



Pineapple Processing for Export (PINEX) Project

Midterm Evaluation

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Midterm Evaluation Report of the Pineapple Processing for Export (PINEX) Project:

This midterm evaluation report presents review of the PINEX project's implementation progress, and assesses the effectiveness, efficiency, relevance, impact, and sustainability of the project. The midterm evaluation also identifies challenges and areas that the project should improve to meet the project's objectives. The evaluation drew information and data from project documents, 768 producers' survey responses, and interviews with 30 processors, 7 exporters, and 10 stakeholders, collected during research from December 2018 to February 2019.

Under USDA Food for Progress (FFPr) FY2015 competition, Partners for Development (Pfd) won funding of \$10.26 million to implement the Pineapple Processing for Export (PINEX) project in Benin from the end of September 2015 through December 2020. The PINEX project aims to contribute to the USDA's FFPr Strategic Objectives of SO1: Increased Agricultural Productivity and SO2: Expanded Trade of Agricultural Products, by improving Benin's pineapple value chain, including production, processing, and export.

The goals of the PINEX project are to improve pineapple productivity, increase pineapple processing, and expand regional and international pineapple product export. Implemented in the Atlantique and Littoral provinces of southern Benin, the project works with all key pineapple stakeholders (e.g., pineapple producers, processors, exporters, government, financial institutions, cooperatives, networks, and civil society organizations). The project has implemented several training and capacity-building activities, provided support in various key linkages (e.g., increase access to financial services and market information) in the pineapple value chain, and developed trade infrastructure.

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List of Acronyms

ABSSA	Agence Béninoise de Sécurité Sanitaire des Aliments / Benin Agency for Food Safety
ALIDé	Association de Lutte Pour la Promotion des Initiatives de Développement
COLEACP	Europe-Africa-Caribbean-Pacific Liaison Committee
CRAD	Centre de Recherche et d'Appui-conseil pour le Développement
DPV	Direction de la Production Végétale / Department of Vegetable Production
FAIS	Food Aid Information System (of the U.S. Department of Agriculture)
FFP	Food for Progress
FGD	Focus Group Discussion
FINADEV	Financial Development, Benin
FY	Fiscal Year (of U.S. Government, ending 30 September)
GDP	Gross Domestic Product
GLOBALG.A.P.	The Worldwide Standard for Good Agricultural Practices
HACCP	Hazard Analysis Critical Control Points
ISO	International Organization for Standardization
M&E	Monitoring and Evaluation
MFI	Microfinance Institution
MOA	Ministry of Agriculture
N	Number
NAPEB/ANEAB	National Association of Pineapple Exporters of Benin/ Association Nationale Des Exportateurs d'Ananas du Bénin
NAPPCB/ANATRAB	National Association of Pineapple Processing Companies/ Association Nationale des Transformateurs de l'Ananas du Benin
NGO	Non-Governmental Organization
NPK	Nitrogen, Phosphorus, and Potassium
PADA	Agricultural Productivity and Diversification Project/ Projet d'Appui à la Diversification Agricole
PfD	Partners for Development
PINEX	Pineapple Processing for Export
PPNB/ RePAB	Pineapple Producers Network of Benin/ Réseau des Producteurs d'Ananas du Bénin
PSC	Pineapple Stakeholders' Council
USD	United States Dollars
USDA	United States Department of Agriculture
USG	U.S. Government
XOF	Currency of Seven West African Countries, including Benin

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Executive Summary

Under the U.S. Department of Agriculture’s (USDA) Food for Progress (FFP) competition in U.S. Government (USG) Fiscal Year (FY) 2015, Partners for Development (PfD) won funding in the amount of \$10.26 million to implement the Pineapple Processing for Export (PINEX) project in Benin from the end of September 2015 through December 2020.¹ The PINEX project aims to contribute to the USDA’s FFP Strategic Objectives of “increased agricultural productivity and expanded trade of agricultural products” by improving Benin’s pineapple value chain, including production, processing, and export. The project operates in the Atlantique and Littoral provinces of southern Benin and works with all key pineapple stakeholders (e.g., pineapple producers, processors, exporters, government, financial institutions, cooperatives, networks, and civil society organizations). The goals of the PINEX project are to increase pineapple productivity, improve pineapple processing, and expand agricultural trade. The project has implemented several training and capacity-building activities, provided support in various key linkages (e.g., increase access to financial services and market information) in the pineapple value chain, and developed trade infrastructure.

This midterm (or interim) evaluation reviews PINEX’s implementing environment and implementation progress, and assesses the effectiveness, efficiency, relevance, impact, and sustainability of the project. The midterm evaluation also presents feedback from stakeholders and identifies challenges and areas that the project should improve to meet the project’s objectives. This report draws information from a project document review, 768 producers’ survey responses, and interviews with 30 processors, 7 exporters, and 10 stakeholders. The evaluators collected data from December 2018 to February 2019.

Highlights

- Findings showed that the project has increased the productivity of the fresh pineapple industry in Benin. The average harvest quantity of pineapple per hectare of pineapple cultivation land was significantly higher in the last pineapple cultivation season (29.15 metric tons per hectare) than the average in 2016 (10.98 metric tons per hectare)². A significantly higher percentage of surveyed producers achieved profits over 500,000 XOF (807 USD), and a lower percentage of respondents experienced a loss in 2018 compared to 2015.
- Nineteen of 24 interviewed processors who discussed their profits in the interview experienced increasing profits in 2018. Interviewed processors also clearly indicated that they have been expanding their businesses gradually, and for most of them, PINEX’s support has been crucial in this regard.
- Exporters indicated that the exporting business in general has been profitable. They have greatly appreciated the opportunity to attend international trade fairs and the technical

¹ The baseline report was approved by USDA in June 2016. During the grant execution of September 2015 and the Baseline Survey and its approval by USDA, PfD initiated various important administrative functions for PINEX such as the hire of key staff and workplan development. Field work began after Baseline approval.

² Different from this mid-term evaluation baseline results, PfD’s independent baseline report in 2016 indicated a yield per hectare of 24.29 metric tons.

support in quality control and hygiene. Three of seven interviewed exporters experienced a loss in the past three years because of the ethephon problem and the export ban in 2017.

- Findings showed that the project has had a significant impact on building capacity for stakeholders. Producers have learned new knowledge and skills, and they have applied improved techniques and technologies in pineapple cultivation. The numbers of agricultural producers who have applied improved farm management practices as a result of USDA assistance was 1,037 in USG FY 2017 (ending in September 30th ³) and 3,814 in FY 2018. The project has changed producers' cultivation behavior, which has contributed to increased productivity, income, and profitability. Processors have learned how to use processing tools and techniques more effectively, particularly how to follow food safety and hygiene protocols, planning and record keeping, and use of information for marketing and trade.
- Due to PINEX's direct or indirect support (e.g., technical training, documentation or record-keeping support, facilitation of credit and loans), producers and processors are increasingly able to access financial resources and/or other input from different sources.
- Both the number of males and females benefiting directly from the project increased dramatically from USG FY 2017 and FY 2018. The number of females who benefited from the project directly in FY 2018 (3,395) was more than nine times that of FY 2017 (364), while the number of males who benefited from the project directly in FY 2018 (8,255) was more than three times that of FY 2017 (2,688). A women producer focus group discussion and interviews with processors revealed the positive impact of the project on specifically the female labor workforce development.
- Overall, the project is on track to achieve its end of project targets. All seven activities have at least a medium chance that their end of project targets will be achieved by the end of the project based on the Food Aid Information System (FAIS) performance indicators.

Recommendations

- PfD should focus more on expanding the trade of diverse and different pineapple products in the next two to three years by supporting more project beneficiaries to attend more national, regional and international trade fairs.
PfD has achieved great success in building producers and processors' capacity in pineapple cultivation and processing. Yet indicators related to expanding trade are still below 50% of achievement. Focus on expanding the trade in next couple of years by supporting more project beneficiaries to attend more national, regional and international trade fairs will connect more production with trade and increase individual profits of pineapple business.
- Pay extra attention to increasing market access, especially West Africa market, and building linkages between sellers and buyers in the next few project years. This will include two steps. Step 1. Conduct a market research to figure out appropriate target international market and then share the results with exporters and let exporters understand their strengths, weakness,

³ Refers to US government's fiscal year end not PfD

opportunities and challenges in exporting to different international markets and explaining why West Africa regional market is more effective and valuable. Step 2. Organize and facilitate more regular workshops and business meetings across the West Africa region, particularly between Nigeria and Benin, and bring together a wide range of stakeholders (e.g. business associations, policy makers, donors, International organizations and non-government organizations, etc.).

Based on the interviews with PfD staff, they shared difficulties in regaining the European market or entering the open US market in the near future. In addition, based on the exporter interviews, exporters could not identify actionable target clients for their business and instead would like to expand their business as far as possible, e.g. beyond Europe to Asian countries and the United States. Such misalignment in target market expansion strategy is counter-productive and should be addressed quickly. No systematic market research has been done to study if West Africa is a viable market. PfD should conduct a market research study to compare the potential demands and economic costs and benefits of the West Africa market compared to other international markets and select the appropriate target markets. Then PfD should share the market research results with the exporters and explain why the West Africa regional market is more valuable.

Exposure of pineapple market information leads to increased market access. Since the West Africa market, particularly Nigerian market will be the main target of market expansion, organizing and facilitating more regular business meeting and workshops between Nigeria and Benin will help value chain actors have more access to the pineapple market information and incubate potential business opportunities.

- Diversify the pineapple product market or facilitate producers' entry into markets using pineapple as an input of a product, for example, dried pineapple, fruit cocktail, pineapple cake or bread, and juice cocktail markets, or organic trade fairs, so that they can avoid dire competition among the recently glutted international market.

Currently the main pineapple product sold and exported is fresh pineapple in Benin. Yet the value and volumes of sales of pineapple juice sold by processors are lower than the end of project target. These findings indicate that the dominate pineapple product is the fresh pineapple. However, more market research has demonstrated that there is an oversupply of fresh pineapple and a trend of low prices and low demand in European market and sufficient supply in other international markets.⁴ Thus this makes Benin fresh pineapple less competitive. PfD should conduct more research on the markets of a variety of products that use pineapple as an input, consider the costs, feasibility and benefits of different pineapple products, and promote production of different varieties of products to diverse markets, and

⁴ Overview Global Pineapple Market, retrieved from <https://www.freshplaza.com/article/2198655/overview-global-pineapple-market/>

promote the diversification of products, derivatives and by-products of fresh and processed pineapple.

- To sustain the current expert knowledge, PfD should continue training local associations and government on pineapple related knowledge and skills, and continue training them on how to conduct trainings, prepare materials and follow up after the training to make sure the value chain actors gradually apply the best practices learned from the training.

