in-difference panel); outcome variable (income vs expenditure); and definition of treatment (intention-to-treat vs actual treatment vs instrumented treatment). The last, combined with DID, is deemed the most reliable, as it attempts to correct for the very large discrepancy between intention-to-treat and actual treatment, discussed in Table 5. The various combinations are summarized in Table 15, with the cell entries denoted Tab Reg 1 to Tab Reg 4.

Table 15: Regression models

	Intention-to-Treat	Actual Treatment	Instrumented Treatment
Cross-sectional format			
Income	Tab Reg 1	Tab Reg 2	
Expenditure	Tab Reg 1	Tab Reg 2	
Difference-in- difference			
Income	Tab Reg 3	Tab Reg 3	Tab Reg 4
Expenditure	Tab Reg 3	Tab Reg 3	Tab Reg 4

Source: Author's analysis.

105. In the subsequent runs, numbers in parenthesis denote standard errors; the asterisks denote the following:

***Significant at 1% level

**Significant at 5% level

*Significant at 10% level

6.3.2 Simple cross-section model

106. Estimates for Tab Reg 1 are shown in Table 16. For per capita income, ITT has a positive effect, both for endline and baseline, though neither is statistically significant. For per capita expenditure, only the endline ITT has a positive coefficient, and is significant at 5% level; the value implies that being assigned as initial group is associated with PHP 3,527 greater expenditure; however, there being no period fixed effect, the increase (10.6% over the baseline mean) is lower than the inflation rate (11.5%). The coefficients of over control variables are consistent with theoretical expectation, i.e. higher education level is associated with higher per capita income and expenditure; a strong wall is associated with higher per capita income; and having own-house is related to higher per capita expenditure.

Table 16: Parameter estimates for cross-section model, by outcome variable, using intention-to-treat (Tab Reg 1)

	Per capita income		Per capita expenditure	
VARIABLES	Baseline	Endline	Baseline	Endline
ITT	1,754	1,672	279.2	3,527**
	(3,657)	(2,203)	(1,496)	(1,776)
num_noeduc	-6,209	-7,312	-4,746	-5,503
	(10,118)	(4,933)	(4,139)	(3,976)
num_belowelem	-6,737***	-3,632**	-4,667***	-4,269***
	(2,403)	(1,434)	(983.2)	(1,156)
num_ elemgrad_belowhs	-3,470**	-3,485***	-4,176***	-4,112***
	(1,455)	(921.0)	(595.2)	(742.4)
num_ collegeup	18,569***	15,714***	4,650***	1,972
	(2,527)	(1,509)	(1,034)	(1,216)
roof_strong	484.2	5,107	344.8	833.9
	(5,353)	(3,138)	(2,190)	(2,530)
wall_strong	14,406***	559.2	9,794***	4,891**
	(4,275)	(2,447)	(1,749)	(1,972)
toilet_flush	-2,242	7,307**	-3,745	2,530
	(10,257)	(3,246)	(4,196)	(2,617)
water_drink_source	5,630	1,798	-1,071	-2,176
	(5,042)	(2,997)	(2,063)	(2,416)
housing_own	4,117	3,695	4,796***	6,467***
	(3,929)	(2,365)	(1,607)	(1,907)
Constant	28,392**	11,655**	38,344***	31,643***
	(11,196)	(4,923)	(4,580)	(3,969)
Observations	1,107	1,107	1,107	1,107
R-squared	0.106	0.158	0.151	0.079

Source: Authors' calculation.

107. Estimates for Tab Reg 2 are shown in Table 17. For per capita income, actual treatment variable has no statistically significant effect, although it is negative at the baseline and positive at endline. Meanwhile for per capita expenditure, actual treatment variable has a positive effect at baseline, but negative at endline; both are statistically significant at 10% level. Note though that the coefficients may be biased owing to omission of time.