PINEX has achieved or even exceeded their end of project targets in training government people or local associations and co-hosted a few trainings together with local associations. PfD can debrief the experience that they gained from co-hosting the trainings with associations and develop a workshop to train the team of the technicians on how to conduct the training workshop with a large number of producers beyond one-one-one hands-on assistance to scale such trainings which have proved to significantly contribute to know how to produce and improve the quality of pineapple production. In addition, as mentioned earlier, not all trainees apply all knowledge they learned from the workshop immediately. PfD should also train the associations on how to follow up with producers who attend the training on a regular basis and help develop a follow up plan (e.g. the frequency of follow up and answer questions if they have when applying the technologies).

- Invite producers to visit and observe pineapple farms of those who have successfully applied improved technologies and techniques.

Studies have shown that farmers attitudes have a positive correlation with farmers' intents to implement improved technologies or techniques.⁵ If farmers are aware that applying improved technologies or techniques will help them improve their profits and productivity, they will be more likely to apply the techniques or technologies. Evaluation findings showed that not all producers who have attended the trainings applied improved techniques or technologies. Therefore, by inviting producers, especially small producers to observe and visit other farmland that have successfully applied improved technologies and techniques and learn the positive impacts of these improved technologies and techniques on production and profits will be helpful for them to implement improved technologies. We know that if technology and techniques are used, the quality of pineapple production will not only increase, but so will scale as this is how Dole and Del Monte or other private companies achieve scale in low cost countries.⁶

- Continue raising awareness and increasing application of improved techniques or technologies, especially business management training, new processing techniques, and safety and certification training for small processors.

24 of 29 processors highlighted PfD's training on processing techniques, business management, and hygiene. Processors also suggested PINEX provide training on business

⁵ Menozzi, D., Fioravanzi, M., & Donati, M. (2015). Farmer's motivation to adopt sustainable agricultural practices. *Bio-based and Applied Economics Journal*, 4(1050-2016-85714), 125-147.

⁶ Bartholomew, D. P., Hawkins, R. A., & Lopez, J. A. (2012). Hawaii pineapple: the rise and fall of an industry. *HortScience*, 47(10), 1390-1398.

management, which can help them make their businesses profitable and sustainable.⁷ Additionally, they recommend continuing to provide processing-related technical training, especially to those who are transitioning from artisanal to industrial processing and operating at a small scale. Though there could be some initial resistance from the artisanal processors to some extent, a continued effort in motivating them and building their capacity for efficient processing would be helpful. PINEX's continued follow up support which accompanies the processors until the activities are completed (e.g., certification process audit) was well received and appreciated by processors, thus PINEX may want to continue its efforts on such front.

- Do more research on how to make more effective use of the radio program to advertise outreach events and trainings and share production and market information with broader audience.

Based on producer survey results (n=768), the top five sources of information for pineapple cultivation practices rated by the surveyed producers are PINEX project (87%), friends/family/neighbor (59%), cooperative (17%), farmer association (17%) and Radio (13%). The top five sources of market information rated by the surveyed producers are friends/family/neighbor (68%), buyers/traders (44%), PINEX project (39%), cooperative (15%), farmer association (14%) and radio (7%). These findings suggest that the word-of-mouth and radio are the top two ways to share information. Given the low literacy rate in the local area and the fact that TV and other technologies are not popular, radio is an appropriate media outlet for advertising. PfD should continue using radio as a medium to advertise and share information but might want to do more research on how to make more effectively use radio (e.g. use prime time, frequency of the advertisement) in order to reach a larger audience.

- PfD should explore the best ways to create a local market of input supplies e.g. lobbying government to build input supply production and market.

In Benin, a lack of market of input supplies greatly halts the quality and yield of pineapple production. Ten out of 29 interviewed processors mentioned the need for local equipment or supplies provided to the market and automated processes for pineapple processing, particularly juice production so as to reduce the processing costs and achieve a higher quality juice. PINEX may lobby the state for the establishment of a local market for acquisition of processing equipment. For example, Benin government can import and provide input supplies, e.g. pineapple specific fertilizer and cover the cost, but then deduct the cost at the point of supply after the harvest and sale.⁸

⁷ Many articles have also discussed the positive correlation between business management training and business performance and profits in the pineapple industry. For example, Magonola, B., & Baliddawa, C. (2014). Building capacity of smallholder farmers in agribusiness and entrepreneurship skills in Northern Uganda. *Agricultural Information Worldwide*, 6, 122-126; Danielou, M., & Ravry, C. (2005). *The rise of Ghana's pineapple industry*. Africa Region Working Paper Series 93. Washington DC: The World Bank, Africa Region.

⁸ Ghana shared similar experience: <https://www.idhsustainabletrade.com/block-farm-model-for-pineapple-production/>

- Instead of one by one coaching, PfD should host a larger workshop so that they can have reach to broader audiences on certification application training. Then PfD can develop a video or audio recording of the application procedure to sustain the knowledge.

There are only 164 GLOBAL G.A.P. certified producers correctly applied GLOBAL G.A.P. standards compared to 600 as the end of project target. One of the top three challenges identified by interviewed processors is lacking certification to expand quality trade and export. These certifications (e.g., GLOBAL G.A.P., HACCP, ISO 22000, organic product, and fair-trade) are crucial not only for good agricultural practices, food safety and hygiene, and fair trade but also expanded and continued export to new markets. PfD is also prioritizing to help more processors with the certification processes. To save time for PfD to coach more than one value chain actor at a time, PfD can host a hands-on workshop or a training to multiple producers, processors or exporters on how to apply for a specific type of certification. PfD can record the training and share it as a sustainable resource by playing the video as many times as needed in front of different groups of audiences, thus not only can they reduce the personnel costs to conduct the in-person training in the future, but maybe also record such verbally and play such over the radio to reach more audiences.

- Showcases of people who get loans and successfully use the loans to expand their business. Organize a peer-experience sharing meeting so that people can hear from their peers about how they use the loans, learn about the risks and how they manage these risks yet repay the loans. Take producers or processors to visit those successful cases and see how successfully processors and producers use loans and what they produced with the financing from the loans.

Only 13 out of the 28 interviewed processors mentioned that they have received a loan from microfinance institutions. Up to now, only 72 processors have received financial services as a result of USDA assistance, which is only 10% of the end of the project target. 918 loans were disbursed as a result of USDA assistance, which only accounts for one third of the end of project target. The end of project target of indicators of values of loans provided to producers and processors are only 30% or lower achieved. Interviewed processors and surveyed producer indicated that the biggest hurdle preventing them from using the financing accessible to them is the high perceived risks and lack of education. Therefore, by helping to education and showcase people who get loans and successfully expand their business by using the loans might be helpful to relieve the perceived risks and motivate people to use financial services.

- PfD should consider various options in supporting sustainability of PINEX, which could include, but not be limited to, engaging a local consultant to monitor and facilitate the financial partnership with microfinance institutions, continuing to strengthen key partners such as the producer and processor associations, and/or incubating a small management consulting firm that could provide fee-based services to key actors in the pineapple value chain.

Ten out of 20 interviewed processors who mentioned financial services highlighted the financial support especially the connection that they made with the microfinance institutions and the lack of automated equipment due to the budget constraints to expand the processing. The producer focus group highlighted the high fertilizer costs and input supply costs. Given the current low achievement in increasing access to financial capital or the lack of education around how to use such, it is expected that PfD may need another couple of years support in this area. Engaging a local consultant to monitor and facilitate the financial partnership with microfinance institutions, further strengthening of current key partners, or incubating a local, small business to provide services will help the pineapple value chain actors to enhance the financial capacity to continue and/or increase their production, processing and trade efforts in the long term by better understanding financing arrangements and how it can be attributable to economic decision-making as it relates to scale and production.

- [Sustain the program by making the Benin government take more ownership of the project initiatives and create a national task force to sustain the activities.](#)

As mentioned by the interviewee from Benin Ministry of Agriculture, they want PfD to help create a sustainability plan of pineapple development together with the Benin government. PINEX should also support the Benin government to take more ownership of the project initiatives for sustainability. Other cases with successful pineapple development, e.g. Ghana has demonstrated the importance of the government support in pineapple development (e.g. on training, input supply, marketing, getting pineapple product certified) with and/or after international non-profit organization assistance.^{9 10} In addition, a PfD interviewee mentioned that the US government (USDA, USAID, U.S. Embassy, etc.), under its “whole of government” approach, should consider asking the Benin government to prioritize or increase their spending in strengthening the agricultural sector, specifically ensuring adequate budgeting for Ministry of Agriculture Extension Officers. These key staff participants will be important in continuing to provide technical assistance to those in the pineapple value chain following the end of PINEX to help ensure financial and operational sustainability long term. In this regard, perhaps the USG can use its leverage via the current Millennium Challenge Corporation Benin Compact.

⁹ Badu-Gyan, F. (2015). Factors affecting adoption of alternative pineapple production systems in Ghana (Doctoral dissertation, University of the Free State).

¹⁰ Ravry, C., & Danielou, M. (2012). The rise of Ghana's pineapple industry: from successful takeoff to sustainable expansion.

1. Background and Purpose of Evaluation

1.1 Project Background

Under the U.S. Department of Agriculture's (USDA) Food for Progress (FFP) competition in U.S. Government (USG) Fiscal Year (FY) 2015, Partners for Development (PfD) won \$10.26 million to implement the Pineapple Processing for Export (PINEX) project in Benin from the end of September 2015 through December 2020. Through its funding, the USDA hopes that implementers can leverage other project support. More broadly, the PINEX project aims to contribute to the USDA's Strategic Objectives of "increased agricultural productivity and expanded trade of agricultural products".

The Beninese pineapple industry has experienced significant growth since the 1980s. In 2015, it accounted for 1.2% of Benin's gross domestic product (GDP) and 4.3% of the country's agricultural GDP. Despite the increased contribution to GDP, a study in 2009 revealed the relatively low value contributions gained from the pineapple value-chain and use of land compared to other crops, and the same study implied that land being used for pineapple cultivation could be used more productively to boost the purchasing power of producers.¹¹ Despite this study, the Benin government in its 2013-18 Strategic Plan for Agriculture committed to greater agricultural diversification, i.e. to rely less on cotton and invest further into pineapple, cashew, and rice. In its 2015 proposal to USDA, which became the PINEX grant later that year, PfD stated that a major goal of PINEX, which was consistent with Food for Progress strategic objectives, was to help validate that diversification decision by increasing pineapple productivity, processing, and export significantly. Specifically, PINEX identifies the following issues in the pineapple value chain that need improvement:

- (i) Inadequate and poor use of cultivation inputs and methods, causing a severe shortage of high-quality fruit needed for processing and export.
- (ii) Low processing standards due to archaic and inefficient processing equipment and lack of hygiene and food safety norms in both cultivation and processing.
- (iii) Lack of stakeholder coordination and synergy to share information and resolve common issues of production, processing and export, such as the need to ensure land rights for production, the need for transport to market, and lack of market access and infrastructure.
- (iv) Processors' and exporters' lack of effective marketing, branding, and advertising knowledge and skills.

To address these issues, the project mobilizes private sector banks, microfinance institutions (MFIs), processors, exporters, pineapple sector cooperatives and networks, pineapple producers, and the Beninese national and local governments. Operating in the Atlantique and Littoral provinces of southern Benin, PINEX works with key stakeholders along the pineapple value chain, including 4,000 pineapple producers, 60 processing companies, 13 export companies, three private sector associations, the Pineapple Producers Network of Benin (PPNB), the National Association of

¹¹ Tossou Ch. C., Floquet A. & Sinsin B. (2009). Impact of pineapple cropping on the environment in the Atlantic Department (Benin Republic), Notes du Laboratoire d'Ecologie Appliquée, 5(1).

Pineapple Processing Companies (NAPPCB), and the National Association of Pineapple Exporters of Benin (NAPEB).

1.2 Project Objectives and Activities

PINEX intends to strengthen the pineapple processing sector, concentrating on exports and to improve standards for pineapple processing. More specifically, the project has three main objectives:

- (i) Increase agricultural productivity by building the technical and business management capacity of pineapple producers, the PPNB, and the Ministry of Agriculture (MOA); connecting producers with access to finance; and enable the private sector to supply improved fertilizer.
- (ii) Improve agricultural processing by building the technical and business management capacity of pineapple processors and the NAPPCB, and connect processors with access to finance, equipment, and certifications.
- (iii) Expand agricultural trade by building the marketing capacity of pineapple processors and exporters, connect processors and exporters with marketing opportunities, expand marketing information, improve market and airport storage facilities, and support innovation and collaboration across the Benin pineapple value chain.

To achieve these three objectives, PINEX has seven specific project activities that include the following:

- (i) Training and capacity building of pineapple producers, e.g. cultivation training;
- (ii) Training and capacity building of pineapple processors, e.g. training for food safety, modern and hygienic processing methods, and technical management;
- (iii) Facility service: facilitate agricultural lending and access to inputs;
- (iv) In-kind grants: innovation in processing and production;
- (v) Trade facilitation: infrastructure, such as community-based training and storage facilities, market stalls, solar-power cool storage unit within the cargo loading zone at the airport;
- (vi) Trade facilitation: market information. PfD has established a Pineapple Stakeholders' Council (PSC) that brings together all members of Benin's pineapple value chain, including producers, processors, exporters, financial institutions, local and national governments, and donors. The PSC shares valuable information related to the pineapple industry, and facilitates collaboration, and contributions among actors throughout the pineapple value chain, addressing issues such as transportation, policy and market access;
- (vii) Trade facilitation: marketing. This includes training in marketing strategy development, branding, and advertising, and preparation for fairs and market research trips regionally and internationally.

Since the project started, the direct beneficiaries include approximately 4,000 pineapple producers censused by PINEX, 60 processing companies, and 13 export companies.

1.3 Evaluation Purpose

As mentioned in the Terms of Reference (Appendix I), the purpose of this midterm evaluation (MTE) was to:

- i. Review and take stock of PINEX’s implementation experience and the implementing environment;
- ii. Assess if targeted beneficiaries are receiving services as planned;
- iii. Assess to what extent PINEX activities are effective, efficient, relevant, impactful, sustainable, and on track to meet the project’s stated goals and objectives;
- iv. Review PINEX’s project-level results frameworks and assumptions; and
- v. Document initial lessons and discuss necessary modifications or mid-course corrections to meet the stated objectives, if needed.

2. Evaluation Methodology

Guided by the evaluation Terms of reference and USDA’s Monitoring and Evaluation (M&E) policies, evaluators used five criteria to assess the project progress and impact including relevance, effectiveness, efficiency, impact, and sustainability. Under each criterion, there are multiple evaluation questions. Please refer to Appendix I for detailed evaluation questions. The evaluation team consists of five evaluators, 16 surveyors (12 enumerators, two supervisors, one technical programmer, and one manager). Please refer to Appendix II for a list of team members, their roles, their reporting channels and their CVs. In addition, please refer to Appendix III for the evaluation timeline.

2.1 Data Collection

2.1.1 Desk Review

In collaboration with PfD, we identified, accessed, and reviewed critical and relevant project documents, such as information about project activities that supported pineapple producers, processors, and exporters (Appendix IV). Documents in French were translated to English using the Microsoft Translator. The evaluators reviewed the documents to understand the project context and progress, understand the progress of the project, inform instrument development, and guide evaluation sampling process. Specifically, the evaluators selected samples from the databases of producers, processors, exporters, and stakeholders provided by the PfD. The PINEX Food Aid Information System (FAIS) Performance report (“FAIS Performance Report”) was useful for identifying the progress of the project implementation as well as successful and challenging areas of the project.

2.1.2 Producer Surveys

The evaluators received a list of 3,545 pineapple producers from PfD, of which 1,600 received different types of support from PINEX and 1,945 received only capacity-building support (i.e., training and technical knowledge). These producers are in the municipalities of Abomey-calavi, Allada, Kpomassè, Toffo, Tori-Bossito, and Zè.

Similar to the baseline evaluation, the evaluators used a two-stage randomized cluster sampling design to select sample pineapple producers for the survey (Appendix V). The evaluators randomly selected two districts from each of the above six municipalities and an additional four districts at

random, for a total of 16 districts in the sample. From each district, the evaluators selected four villages that had more than 12 producers, for a total of 64 sample villages.¹² The percentage of sampled producers out of the total number of PINEX supported producers for each municipality ranged from 19.8% to 29.4% (average 21.7%). A summary of the statistics on sample sites and sample size is presented in Figure 1 below.

Municipality	Sampled district (#)	# of villages	Total # of PINEX supported producers	# of sampled producers	% of sampled producers ^a
ABOMEY-CALAVI	3	10	526	120	22.8%
ALLADA	4	15	842	180	21.4%
KPOMASSE	1	1	60	12	20.0%
TOFFO	3	8	327	96	29.4%
TORI-BOSSITO	2	13	787	156	19.8%
ZE	4	17	1,003	204	20.3%
Total	17	64	3,545	768^b	21.7%

^a This column presents the percentage of the sampled producers out of the total number of PINEX supported producers in each municipality.

^b Sixty-five percent of the sampled producers are members of RePAB and primary beneficiaries of the PINEX project. The remaining 35% received, at least, trainings from the PINEX project.

Figure 1. Summary of sample sites and sample size

The evaluators randomly selected 768 pineapple producers (i.e., 12 producers from each of the 64 sample villages/clusters) for the survey and 224 extra pineapple producers from the selected villages/clusters, in case some sampled producers were not available. The total number of selected producers is the same with the baseline evaluation. Please refer Figure 2 for the demographic characteristics and Appendix VI for the detail list of surveyed producers.

Sample producer characteristics	Number	Percentage
Gender		
Male	702	91
Female	66	9
Household head		
Yes	681	89
No	87	11
Education		
Without Education	336	44
Primary	225	29
Secondary Undergraduate	125	16
Secondary Second cycle	57	7
Higher	25	3
Ethnicity		
Aizo	484	63

¹² Per the plan, the evaluators should have selected at least two districts and eight villages from each municipality. Only one village—of Dedomé district of Kpomasse (i.e., Dédomé Kpodji)—has ≥ 12 producers, and therefore, evaluators selected only that village as our sample from Kpomasse. The seven villages that were supposed to be selected from Kpomasse were selected randomly from among the villages that had ≥ 12 producers from different districts. Therefore, there are more districts selected from the other four municipalities.

Fon	136	18
Tori	121	16
Goun	6	1
Yoruba	2	0
Nago	1	0
Wemenou	1	0
Other	17	2
Age in years – average (standard deviation; min-max)	38.54 (10.36; 19-75)	
Household size – average (standard deviation; min-max)	8.57 (5.43; 1-45)	

Figure 2. Survey respondents' characteristics

Evaluators developed the survey instrument to include questions on the progress of key outcome indicators, such as the types of inputs and techniques used for pineapple production and access to agricultural information, training, inputs (such as fertilizer and field labor), and extension services (Appendix VII). The survey contained different types of questions, such as multiple and bivariate choices; Likert scale rating; numbers; and short, open-ended questions. Evaluators incorporated the review feedback received from PfD, the field team lead, and field manager before and during the fieldwork to the survey instrument. All instruments, unless otherwise noted, were prepared in English and translated to French by a professional translator.

A Benin-based organization, Centre de Recherche et d'Appui-conseil pour le Développement (CRAD), administered the producer survey. CRAD trained 14 enumerators from January 9, 2019, to January 12, 2019. They mobilized 12 enumerators¹³, two supervisors, and two coordinators for the overall management of the survey. The training plan for the enumerator is provided in Appendix VIII. 28 pilot surveys were administrated (2 questionnaires per enumerator). Enumerators collected data from January 19, 2019, through January 27, 2019. At the end of the data collection, 768 pineapple producers were surveyed in all the communes, as retained in the CRAD's report (Please refer to Appendix IX for the full CRAD report). Data were checked daily using a data quality-control program in SPSS. Errors were documented and addressed.

2.1.3 Producer Focus Group Discussions (FGDs)

The evaluators conducted four FGDs (one each for women, youth, big-scale producers, and master producer trainers) to gather information from different pineapple production groups with similar backgrounds or experiences. The FGDs also helped evaluators to understand each group's collective perceptions, opinions, and beliefs about the project's activities and impact, pineapple cultivation, and emerging challenges associated with pineapple sales. Key informant producers also participated in these focus groups. The evaluators developed the FGD guidelines (Appendix X). The FGD guidelines contained semi-structured questions that gave flexibility to the FGD moderator, interviewers, and participants to discuss the issues that were more important to the participants and that need more attention in the near future. All FGDs and interviews described later were conducted by the field team lead and/or the field researcher. Each FGD lasted approximately one to one and a half hours. The list of FGD participants is presented in Appendix XI.

¹³ Due to some practical reasons, only 12 trained enumerators were able to carry out the survey.

2.1.4 Processing Company Interviews

The evaluators used the same sampling methodology when selecting the processing companies to interview, i.e. a mixed- method purposive sampling and random sampling. From a PfD-provided list of 60 pineapple processing companies (located in the municipalities of Abomey-calavi, Allada, Cotonou, Porto-Novo, Toffo, Tori-Bossito, and Zè), the evaluators used mixed-method purposive sampling and random sampling to select the processing companies for interviews. The evaluators selected two large pineapple processing companies and 10 PINEX-targeted small processing companies, including those engaged in the Hazard Analysis Critical Control Points (HACCP) certification process and those exporting products to regional markets. Then, the evaluators randomly selected 18 companies from the remaining 48 companies. The list of 30 interviewed companies is presented in Appendix XII.

To understand how and to what extent PINEX has supported processing companies directly and/or indirectly, and to collect ideas and suggestions to maximize outcomes for processors in the project, the evaluation team developed semi-structured interview guidelines (Appendix XIII). The interviews were conducted in the field, close to the interviewees' activity sites, and lasted approximately one hour.