Table 17: Parameter estimates for simple model, by outcome variable, based on actual treatment (Tab Reg 2)

	Per capita income		Per capita expenditure	
	Baseline	Endline	Baseline	Endline
AT	-2,362	626.8	2,674*	-3,277*
	(3,665)	(2,250)	(1,497)	(1,814)
num_noeduc	-6,260	-7,232	-4,457	-5,619
	(10,116)	(4,935)	(4,133)	(3,978)
num_belowelem	-6,754***	-3,646**	-4,654***	-4,377***
	(2,403)	(1,434)	(981.8)	(1,156)
num_ elemgrad_belowhs	-3,472**	-3,488***	-4,168***	-4,101***
	(1,455)	(921.3)	(594.3)	(742.6)

	Per capita income		Per capita expenditure	
	Baseline	Endline	Baseline	Endline
num_ collegeup	18,588***	15,684***	4,629***	1,873
	(2,527)	(1,509)	(1,032)	(1,216)
roof_strong	545.1	5,509*	467.6	1,028
	(5,345)	(3,128)	(2,184)	(2,522)
wall_strong	14,336***	473.3	9,753***	5,130***
	(4,270)	(2,456)	(1,745)	(1,980)
toilet_flush	-2,154	7,057**	-3,901	2,082
	(10,258)	(3,232)	(4,191)	(2,605)
water_drink_source	5,547	1,869	-741.3	-2,152
	(5,044)	(2,998)	(2,061)	(2,416)
housing_own	4,461	3,415	4,539***	7,020***
	(3,941)	(2,426)	(1,610)	(1,955)
Constant	30,163***	12,247**	37,105***	34,835***
	(11,275)	(4,887)	(4,607)	(3,939)
Observations	1,107	1,107	1,107	1,107
R-squared	0.106	0.157	0.153	0.079

Source: Authors' calculation.

6.3.3 Panel estimates assuming exogenous treatment variable

108. The omission of time is corrected in Table 18, which is a panel estimate with a time dummy. Based on intention-to-treat (i.e. being in initial group), being treated is associated with PHP 442 **lower** per capita income at the endline, although per capita expenditure is PHP 2,310 **higher**. However, neither is statistically significant, as seen in the relatively high values of the standard error. As discussed previously though, the meaning of "initial" and "succeeding" groups is nullified by departure from the original experimental design.

Table 18: Parameter estimates for DID model, by outcome variable and definition of treatment (Tab Reg 3)

	Per capita income ITT	Per capita expenditure ITT	Per capita income AT	Per capita expenditure AT
time	-10,291***	-1,834	-11,890***	1,729
	(2,593)	(1,757)	(4,244)	(1,937)
num_noeduc	-4,456	260.8	-4,352	3.130
	(5,126)	(2,078)	(5,111)	(2,075)
num_belowelem	-4,078**	-1,733	-3,974**	-1,931
	(1,974)	(1,654)	(1,955)	(1,628)
num_ elemgrad_belowhs	-2,039*	-1,770*	-2,025	-1,794*
	(1,209)	(1,016)	(1,209)	(1,013)
num_ collegeup	6,948**	-5,441**	6,964**	-5,520**
	(3,181)	(2,036)	(3,108)	(2,061)
roof_strong	243.3	546.9	431.0	331.8
	(4,067)	(2,470)	(3,928)	(2,636)
wall_strong	2,104	7,560***	1,865	8,025***
	(6,006)	(2,724)	(5,782)	(2,720)
toilet_flush	7,406	1,313	7,480	1,005

	Per capita income ITT	Per capita expenditure ITT	Per capita income AT	Per capita expenditure AT
	(5,389)	(1,981)	(5,061)	(2,044)
water_drink_source	2,622	-2,935	2,493	-2,749
	(2,121)	(3,140)	(2,080)	(3,072)
housing_own	56.79	1,678	-236.4	2,037
	(1,667)	(1,752)	(1,571)	(1,791)
Treatment	-441.6	2,310	2,917	-5,122*
	(5,258)	(2,798)	(4,645)	(2,810)
Constant	29,625***	36,232***	29,667***	36,379***
	(6,453)	(5,433)	(5,842)	(5,293)
Observations	2,214	2,214	2,214	2,214

Source: Authors' calculation.

109. The definition of "treatment" is made consistent with project M&E records in the last two columns of Table 18, which uses AT rather than ITT. Actual treatment is associated with a higher per capita income at endline, but a lower per capita expenditure at endline; again, both are not statistically significant. Note that the estimation assumes exogeneity in the treatment variable, failure of which may render the coefficient estimates biased.

6.3.4 Panel data with endogeneity correction for treatment variable

110. Correction for endogeneity involves instrumental variables, which we adopt from the ITeMA[7] data for ARBOs shared by the ConVERGE PMO. The instruments are num_members (number of members as of 2019) and cbu_paid (share of capital build-up that has been paid by coop members). Result of the probit regression is shown in Table 19. The psuedo-R^2 is quite high at 0.24. Both instruments are statistically significant at 1% level; coefficient of cbu_paid is positive, but that of num_members is negative. That is, ARBOs with more members are less likely to receive ConVERGE intervention; this may be capturing greater organizational and financial independence of larger and more established ARBOs, who are therefore less motivated to comply with Project requirements.

Table 19: Parameter estimates for probit model, using actual treatment

	Coefficient	P>|z|
num_members	-0.005	0.00
cbu_paid	1.604	0.00
num_noeduc	-0.473	0.07
num_ belowelem	0.041	0.49
num_ elemgrad_belowhs	0.007	0.83
num_ collegeup	-0.015	0.82
roof_strong	0.075	0.59

[7] ITeMA stands for Information Technology-enabled Maturity Assessment.

	Coefficient	P>|z|
wall_strong	0.050	0.65
toilet_flush	-0.067	0.82
water_drink_source	-0.125	0.34
housing_own	0.339	0.00
constant	-0.188	0.56

Source: Authors' calculation.

111. Result of random effect estimation with the actual treatment variable is instrumented by predicted probability (derived from the probit regression). For per capita expenditure, instrumented treatment has a negative effect, although it fails to hurdle 10% statistical significance.

112. What is striking is the coefficient of instrumented treatment when the outcome variable is defined as per capita income. Treatment is associated with a per capita income that is greater by 15,289 at the endline; moreover, the estimate is statistically significant at 5% level (refer to Table 20). Note that the regression incorporates a time variable hence already corrects for period fixed effects (including inflation). The magnitude is quantitatively significant as well: the coefficient is 41%, far in excess of the 20% hypothesized minimum effect size.

Table 20: Parameter estimates for DID, instrumented treatment variable (Tab Reg 4)

	Per capita income	**Per capita expenditure**
phat	35,535	17,365
	(56,298)	(37,498)
time	-18,521***	1,419
	(3,884)	(2,231)
num_ noeduc	746.7	1,786
	(8,957)	(5,187)
num_ belowelem	-3,916	-1,050
	(2,604)	(2,141)
num_ elemgrad_belowhs	-2,323	-1,969*
	(1,530)	(1,096)
num_ collegeup	5,564	-5,913***
	(4,320)	(2,109)
roof_strong	-695.4	-1,093
	(2,944)	(2,244)
wall_strong	29.55	9,366***
	(6,307)	(3,095)
toilet_flush	7,543**	1,289
	(3,728)	(2,159)
water_drink_source	2,894	-2,516
	(3,624)	(2,617)
housing_own	-4,581	-5.433
	(6,178)	(3,113)
did_phat	15,289**	-5,763
	(6,766)	(4,308)

Constant	17,650	29,202*
	(24,843)	(17,501)
Observations	1,934	1,934

Source: Authors' calculation.

7. Conclusion

7.1 Summary assessment

113. *The quantitative analysis shows an average treatment effect of 41%* with high degree of significance. This represents the sum total of interventions of the Project that lead to increased household income per capita, as expressed in the Project ToC. Despite the measured fall in income of Project beneficiaries in the sample, when rigorous statistical methods are applied to control for external factors, we find that beneficiaries did realize higher income compared with a similar group of non-beneficiaries. This validates the basic hypotheses of the theory of change in terms of boosting living standards of ARC cluster households through value chain interventions and the cluster approach.

114. Despite some deviations encountered in the field, the assumptions and impact pathways are generally confirmed by the process evaluation. Inputs are converted to activities and outputs, though with shortfalls from logframe targets. In turn, outputs apparently materialize into immediate and intermediate outcomes, leading to the measurable impact on income noted above.

115. *This is consistent with beneficiaries' own expression of satisfaction over Project outcomes.* Beneficiaries are generally satisfied with the Project, though it should be pointed out that their understanding of the Project rationale is rather limited. They tend to understand the Project as focused on organizing formal groups for them to become eligible for government support, often with minimal or no cost-recovery. This may account at least in part for their optimistic view of Project outcomes. However, there were critical observations expressed over some processes, such as: the Cluster Strategy involving lead and participating ARBOs; procurement of substandard equipment; conversion of input grant to PCF; and appointment of a shadow manager with no accountability obligations to the managed ARBO.