2.1.5 Export Company Interviews

The evaluators used the same sampling methodology when selecting the export companies to interview. The evaluators received a list of 14 pineapple export companies from PfD. These companies were in the Atlantique and Littoral provinces of southern Benin. The evaluators used mixed-method purposive sampling and random sampling to select the export companies for interviews. First, the evaluation team selected two large pineapple export companies. Then, the evaluation team randomly selected five companies from the remaining 12 companies. The list of seven interviewed companies is presented in Appendix XIV. To understand how and to what extent the PINEX project has supported exporting companies directly and/or indirectly, and to collect ideas and suggestions to maximize output and outcomes, the evaluators developed semi-structured interview guidelines (Appendix XV). The interviews lasted approximately one hour.

2.1.6 Stakeholder Interviews

The evaluators received a list of 55 PINEX stakeholders (i.e., members of PSC) from PfD. These stakeholders were in southern Benin. The evaluators used clustered purposive sampling to select the stakeholders for interviews. First, the evaluation team categorized the stakeholders based on the nature of their engagement in the PINEX project and pineapple value chain in general (e.g., Benin government, American government, project implementing partner, pineapple exporters, financial institutions, or other stakeholders). Then, the evaluators selected one or more stakeholders from each of these categories, for a total of eight stakeholders for interview. Evaluators also interviewed PfD staff in Benin and United States. The list of total ten selected stakeholders including PfD staff is presented in Appendix XVI. To understand how and to what extent the PINEX project has supported the pineapple value chain directly and/or indirectly, and to collect ideas and suggestions to maximize project outcomes, the evaluators developed semi-structured interview guidelines (Appendix XVII). The interviews were conducted in the field, close to the interviewees' activity sites, and lasted approximately one hour.

The data collection tools of this mid-term evaluation including the producer survey, processing company, and export company interview questions are consistent with those used in the baseline evaluation in many aspects. For example, for producer survey questions that need quantifiable measurements, the mid-term survey used the same quantifiable measurements with those used in the baseline survey. Themes that are covered in both baseline and midterm surveys include but are not limited to cultivation inputs, the use of agricultural techniques, access to financial services, markets and transactions to sell the pineapple crop, etc. Additionally themes that are covered in both the baseline and midterm processor interviews include but are not limited to types of processing equipment that have been used, the processing capacity of the company, the types and volumes of commodities processed and sold by processors, the types of packaging, etc. Themes that are covered in both baseline and midterm export interviews include but are not limited to procurement of the fresh pineapple, quality requirements for exporting, transportation and shipment preparation, volume and value of commodity sales, product marketing and access to market information, etc. As with the baseline evaluation, the evaluators for this report consulted with expertise from PfD while finalizing the survey questionnaires and confirmed interview/FGD protocols. The evaluators also translated the data collection tools into French. The producer survey was developed into Open Data Kit (ODK) as was the baseline evaluation.

2.2 Data Analysis and Interpretation

Quantitative data were collected and analyzed (using Excel and R 3.4.3) for producers. This analysis consisted of descriptive analysis, sub-group analysis and correlation analysis where possible and appropriate. The evaluators disaggregated the surveyed producers into three categories based on the total area of land cultivated: small producers (less than 1 ha), medium producers (1 to 5 ha) and large producers (more than 5 ha). In the sample, there are 13% small producers, 78% medium producers and 9% large producers. The evaluators also disaggregated the surveyed producers by their extent of involvement in the program into producers who only got trainings from PfD and producers who had additional support from PfD in other areas, such as access to financial services. Producers who received additional support from PfD in the form of other areas or services accounted for 65% of total respondents.

Qualitative data collected from interviews and focus group discussions were transcribed, translated by professional translators, and coded. Codes were generated based on the *a priori* knowledge gained from the review of project objectives, activities, and performance indicators. Codes were organized into the themes guided by the evaluation questions, primarily related to project relevance, impact, effectiveness, efficiency, and sustainability (using Dedoose). When the data showed emerging trends and patterns, the evaluators documented such information. Qualitative information, codes, and themes were iteratively analyzed, triangulated, and summarized in a logical and coherent fashion that also considered the project's context. Note that the survey respondents could select all responses that applied for a particular question, therefore, the total percentage might not always add up to 100 percent. Additionally, an interviewee might mention more than one theme, and evaluators coded their responses in multiple ways; therefore, the total number of responses for themes related to each question might exceed the total number of interviewees.

The evaluators contextualized and triangulated findings from the desk review and the quantitative and qualitative data. Overall, the analysis was used to examine changes within the pineapple value chain after the project intervention, identify key gaps that the project may focus on during the remaining time of project implementation, and make recommendations for PINEX.

3. Evaluation Results

The evaluators triangulated results from a project document review, specifically indicators from the FAIS Performance Report; the producer survey (n=768); processor interviews (n=30¹⁴); exporter interviews (n=7); and stakeholder interviews (n=10¹⁵); and four producer FGDs to comprehensively assess the project's performance on five criteria: impact, effectiveness, efficiency, relevance and sustainability. Due to the page limit of this report, the evaluators did not include information related to current pineapple cultivation, processing, and export, such as land use, planting material, equipment, fertilization, chemical use, irrigation, processing equipment, and transportation. Please refer to Appendix XVIII for contextual information and the survey data statistics.

3.1 Effectiveness

3.1.1 Level of Achievement of Objectives and Targets

Evaluators used the performance indicators, reported in the 2018 November FAIS Performance Report that PfD submitted to USDA, to assess the effectiveness of the project. Specifically, evaluators compared the cumulative achievement of each indicator for the past two years, FY (ending in September 30th) 2017 and FY 2018, with their end of project target. If >50% of the end-of-project target was met, evaluators used a green circle, indicating that the project is on track to achieve its end-of-project target. If 40%-50% of the end-of-project target was met, a yellow circle was used, indicating that the project needs a little more effort in achieving the end-of-project target for that indicator. If <40% of the end-of-project target was met, evaluators assigned a red circle, indicating that this indicator is at risk of not achieving its end-of-project target. Then, evaluators assessed the likelihood that the project will achieve activity targets, based on the level of achievement on related indicators¹⁶. Please refer to Appendix XIX for the full assessment of each performance indicator.

Figure 3 demonstrates the midterm status of each activity and whether it is on track to achieve its end of project targets by the end of the project. According to the table in Appendix XIX, only three performance indicators overall are marked yellow, indicating they are on track but need attention. All three fall in the range of 44%-49% achieved and, therefore, have been categorized as on track (green circle) and counted as such in the table below. In addition, a few indicators that are categorized as on track in the table below have been achieved. For example, eight indicators related

¹⁴ One interviewed exporter is also a processor. Therefore, that interview also explored processor questions. Evaluators double-counted this person as a processor and an exporter.

¹⁵ One processor was interviewed using stakeholder interview questions. Evaluators double-counted this person as a processor and a stakeholder.

¹⁶ Based on one interview with PfD staff, there is a high chance that the project will have a no-cost extension for one year. Evaluators have taken this possibility into account when assessing the likelihood of objective achievement.

to financial services activity have been achieved already. Notably, all seven activities have at least a medium chance that their end of project targets will be achieved by the end of the project.

Activity	# (%) indicators on track	# (%) at-risk indicators	On track to achieve the targets of activities by end of project (chance of high, medium, and low)
1. Financial Services: Facilitate Agricultural Lending and Access to Inputs	13 (54%)	11 (46%)	Medium ^a
2. In-Kind Grants: Innovation in Processing and Production	2 (67%)	1 (33%)	High
3. Trade facilitation: infrastructure	5 (56%)	4 (44%)	Medium to high ^b
4. Trade Facilitation: Market Information	7 (64%)	4 (36%)	Medium to high ^c
5. Trade Facilitation: Marketing	6 (46%)	7 (54%)	Medium ^d
6. Training and Capacity Building: Pineapple Processing	13 (87%)	2 (13%)	High ^e
7. Training and Capacity Building: Pineapple Production	35 (92%)	3 (8%)	High ^f
Total ^g	81 (72%)	32 (28%)	High

^a Eight indicators' end of project targets have been achieved already. The majority of the indicators that are at risk (8 out of 11) are related to loans and receiving financial services. Results of interviews and producer survey showed that many processors and producers are very cautious to use loans and credits, which may affect the achievement of this activity's end of project targets.

^b Three out of four indicators that are at risk are related to volume of dry or cold storage capacity. Based on the interviews, PINEX initiated a Cold Room installation at Cotonou international Airport PINEX in 2019, thus there might be fewer indicators at risks by the time of this report writing. Therefore, evaluators assessed this area as having a medium to high chance of completion instead of a medium chance.

^c Three indicators' end of project targets have already been achieved. Indicators that are at risk include number of policies, regulations and/or administrative procedures in stage 2 (25% of the end of project target has been achieved) and stage 3 (0% has been achieved) as a result of USDA assistance and number of individuals accessing pineapple market information as a result of USDA assistance (23% of the end of project target has been achieved). The Benin Ministry of Agriculture staff has reached out to ask PfD help develop a sustainability plan for pineapple development. According to interviews with PfD staff, they are planning to get more processors and producers expose to market directly through market tours, trade fairs, etc. Therefore, evaluators assessed this area as having a medium to high chance of completion.

^d Indicators that are at risk include number of processing companies receiving marketing and branding training as a results of USDA assistance (5% of the end of project target has been achieved), number of national and regional trade fairs and market forums attended (29%-38% of the end of project targets have been achieved), and number of jobs attributed to the project (male). According to interviews with PfD, improving trade facilitation by supporting more processors and producers attending trade fairs and developing regional market in West Africa are one of their focuses for the rest of the project years. Three indicators' end of project targets have already been achieved.

^e The indicators that are at risk involve the value and volume of sales for pineapple juice sold by processors and number of individual ISO 22000-certified pineapple processors correctly applying ISO 22000 standards as a result of USDA assistance. Four indicators' end of project targets have been achieved already.

^f Seven indicators' end of project targets have been achieved already.

Source of data: PfD's FAIS Performance Report submitted to USDA in November 2018 that covers progress from project inception through 30 September 2018

^g In its management of USDA's list of up to 162 indicators, PfD has sought to make the reporting for its staff and for the project participants, especially the 4,000 pineapple producers, as practical as possible, without however sacrificing any key data. In this regard, some of the 162 indicators are 'not applicable,' while others have been combined into one indicator as opposed to being disaggregated into several sub indicators. That's why the total number of indicators is 113.

Figure 3. Status of each Food Aid Information System performance indicators related to each activity

3.1.2 Project Monitoring

The PINEX project has prepared and followed the detailed guiding plan for periodic monitoring and evaluation, including an annual program review, midterm evaluation, final evaluation, special studies, and management of evaluation activities. The plan outlines the purpose and scope of the M&E activities to be carried out, roles and responsibilities of the evaluators, timeline and management of the activities, proposed design and methods of the evaluation, and how to use M&E findings. In addition to dedicated M&E, the project has also prepared the activity and monthly reports to track its activities over time.