7.2 Implications for the ARC Cluster Development strategy

116. The main approach taken by DAR to link small farmers to value chains is through clustering. Under the clustering approach, ARCs, which are areas/clusters with high concentration of agrarian reform beneficiaries, were identified nationwide. Subsequently, ARB organizations were formed within these identified ARCs. The project interventions are transferred through a "big brother scheme." Within each cluster, the ARBOs are then classified into lead ARBO (LARBO) and participating ARBOs (PARBO). The heavy interventions (e.g. warehouses, transportation trucks, equipment) are typically given to the LARBOs while the benefits are expected to cascade to their respective PARBOs (through sharing of facilities, oftentimes for a fee). There are instances wherein PARBOs can directly receive support like trainings, production inputs and tools, and some postharvest tools.

117. *The cluster approach is a pragmatic way of delivering government program and support from private sector as well*. Given the limited financial and human resources of the government, it is easier for the government to deal with organized groups like associations or cooperatives rather than individual farmers. Thus, it is crucial to encourage farmers to organize themselves into associations or cooperatives.

118. *To accelerate mobilization, key project staff should already be recruited at the pre-implementation phase.* This step has already been done in Western Mindanao Community Initiatives Project (WMCIP) and Northern Mindanao Community Resource and Management Project (NMCIREMP) as one of the conditions for the loan effectiveness. This should be considered in the project design of future IFAD projects.

119. *By forming clusters, alliance and network building among various organizations are also promoted*. Continued interaction (or repeated transactions) among ARBOs could foster good relations and camaraderie, thereby building social capital in the ARCs. Organizations become more successful when strong alliances are forged (Ballesteros and Ancheta 2021). An example of strong alliance and effective leadership of a cluster is SIUFMULCO which has qualified for capacity development assistance (from an international development agency) towards becoming Mindanao's biggest abaca supplier within five years.

120. *However, the link between LARBO and PARBOs can be strengthened in some clusters*. Per Ballesteros and Ancheta (2021), the alliance and networking with other organizations is uncommon among ARBOs. Although LARBOs have higher ITeMA scores, which reflect their organizational maturity, the LARBOs are not strong enough yet to cater to the needs of their PARBOs because they are still focusing on their own organization's concerns. On average, ARBOs nationwide are at maturity level 3 (where 1 is the lowest level and 5 is the highest level).

121. *Both the LARBOs and PARBOs still need further capacity building assistance to strengthen their respective organizations*. The project provided capacity building on organizational, financial, and business development to both LARBOs and PARBOs. As noted in Ballesteros and Ancheta (2021), LARBOs have clear vision, mission, goals and objectives, but they have not fully operationalized or updated their systems and processes. For both LARBOs and PARBOs, their reporting and monitoring systems still need to be improved. Hence, DAR and other agencies may consider providing continual assistance beyond the project term, especially to weaker ARBOs.

122. Consider an alternative scheme in which the recipients of VC equipment and facilities have greater voice in selection of equipment and supplier. The process evaluation has uncovered several cases in which beneficiaries were not satisfied with the equipment received, and left the equipment under-utilized or even idle. This may be avoided if they were directly in charge of selecting equipment and supplier, with technical support from government. While this may entail greater requirement of time and money from beneficiaries, it may turn out to be a better use of scarce taxpayer funds.

123. *A common factor among functional clusters is the presence of strong leaders in the LARBOs* (either the Chairperson or the Manager). Supported by the literature review in Ballesteros and Ancheta (2021), trust in cluster leaders is important to encourage members to participate and cooperate. Trust is fostered when members are given fair and equal treatment and also given space to express their thoughts and grievances freely.

124. *There needs to be a longer/sustained period of hand-holding to produce capable leaders and managers within the ARBOs*. Strong leaders are not made overnight. Through their years of experience in dealing with various stakeholders including the government and years of exposure to business operations, they are able to build their business acumen and confidence to lead the organization. Assistance to develop more leaders should also extend to PARBOs, not just the LARBOs.

125. *Other government agencies need to be more involved in planning and implementation of ARC Cluster Development*. These are agencies involved in value-adding activities like transfer of technology, certification and accreditation, and in forming linkage with formal credit sources and with markets:

126. The Department of Trade and Industry and the Department of Science and Technology should be more involved in ensuring that value-adding processing technologies are already available and are accessible to ARBOs. Especially when ARBOs are not mature enough to know the latest processing technology, their chances of producing quality outputs are limited. They need to acquire the same type of equipment that existing commercial businesses are using and technical knowledge to produce the desired/acceptable level of quality.

127. *The Department of Health should be included in the Project Steering Committee*. The DOH, specifically the Food and Drug Administration, needs to be involved in ensuring that food processing facilities are designed and built up to required standards. The certification from FDA is crucial for the ARBOs involved in food processing to be able to access and tap wider local markets (e.g. supermarkets) and even export markets.

128. Government agencies that have loan programs should investigate the factors affecting the borrowing behavior and/or hesitancy of ARBOs. Often, ARBOs lack the working capital for their enterprise operations or expansion. Project ConVERGE facilitated linkage between the ARBOs and formal credit institutions. However, some ARBOs choose not to borrow due to fear of not being able to repay the debt. Others are unable to tap the credit line due to past due loans. It is crucial to address the concerns of ARBOs regarding credit to enable them to independently find funding sources for their business operations or expansion.

129. *There needs to be more market facilitation activities beyond holding trade fairs*. Linking the ARBOs with actual markets and finalizing market agreements are more tangible assistance needed by ARBOs.

8. Annexes

Annex A. List of ARBOs in the Initial and Succeeding Groups

ARBO name	Barangay	Municipality	Province
Initial group			
BANDFA	Bangonay	Jabonga	ADN
KJSTMMH	La Paz	Santiago	ADN
LFMPC	Libas	Jabonga	ADN
TUDATRIDEVCO	Tudela	Trento	ADS
API-ARBMPC	Manat	Trento	ADS
AARBA	Awao	Sta. Josefa	ADS
TAIA	Tudela	Trento	ADS
KAMMPE	Angas	Sta. Josefa	ADS
LARBFA	Libertad	Bunawan	ADS
NAMARKA	Imelda	Bunawan	ADS
BBARBA	Bunawan Brook	Bunawan	ADS
La Frat ARBs Association	La Fraternidad	Tubay	ADN
San Jose ARBA	San Jose	Jabonga	AND
CAFA CO			SDN
Batunan FARMER MPC	Batunan	Tagbina	SDS
KAPARBA	Pay-as	Kadingilan	B
ARBOSFA	Pocopoco	Damulog	B
MAKAFCO	Maican	Damulog	B
OKMPC	Old Kibawe	Kibawe	B
KADUMA APC	Pongol	Libona	B
NAMMUKAU	Umagos	Lagonglong	ADS
MLBC-ARBC	Bogo Capalaran	Molave	ZDS
SARBEMUPCO	Sayon	Sta. Josefa	ADS
PAFA			SDN
GFMPC	Guinalaban	Salay	MO
SOFA	Lower Angas	Sta. Josefa	ADS
LATURAN APA			B
Succeeding group			
MAFORMACO	Maraiging	Jabonga	ADN
SAARBORMA	Sangay	Kitcharao	ADN
SCOFARBEMULCO	Mahayhay	Kitcharao	ADN
TAFA	Tagbuaya	Jabonga	ADN
LAMUPCO	La Fortuna	Veruela	ADS
SJASUFA	Patrocinio	Sta. Josefa	ADS
SAMULCO	Samay	Balingasag	MO
SARBEMCO	Poblacion	Sugbongcogon	MO
BINUANGAN FARMERS ASSO.	Binuangan	Tubay	ADN
SARBA	Sto. Niño	Jabonga	ADN
San Pablo ARBA	San Pablo	Jabonga	ADN
DAFAMCO			SDN
MARBECO	Malixi	Tagbina	SDS

ARBO name	Barangay	Municipality	Province
NAGMASAGECO	Javier/Guinhalinan	Barobo	SDS
Migcuya MPC	Migcuya	Dangcagan	B
KKSFO	Kitingting	Damulog	B
LMPC	Labuagon	Kibawe	B
BALINGAY SC			B
KMPC	Kitobo	Kitaotao	B
STO NINO FA	Sto. Niño	Manolo Fortich	B
SMMFFA, Inc.	San Miguel	Manolo Fortich	B
YFCBMPC	Yungod	Salay	MO
BFCC	Banglay	Lagonlong	MO
UDARBEMCO	Upper Dimorok	Molave	ZDS
BARBMPC	Mambalili	Bunawan	ADS
VALFAMCO	Valdeconcha	Binuangan	MO
SIPACAGROMUPCO	Sta. Isabel	Sta. Josefa	ADS
BFCC	Banglay	Lagonlong	MO

Note: ADN – Agusan del Norte; ADS – Agusan del Sur; B - Bukidnon; C – Camiguin; MO – Misamis Oriental; SDN – Surigao del Norte; SDS – Surigao del Sur; ZDN – Zamboanga del Norte; ZDS – Zamboanga del Sur