PfD has been reporting to USDA based on the Food Aid Information System indicators. PfD has carried out a series of trainings, meetings, and follow-up visits with the target beneficiaries to put the M&E system into practice. The monitoring reports reflected that the project experienced some challenges (collaboration issues with some beneficiaries) in collecting accurate data while rolling out the monitoring plan. Based on interviews with PfD staff such challenges might have occurred because record keeping is still a relatively new concept to the producers, and it is challenging for them, especially those who are barely literate. Processors record juice production, sales, and income on a daily basis and provide their records to the project team. The project team compiles the data on a monthly basis in Microsoft Access.

3.2 Efficiency

3.2.1 Increased Productivity as A Result of Improved Farm Management Practices

The number of agricultural producers who have applied improved farm management practices as a result of PINEX assistance was 1,037 in FY 2017 and 3,814 in FY 2018. Evaluators examined the relationship between whether the surveyed producers practiced farm management practices in the last cultivation period and the total metric tons of harvest. The surveyed producers who have practiced farm management practices in cultivation (n=648) have a marginally higher average harvest per hectare of pineapple cultivation land compared to those who have not practiced farm management practices (n=22).¹⁷ The FGD results show that producers have benefited from PINEX's training in improved farm management practices. For example, producers have started sorting their slips for more efficient planting and planning for 2019 by calculating their yield, costs, and sales. They also mentioned that they now look for buyers ahead of time and explore and prepare for market needs before cultivation.

3.3 Project Impact

3.3.1 Impact of PINEX on the Application of Improved Techniques or Technologies

3.3.1.1 Number of Hectares under Improved Techniques or Technologies as a Result of USDA Assistance

There have been 4,008 hectares under improved techniques or technologies as a result of USDA assistance in FY 2017 and 5,165 hectares in FY 2018. All hectares under the improved techniques or technologies in FY 2017 continue to be so in FY 2018, and 1,157 new hectares have been added in FY 2018. Figure 4 below shows the number of hectares under different types of improved techniques and technologies as a result of USDA assistance in FY 2017 and FY 2018.

¹⁷ The difference is not statistically significant (p value=0.28).

Indicator: Number of Hectares Under Improved Techniques or Technologies as a Result of USDA Assistance						
Year	Hectares under crop genetics	Hectares under disease management	Hectares under pest management	Hectares with irrigation	Hectares under soil-related fertility and conservation	Total number of hectares under improved techniques or technologies (total w/one or more improved techniques or technologies)
FY 2017	4,008	4,008	4,008	0	4,008	4,008
FY 2018	5,165	5,165	5,165	0	5,165	5,165

Source: PfD 2018 November FAIS Performance Report

Figure 4. Number of hectares under different types of improved techniques or technologies as a result of USDA assistance

3.3.1.2 Number of Individuals Who Applied New Techniques or Technologies as a Result of USDA Assistance

A total of 1,564 individuals have applied new techniques or technologies as a result of USDA assistance in FY 2017, and 3,814 individuals have done so in FY 2018. All individuals who have applied new techniques or technologies in the first year have applied them again in the second year, and the number of newly added individuals in FY 2018 was 2,250. A total of 143 females have applied new techniques or technologies in FY 2017, and 387 have done so in FY 2018. A total of 1,421 males have applied new techniques or technologies in FY 2017, and 3,427 have done so in FY 2018. Figure 5 below shows the number of individuals who have applied specific types of improved techniques or technologies in FY 2017 and FY 2018.

Indicator: Number of Individuals Who Applied New Techniques or Technologies as a Result of USDA Assistance						
Year	Individuals applying crop genetics	Individuals applying disease management	Individuals applying pest management	Individuals with Irrigation	Individuals applying soil-related fertility and conservation	Total number of individuals who have applied new techniques or technologies (total w/one or more improved techniques or technologies)
FY 2017	1,564	0	1,564	0	1,564	1,564
FY 2018	3,814	1,252	3,814	0	3,181	3,814

Source: PfD 2018 November FAIS Performance Report

Figure 5. Number of individuals who applied specific types of improved techniques or technologies

3.3.1.3 Types of Improved Techniques or Technologies That Have Been Applied

Producer survey results showed that almost all respondents (97%) have exercised safety measures; 93% said they wear gloves and 88% wear boots while working in the pineapple field. Producers participating in the FGDs also mentioned that they have learned about and applied the acceptable level of ethephon ($C_2H_6ClO_3P$), a plant growth regulator that promotes ripening and which therefore in effect creates more uniform coloring of pineapple, which has helped create an environment conducive to lifting the Government of Benin's own proactive ban on Beninese pineapple to Europe (since they believed it would be rejected on arrival in Europe due to application of ethephon beyond EU standards) and helping to regain the international market after the ethephon problem¹⁸. Surveyed producers have also applied specific fertilizers for pineapple

¹⁸ In 2016, the ethephon residue from the Benin exported pineapple to European market was found to be higher than permitted levels. The Government of Benin therefore voluntarily banned pineapple export. The government lifted the

cultivation and followed the best practices of quantity or ratios, sequence, and timing and frequency of fertilizers applied after PfD training. Before engagement with the project, almost all producers who participated in the FGDs did not know the specific type of fertilizer they should use and how to apply it during cultivation. After their participation in the PINEX project, they have used Nitrogen, Phosphorus, and Potassium (NPK) and urea and have applied them in a specific order. The project has also taught producers the appropriate frequency of fertilization, while their previous practice was to apply fertilization at any time and at any amount they wanted. Producers also mentioned that techniques in fertilization have largely improved the quality, weight, and productivity of pineapple. More details about changes in cultivation behavior and techniques can be found in Section 3.3.3.2.

The most frequently mentioned PfD-supported techniques processors included using kits (such as masks, lab coats, gloves) and good hygiene practices. Processors have also started using multiple pasteurizations and labeling their products as a result of training. One processor interviewee mentioned that they received a high-capacity extractor from the project. Processor and exporter interviewees also mentioned that the storage facilities and cold storage at the airport, built by the project, are very helpful (e.g., the storage facility in Tandahota). Processors discussed the use of a refractometer. Most mentioned their refractometers were given to them by PINEX. Six producers are interested in converting their waste into biogas with the help of PINEX.

3.3.2 Increased Sales in Value and Volume

Based on PfD's most recent FAIS Performance Report submitted to USDA in November 2018 that covers progress from project inception through 30 September 2018, the value of sales of fresh pineapple sold by producers have increased dramatically in FY 2018 (\$26,838,748), compared to the 2015 baseline (\$5,324,375, based on the project baseline report) and FY 2017 (\$15,830,000) (Figure 6).¹⁹ The increase in value may have occurred because more fresh pineapples were sold to Nigeria by producers after Nigeria recovered from its 2012-2015 economic crisis. In addition, more fresh pineapples have been sold to Sahelian countries (e.g. Burkina Faso and Niger) or small processing companies at higher prices. The volume of sales of fresh pineapple sold by producers was 135,016 metric tons in FY 2017 and 234,016 metric tons in FY 2018. The figure below shows the value of sales in four types of pineapple products in the past two years. The volume and value of sales for the dried pineapple sold by processors in the past two years have largely increased, compared to the 2015 baseline. The values of sales in pineapple juice in both FY 2017 and FY 2018 have increased compared to the 2015 baseline, while the volume of sales in pineapple juice in FY 2017 has slightly decreased but largely increased in FY 2018 compared to 2015 baseline. Both the value and volume of sales of fresh pineapple sold by exporters have not increased in the past two years compared to the 2015 baseline, which indicates the impact of the export ban and its effect on sales in 2018 is significant. These findings suggest that PfD should pay extra attention to helping exporters increase

ban in 2017 after a series of actions in improving food security, particularly by reducing the ethephon residue to the acceptable/permitted level (2SL).

¹⁹ Each quarter in 2017 and 2018, PfD randomly sampled around 5.5% (206) of the 3,814 total producers to create estimates for key indicators, including value of sales. The total number of producers sampled in this 24-month period was 1648 (206 each for eight different quarters).

their value and volume of sales in fresh pineapple in future project years and continue supporting the growth of the volume and value of sales in pineapple juice through various ways, e.g., technical support, financial support, and administrative support.

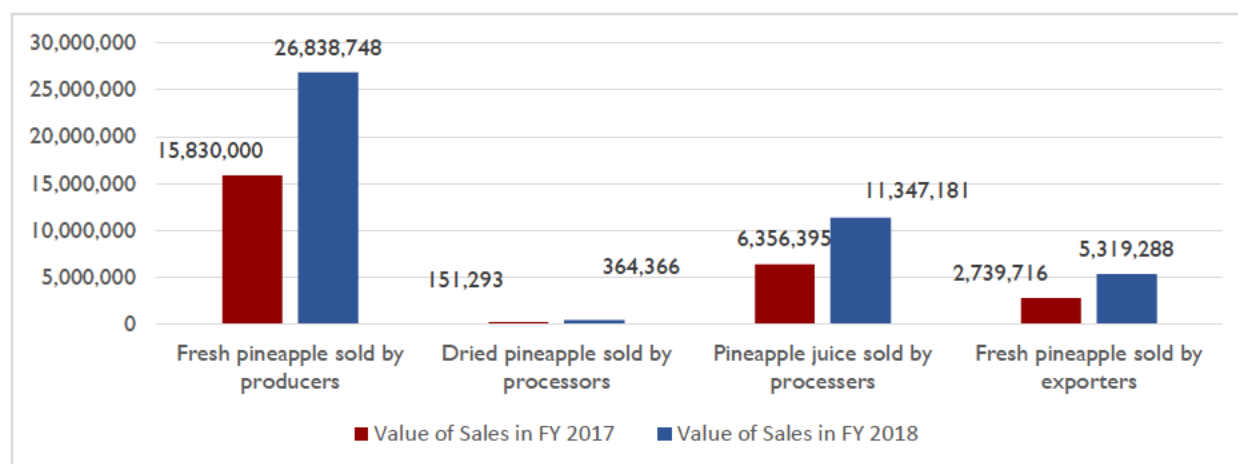


Figure 6. Value of sales (in USD) in USG FY 2017 and FY 2018

3.3.3 The Impact of the Project on the Direct and Indirect Project Beneficiaries

In total, 3,052 individuals have benefited directly from the project in FY 2017, and this number has increased to 11,650 in FY 2018. All individuals who benefited directly from the project in FY 2017 have continued receiving the benefits in FY 2018. The total number of individuals benefiting indirectly as a result of USDA assistance has been 37,338 in FY 2017 and has increased to 50,500 in FY 2018.

3.3.3.1 More Females Working in Pineapple Production and Processing

Both the numbers of males and females benefiting directly from the project have increased dramatically from FY 2017 and FY 2018. The number of females who benefited from the project directly in FY 2018 (3,395) was nearly 10 times the FY 2017 number (364), while the number of males who benefited from the project directly in FY 2018 (8,255) was more than three times the FY 2017 number (2,688).

“For a long time, women wouldn’t work around here, so we wanted a place where women could work. Women from [the local area] have priority.”

This finding indicates that the project has had a great impact on increasing female beneficiaries, a finding also reflected in the survey, interviews, and focus groups. In the survey, the most frequently reported type of labor used by the respondents in the last pineapple cultivation season was casual labor. Of the survey respondents, 92% said they have used male casual labor, and the same percent of respondents said they have used female casual labor. In the processor interviews, 10 processors shared how they have been supporting and empowering women of the community in their businesses. The majority of employees are women in one of the processing companies which employed 24 people. Eleven other processors have employed women at approximately the same rate at which they employ men. Another processor said that they have collected recycled bottles from women who collect and sell locally. One processor has bought their pineapples from two PfD-

supported women producers. In the female FGD, all of the participants highlighted that the project has increased their confidence in working in the pineapple business and their competency in working outside of their household. This feedback has helped change the gender status quo of the labor market in the current pineapple industry. In a discussion with stakeholders from PfD, they estimated that women make up about 10% of producers and about 70% of the processors.

3.3.3.2 Changing Production Behavior Leading to Higher Yield

Results showed that the project has had the greatest impact on improving pineapple cultivation practices. Producers who participated in the FGDs consistently and repeatedly pointed out that PINEX has taught them why and how to prepare land, sort slips, apply fertilizer and chemicals, and use safety measures. When asked what, if any, changes have occurred in pineapple production in the last cultivation season compared to production in 2015, 90% of the 768 producer respondents answered that they have seen changes in cultivation practices, and 88% thought that engagement with PfD has contributed the most to changes in cultivation practices (see Figure 7). Most respondents believe that engagement with PfD has contributed most to the top five changes, including cultivation practice, profitability, performance, information, and production.

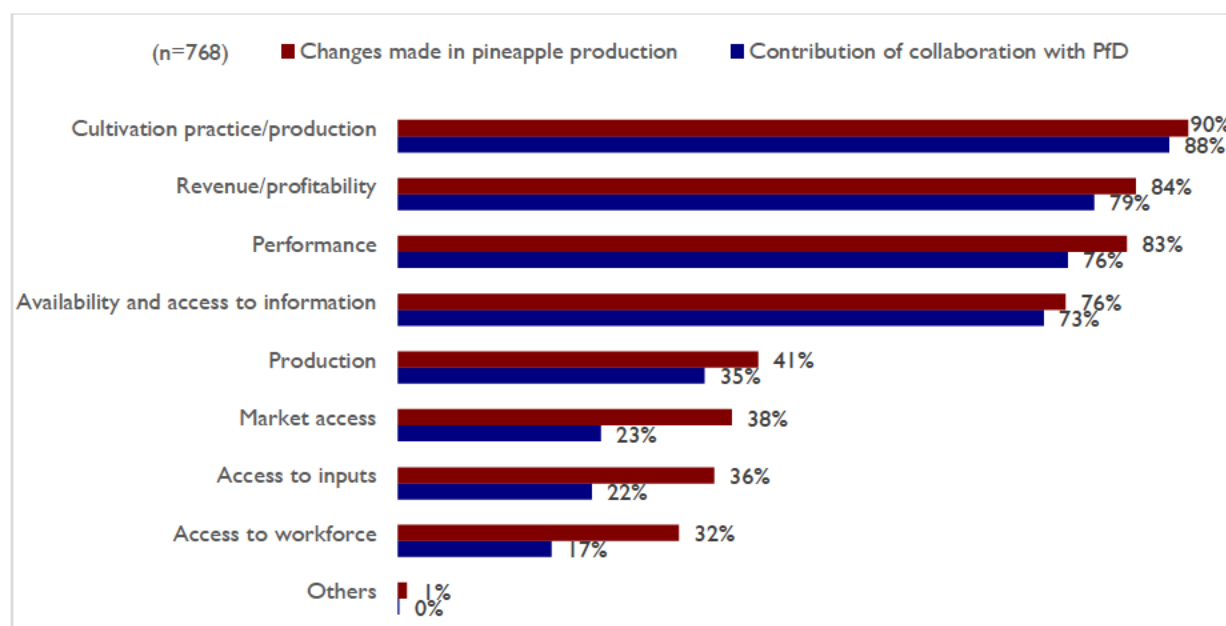


Figure 7. Survey respondents' observed changes in pineapple cultivation since 2015 and the contribution of PfD engagement

Though land preparation is critical to securing high yields, it is a tedious process, and producers did not know any best practices of land preparation. PINEX training has provided critical insights, awareness, and skills to producers on how to better prepare land to achieve higher yields. After PINEX training, producers have started to sort out the planting materials (i.e., slips) by size before planting (large, medium, and small), which is very important to regulate uniform growth, flowering, ripening time, and pineapple size to maintain the quality of pineapple and increase the quantity of harvest. Producers have started planting large and medium-sized plants and discarded the small, diseased, and dried ones. They have also started leaving the slips in the sunlight for three days, for

hardening off, before planting. Additionally, producers have started using wheeled planters, which plant carefully in lines, in single or double rows.

Producers participating in the FGDs reported that after PINEX training, they are planning to change their cropping systems from intercropping to monocropping, though some of them are still intercropping²⁰. They also said that they are planning to avoid planting tomatoes and cassavas as they know such plants can create diseases in pineapple, and they have started cleaning the residue off the intercropped plants after harvesting. The producer survey showed that 81% of respondents still practiced intercropping in the last pineapple cultivation season, and the main crops used in the intercropping were corn, cassavas, and tomatoes. This finding indicated that PfD should find whether and why producers are reluctant to change their behaviors.

Producers participating in the FGDs also come to know about the need for pineapple-specific fertilizer (i.e., different from the one prepared for cotton, which producers were using before the PINEX intervention) and fertilizer application quantity (including the ratio of different components), sequence, timing, and frequency. FGD participants said that they have gained the knowledge of pineapple-specific fertilizer - i.e., applying fertilizer at three, six, and nine months after planting; applying a 2:1 ratio of potassium to nitrogen; and applying NPK first to make sure the roots get strong and then applying urea later. The survey results are consistent with FGD findings. For example, survey respondents reported the average times of fertilization consist of three times after planting. The majority of respondents (96%) have used urea and NPK for fertilization. About 54% of respondents have used potassium sulfate for fertilization, 2% have used organic fertilizer, and 4% have used other fertilizers. All but three respondents have used carbide calcium for inducing flowering. However, 4% of respondents have used herbicides. Only 1% of respondents have used insecticides against mealybug insects. Nine percent of respondents have used ethephon to change the skin color of the pineapple. One percent of producers have used other pesticides or insecticides. More than half of surveyed producers (54%) indicated pineapple damages occurred due to diseases or insects during pineapple cultivation. In addition, based on findings presented in the Effectiveness Section 3.1, PfD has not achieved its end of project target regarding the number of hectares to which pest management were applied. These findings indicate that PfD should consider continuing to provide support to ensure adequate pineapple-specific fertilizer is accessible and to provide training in better use of chemicals to control diseases from insects.

Following PINEX's trainings and technical support mentioned above, producers have also started planting approximately 20% more plants per unit area. The average density of Smooth Cayenne is reported to be 44,079 plants per hectare and that of Sugarloaf was 44,232 plants per hectare, based on the producer survey. A discussion with the PfD technician revealed that if all suggested cultivation techniques are carried out properly, producers could inject calcium carbide for flowering five to seven months after cultivating instead of at 10 months, because the size and maturity of pineapple after five to seven months would be similar to the 10-month pineapple using previous

²⁰ PfD has recommended to segregate pineapple cultivation wherein pineapples are grown exclusively in one area of the family's overall land under cultivation and cultivation of other crops in their other fields. This separation improves productivity of pineapple. PfD does not discourage a diversification of crops within households.

practices. Thus, producers could shorten the pineapple cultivation cycle from 18 months, on average, to 12 months. Evaluators found 26% of surveyed producers have a pineapple cultivation cycle of less than 18 months, 13% of these had a cycle of 12 months.

Evaluators also noticed that only 25% of survey respondents said that they have protected their pineapples from the sun, even though 95% of total survey respondents claimed that they knew the best practices to protect pineapple from sun. PfD might want to explore why the trained producers are reluctant to use this practice and provide appropriate support.

3.3.3.3 Increased Production, Income, And Profits

Of the surveyed producers, 82% reported that their pineapple production has increased during the last pineapple season, 7% reported no change in harvest, and 11% reported a decrease. The average harvest quantity of pineapple per hectare of pineapple cultivation land has been significantly higher in the last pineapple cultivation season (29.15 metric tons per hectare) than the average in 2016 (10.98 metric tons per producer)²¹. Similarly, more than three quarters of surveyed producers (78%) reported that their pineapple sales have increased during the last pineapple season, 9% reported no change in sales, and 13% reported a decrease. Producers indicated that PINEX trainings and suggestions regarding cultivation practices, availability of inputs (though some inputs - e.g., pineapple-specific fertilizer - have limited access), and favorable weather have helped improve the quality and quantity of the products.

Increased quality and quantity of harvested pineapple, combined with an increased market price during their harvesting time, have contributed to higher sales in terms of quantity and income. Based on survey findings, the average gross income per household from both Smooth Cayenne and Sugarloaf in the last cultivation season was 2,816,702 XOF (4,899 USD) and the median gross income was 950,000 XOF (1,652 USD). The average gross income from Smooth Cayenne in the last cultivation season was 6,201,987 XOF (10,786 USD), with a range of 12,000 to 413,250,000 XOF (21 to 718,696 USD). The average total household gross income from Sugarloaf was 1,866,161 XOF (3,245 USD), with a range of 6,000 to 55,025,000 XOF (10 to 96,696 USD)²². Note that there is no income information in the baseline report, and evaluators could not make a baseline-midterm

²¹ Evaluators deleted the outliers (from statistical and practical perspectives) and one missing value. What remained were 679 respondents for questions regarding the 2018 harvest (i.e. harvest in last cultivation season) and 585 respondents for questions regarding the 2016 harvest. Evaluators used these numbers to calculate the means and compared them in a t-test where $p=0.000$. A few contexts need to be kept in mind when interpreting these results. First, 92% of total surveyed producers have 0.25 to 2 hectares of pineapple cultivation land. The average harvest per hectare might be higher if more big pineapple producers are selected. Second, it's the average harvest per hectare of pineapple cultivation land instead of pineapple harvest land. Third, evaluators asked producers to indicate their average harvest per pineapple cultivation land in 2016 directly rather than the total harvest in 2016. Therefore, producers might not have a good estimate of the average harvest of pineapple cultivation land directly. The 2016 yield per hectare based on PfD's independent baseline report in 2016 is 24.29 metric tons.

²² The average net income per household in the last pineapple season from both Smooth Cayenne and Sugarloaf was 2,141,562 XOF (3,724 USD) and the median net income was 449,175 XOF (781 USD). Please note that the net income was calculated after deducting the cost of (1) equipment, (2) labor for land preparation, (3) fertilizers, (4) labor for fertilizing, (5) chemicals, (6) labor for using chemicals, (7) labor for weeding, (8) protection from sun, (9) insect and diseases control, (10) labor for harvesting, and (11) transportation. Please also note that these costs might not be comprehensive of all costs.

comparison for now. Those who have experienced a decrease in harvest indicated that they had problems with accessing inputs and personal reasons (e.g., health). They also mentioned the lowered market price during their harvesting time.