Annex B. Interventions received per sampled PARBO based on project records

Province	ARBO Name	Per M&E records (1-beneficiary, 2-nonbeneficiary)	Remarks (type of intervention)
Agusan del Norte	BANFA (BARCO)	2	
Agusan del Norte	KAMAS Organization	2	
Agusan del Norte	KJSTMMH	2	
Agusan del Norte	La Frat ARBs Asso.	2	
Agusan del Norte	LFMPC	2	
Agusan del Norte	MAFORMACO	2	
Agusan del Norte	SAPORMA	2	
Agusan del Norte	SARBA (SANJARCO)	2	
Agusan del Norte	SCOFARBEMULCO	2	
Agusan del Norte	SKMB	2	
Agusan del Sur	API-ARBMPC	2	
Agusan del Sur	BARBMPC	1	Credit
Agusan del Sur	BBARBA	2	
Agusan del Sur	KAMMPE	1	VC, credit
Agusan del Sur	LARBFA	2	
Agusan del Sur	SJASUFA	1	Sta. Josefa, Sayon FMR
Agusan del Sur	SOFA	1	Sta. Josefa, Sayon FMR
Agusan del Sur	TUDATRIDEVCO	2	
Misamis Oriental	BFCC	2	

Misamis Oriental	GFMPC	1	VC
Misamis Oriental	NAMMUKAU	2	
Misamis Oriental	SAMULCO	1	VC
Misamis Oriental	SARBEMCO	1	VC, credit
Misamis Oriental	VALFAMCO	1	VC (decorticating machine)
Misamis Oriental	YFCBMPC	2	
North Bukidnon	KADUMA APC	1	VC (Corn sheller)
North Bukidnon	LAPASS	1	VC (Corn sheller)
North Bukidnon	SMMFFA, Inc.	1	VC (Corn sheller)
North Bukidnon	STO NINO FA	1	VC (Corn sheller)
South Bukidnon	BSC	1	VC
South Bukidnon	KAPARBA	1	VC
South Bukidnon	KMPC	1	VC
South Bukidnon	LMPC	1	VC
South Bukidnon	OKMPC	1	VC
South Bukidnon	POSFA	1	VC
Surigao Del Norte	CAFACO	2	
Surigao Del Norte	DARBO	2	
Surigao Del Norte	PIFA	2	
Surigao Del Sur	BFMPC	2	
Surigao Del Sur	MARBECO	2	
Surigao Del Sur	NAGMASAGICO	2	
Zamboanga del Sur	MLBC-ARBC	2	

Annex C. Sample households by ARBO and by survey stage

	Baseline (full sample)	Endline (panel)
Bukidnon	264	258
BSC	11	11
KADUMA APC	17	16*
KAPARBA	38	35*
KMPC	39	39
LAPASS	21	21
LMPC	80	78*
OKMPC	8	8
ARBOSFA	11	11
SMMFFA, Inc.	16	16
STO NINO FA	23	23
Misamis Oriental	244	239
BFCC	32	32
GFMPC	47	46*
NAMMUKAU	65	65
SAMULCO	48	44*
SARBEMCO	20	20

	Baseline (full sample)	Endline (panel)
VALFAMCO	19	19
YFCBMPC	13	13
Agusan del Norte	150	143
BANFA (BARCO)	13	12*
KAMAS Organization	11	10*
KJSTMMH	32	32
LFMPC	22	21
La Frat ARBs Asso.	11	9*
MAFORMACO	4	4
SAARBORMA	9	9
SARBA (SANJARCO)	21	20*
SCOFARBEMULCO	10	9*
SKMB	17	17
Agusan del Sur	308	296
API-ARBMPC	118	115*
BARBMPC	93	88*
BBARBA	19	19
KAMMPE	29	26
LARBFA	12	12
SJASUFA	9	9
SOFA	9	8
TUDATRIDEVCO	19	19
Surigao del Norte	34	34
CAFACO	15	15
DARBO	10	10
PIFA	9	9
Surigao del Sur	119	113
BFMPC	32	31*
MARBECO	60	56*
NAGMASAGICO	27	26*
Zamboanga del Sur	25	24
MLBC-ARBC	25	24*
Total	**1,144**	**1,107**

Note: Those with asterisk (*) are ARBOs with replacement HH respondents.

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