Figure 8 below compares the total profits of pineapple cultivation in 2015 and in 2018. A higher percentage of respondents achieved profits over 500,000 XOF (807 USD), and fewer respondents experienced a loss in 2018 compared to 2015.



Figure 8. Profitability of pineapple grown in 2015 versus 2018

Evaluators also found that major PINEX project activities, such as training and information support, have significant associations with increased harvest of pineapple, no-rejection for sale, increased sale of pineapple, and increased profit from pineapple. Figure 9 shows the percentage of respondents who have received training and services, as well as those who stated that they have had an increased harvest, sale profit, or no-rejection of pineapple when selling to buyers. More than 81% of producers who have received one or more services on cultivation practices or market information have increased harvest, sale, and profit.

Services/training	Increased harvest	No-rejection of sale	Increased sale	Increased profit
Received pineapple cultivation information from PINEX (N=667)	85%	65%	82%	95%
Received market information from PINEX (N=299)	87%	59%	86%	97%
Received training on agricultural financial management from PINEX (N=574)	87%	62%	83%	97%
Received training on pineapple cultivation practices from PINEX (N=715)	84%	66%	81%	95%
Received training on farm management from PINEX (N=596)	87%	64%	83%	95%
Received training on marketing from PINEX (N=486)	89%	61%	86%	97%

Note: There is significant association between the services/training provided by PINEX and increased harvest, no-rejection for sale, increased sale, and increased profit (chi-square test, $p < 0.05$) (except for the association between cultivation information and increased harvest).

Figure 9. Association of project activities to the increased harvest, sale (also no rejection for sale), and profit

Evaluators also asked surveyed producers to rate the usefulness of PINEX project activities in increasing their production and increasing the benefits from pineapple cultivation. Almost all producers (89% or more) indicated that the pineapple cultivation and agriculture management trainings have been moderately or very useful, while nearly half of the producers (48%) rated the activities as moderately or very useful in obtaining membership in pineapple producer associations (Figure 10). However, only one-third or fewer respondents indicated that the project's support in

connecting them with input suppliers and buyers or exporters - and in obtaining storage facilities and inputs directly (e.g., plant material, chemicals, fertilizers) - has been moderately or very useful.

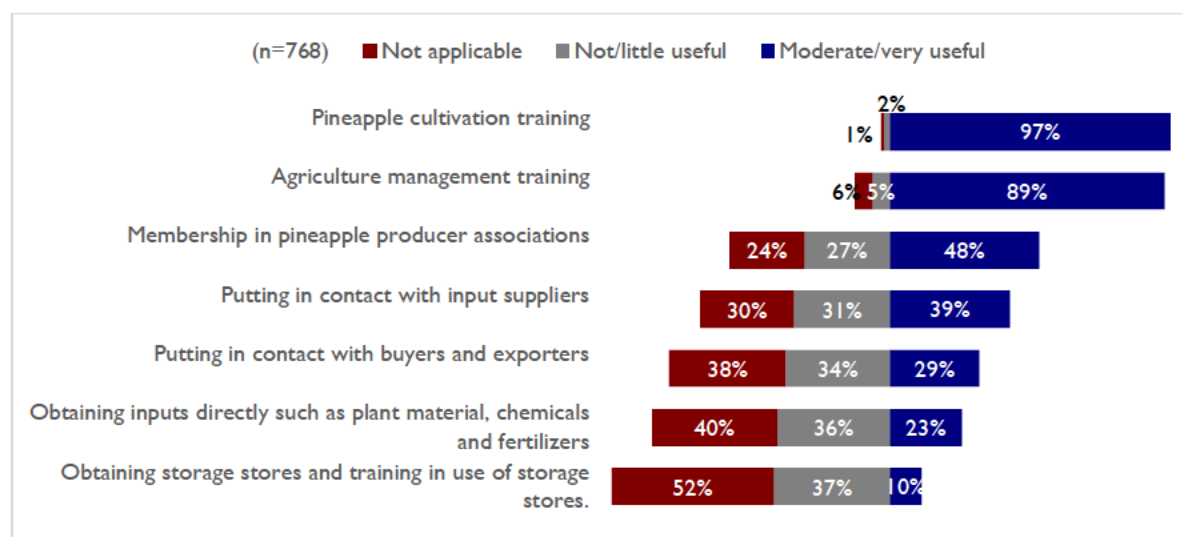


Figure 10. Perceived usefulness of project activities

All processors and exporters interviewed discussed the impact that PINEX support has had on their businesses. More specifically, they stated PINEX has made an impact by (i) increasing their production capacity through business management and processing training, (ii) helping them in expanding the market, and (iii) increasing their profits. All 24 processors who discussed their production capacity stated that they have experienced increases in capacity in the last one to three years due to the acquisition of new equipment (one mentioned they received equipment from PINEX) and due to acquiring new markets from fairs.

Nineteen of the 24 processors who discussed their profits in the interviews have experienced increasing profits; half of the 24 processors said that their businesses would need to be more profitable for them to continue or experience growth. Reasons discussed for lack of growth included the need for more advanced equipment - including an automatic crusher, cooker, pasteurizer, and more modern equipment in general - as well as space and packaging issues (for example, new juice packaging bottles that needed to be imported were either not readily available on the market or expensive when available). But most who said they needed their businesses to be more profitable were having trouble financially, with increasing expenses outweighing the revenue increase; had clients who owed them money; or had small margins but provided no further explanation why. Six processor interviewees also highlighted that PfD record-keeping training has helped them know about their profits and learn how to minimize losses and increase their production capacity. Processors mentioned that the PINEX project has provided training to directors on recording in notebooks the costs, profits, and capacity and then followed up to check the notebook at the end of the month.

Exporters indicated that the exporting business in general is profitable. However, three out of seven exporters indicated that they had experienced decreased profits in the last three years. Those who shared that their profits have increased said it was due to increased efforts in quality control,

development of hygiene, and technical strategy. For those with decreased profits, they attributed the decline to the ethephon problem, as well as the increased cost of air freight and increased competition. Only one of seven exporters who discussed their production capacity in interviews have experienced an increase in production during the ethephon problem in 2018.

3.3.3.4 Increased Knowledge and Skills in Production, Processing, and Marketing

PfD has provided a variety of trainings, information, and technical support to pineapple producers that have largely increased their knowledge in areas including cultivation practices, agricultural finance management, farm management, and marketing. Detailed training findings can be found in Appendix XIX (Appendix table 17). Of surveyed producers, 87% reported that they have received information about cultivation practices from the PINEX project followed by friends/family/neighbor (59%). Sixty-eight percent said that they have received pineapple market information from friends/family/neighbor and also from buyers (44%) and the PINEX project (39%). As mentioned in Section 3.3.3.2., due to improved knowledge and skills in cultivation practices, producers can achieve higher production per unit of land and they can shorten the pineapple cultivation cycle. Surveyed producers received training and technical support from various sources, yet the PINEX project was selected most frequently (see Figure 11 below).

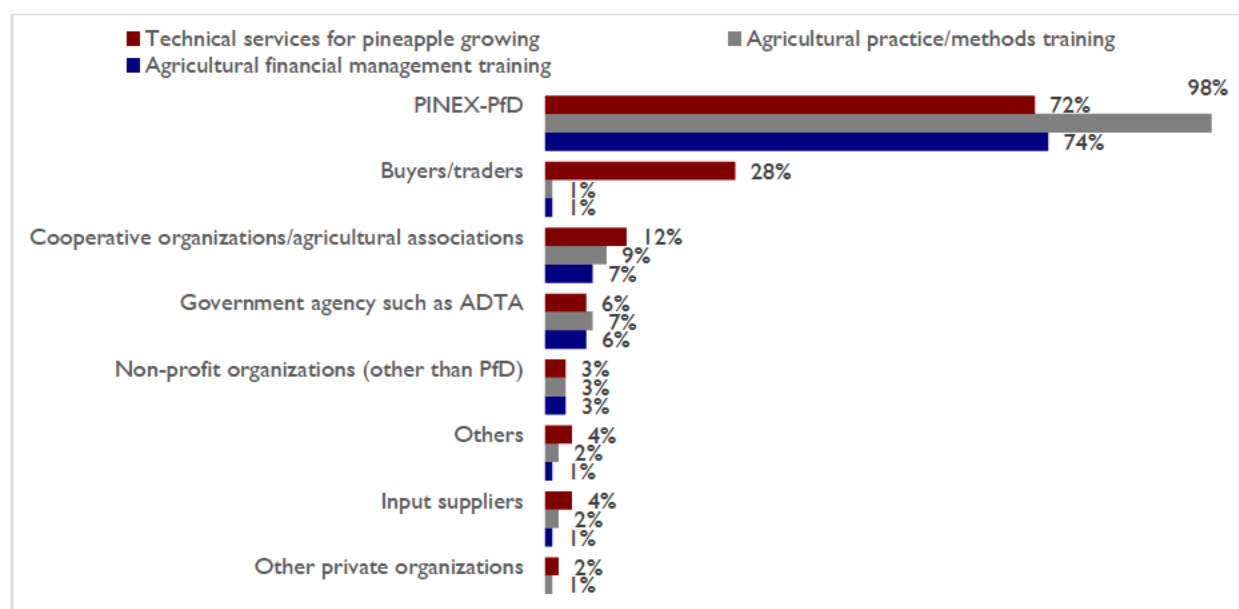


Figure 11. Sources of technical services and agricultural practice/method and/or financial management training

Twenty-four out of 30 processor interviewees mentioned that trainings provided by PfD have increased their knowledge in areas such as market prospecting (mentioned for a total of 39 times). Five of seven exporter interviewees commented that PfD has provided information on international markets. Three out of six stakeholders agreed that the major PINEX impact areas are expanding markets and providing training in business development (mainly mentioned by the associations). The MFI interviewees appreciated that the PINEX project can provide evaluation and follow-up of training for their clients. Of the 20 processors who discussed participating in fairs with PINEX, eight have secured new clients as a result of these fairs and their partnership with PINEX. In addition, nearly all exporters (five of seven interviewed) stated that they have increased their markets

by participating in international trips and fairs with PINEX, which has allowed them to connect with new clients, especially in Europe. Due to PINEX assistance in facilitating trips to fairs, processors have expanded to many local, regional, and international markets, including within-Benin market expansion (eight processor interviewees), Burkina Faso (eight), Niger (five), Senegal (five), Mali (three), Togo (three), France (two); and Ghana, Nigeria, Belgium, and Japan (future).

Five processors discussed certifications they have received through their partnership with PINEX. These were mostly certifications in HACCP. Six of the 27 small processing companies who discussed quality standards

"I am [having a market] thanks to Global GAP facilitated by PINEX, so it's just shown [the effect of PINEX support]."

are working towards HACCP certification with PINEX assistance, and the two large companies are working towards ISO 22000 certification with PINEX assistance. Additionally, four exporters shared that PINEX has helped them or is currently helping them receive GLOBAL G.A.P. certification. three of which mentioned that they have received GLOBAL G.A.P. certification. These certifications are expensive and need to be renewed, yet they are vital to operating in international markets. Assistance from PINEX in achieving these certifications has been helpful for those who have received it.

3.3.3.5 Access to Financial Services

Based on the producer survey, 37% of respondents have applied for loans for pineapple cultivation. Of these, 55% have received the full requested amount, 41% have received a partial amount, and 4% have not receive a loan. Of the total surveyed producers (n=768), 35% have received a full or partial loan successfully. This percentage is significantly higher than the 20% reported in the baseline report. Producer survey data showed that a significantly higher proportion of big producers (46%) have applied for loans, compared to small producers (29%). However almost all applicants, regardless of size (96% of 282 producers who applied for loans), have received a full or partial loan. Those who did not apply for a loan (63% or 485) indicated several reasons for not doing so (Figure 12).

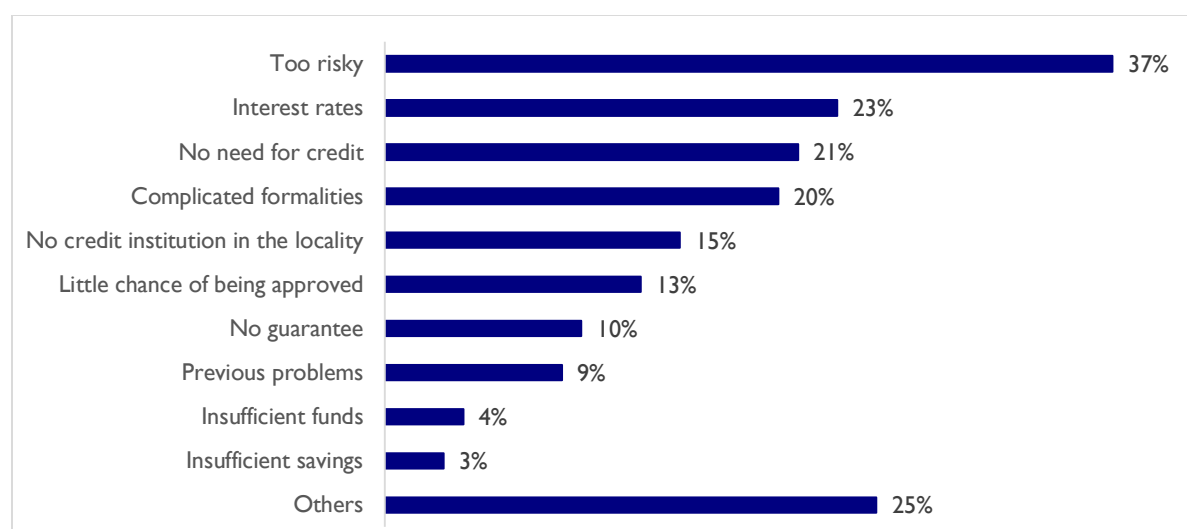


Figure 12. Reasons for not applying for a loan

These factors are also revealed in the producers' FGDs. Youth producers have been challenged by having to produce documentation or records of cultivation and having to prepare a practical installment repayment plan is also challenging. FGD participants elaborated that these factors are applicable more for smallholder producers, as they have limited access to formal credit provided by Association de Lutte Pour la Promotion des Initiatives de Développement (ALIDé) and other financial institutions due to their limited capacity to produce a guarantee and documentation. Surveyed producers got loans from various sources (Figure 13). Please refer to Appendix XIX (Appendix table 15a, 15b, and 15c). for more information about loan (e.g., application, approval, purpose, and sources).

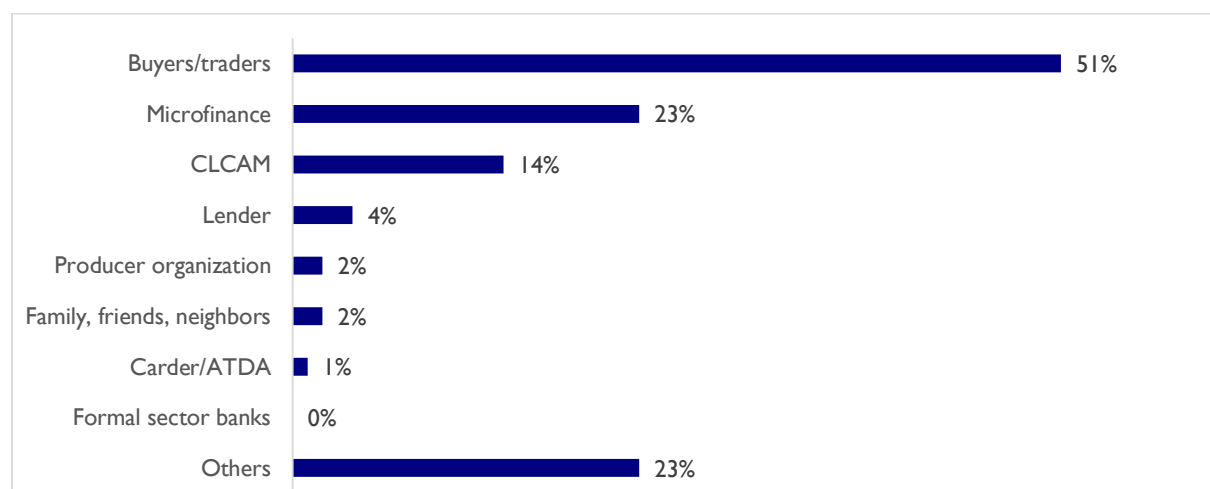


Figure 13. Sources of loans

Many processors have used multiple funding sources for their finances. Of the 28 processors who discussed their financial resources, 13 have received a loan from a bank, the same number have also received a microfinance loan, and four received a grant. While 11 processors operate on their own savings, three are nearing financial trouble and have never taken a loan from a bank. Six other processors and one exporter have tried requesting a loan from a bank but have been denied or had issues including high interest rates, too many conditions for the loan, or short repayment deadlines; or the need to have the loan quicker than the bank can give it. A representative from one of the big exporting companies said, “We only work with self-financing. We do not use the financial market because interest rates are very high. Also, export activity is a high-risk activity, so we avoid loans.” Another representative from a big exporting company said, “Access to credit is very difficult and interest rates are huge which makes our products uncompetitive.”

3.3.3.6 Other Indirect Benefits

One exporter interviewee mentioned that the project has helped create and keep relationships that sustain Benin's status on the international market. During the women producer focus group, participants mentioned that not only have they benefited in pineapple production, microfinance, and business management, but their children and families also

“What the project to me is priceless; my children will also benefit from it. The project has allowed us to celebrate the holidays. It's not only pineapple that we need to produce; everyone knows what they have to produce in order to eat and how much they need to invest and it's because of this project that we now have this knowledge. They also taught us how to take care of our household and how to deal with difficult situations in life.”

have benefited from the project. They also mentioned that the project has afforded benefits for every aspect of their lives and futures. Young producer FGD participants mentioned that pineapple is profitable and can improve personal and household incomes. They have also learned to understand risks and planning beyond pineapple production, which are important skills for livelihoods.

3.3.4 Secondary and Tertiary Impacts on the Targeted Community

3.3.4.1 Local Female Workforce Development and Local Labor Force Development

The project aims to increase female workforce development. As indicated in the women FGDs and mentioned by quite a few female processors interviewed, the project has largely increased their skills in pineapple cultivation and business management skills and changed their lives. According to the discussion with PfD, female processors account for approximately 70% of total processors. One female processor has prioritized hiring local female labor force, which will influence the female workforce development in the local community. Women FGD participants mentioned that participating in the project activities has not only influenced their work and profits, but also their lives. They mentioned that they have also learned how to take better care of their children and long-term life skills. In addition, after the government lifted the ban on exports, a few companies resumed or increased their capacity and hired more human resources for collection of raw materials and processing, following the certified and safe production process, lab testing, monitoring, etc. Based on PfD 2018 November FAIS Performance Report to USDA, the project has created 2,883 jobs for females and 1,463 for males.

3.3.4.2 Capacity of Government Institution

Ten people in the Benin government have attended short-term agricultural sector productivity or food security training as a result of USDA assistance, which will help build government capacity in providing pineapple cultivation and food security after the program ceases. One of the project's objectives is to improve policy and regulatory framework. Based on the 2018 November FAIS Performance Report, seven policies, regulations and/or administrative procedures have been developed in the past two years. The interview with the Ministry of Agriculture revealed that PfD has been very active in helping the Benin government cope with the ethephon problem and in providing technical suggestions in co-creating policies. The project has started a Solar Cooler Initiative and put pineapples on pallets, which allows more pineapple to be loaded more quickly onto airplanes. An interviewee mentioned that the government would like to add more resources to PINEX so that the project can train more people, reach more producers, involve more stakeholders, help processors/exporters enter new markets, and conquer and maintain the market approach.

3.3.4.3 Associations and Other Non-Profit Organizations

Based on the PfD 2018 November FAIS Performance Report, in the past two years (FY 2017 and FY 2018), 81 people in civil society have received short-term agricultural sector productivity or food security training as a result of PINEX assistance. This number has highly exceeded the end-of-project target (n=16). Twenty-seven PPNB staff have been trained in pineapple production, business management, and member services; this number also has exceeded the end-of-project target (n=12). Three producer organizations have applied improved techniques and technologies; this number exceeded the end-of-project target (n=1). The major impact areas identified by the

majority of the interviewees from associations and the U.S. Agency for International Development (the Economic Growth section of the USAID at Benin) were the trainings that they co-hosted, or those they received from the project. They now can have a team of technicians and provide similar technology consulting to their members. A producer association representative mentioned that 35 of the Association's members have received loans from one MFI because of the financial facilitation by PfD. One of the association interviewees mentioned the constructive dialogue built across all stakeholders and between the public and private (e.g., with the Agence Béninoise de Sécurité Sanitaire des Aliments / Benin Agency for Food Safety (ABSSA) and Direction de la Production Végétale / Department of Vegetable Production (DPV)) sector. This interviewee suggested the project continue promoting constructive dialogue, trust, and transparency among stakeholders.

3.3.5 Impact on Investment from Partnerships with Microfinance Institutions

One MFI interviewee mentioned that they have increased investing through loans for pineapple cultivation, processing, and exporting, as they know that PfD can provide technical assistance to strengthen producer's capacity. In addition, PfD follow up with their pineapple clients in the field, which has relieved MFIs' burdens and strengthened the quality of their clients. PfD also help facilitate relationships with the producer network (RéPAB) and processing factory (e.g., Fruits Tillou).

This interviewee mentioned that their target for December 2018 was to provide loans to 1,800 clients (i.e., pineapple producers) involved in the project; the actual borrowers totaled 1,000. In the FGDs, producers indicated that PINEX supports the lower interest rate, prescribed by Benin statute, provided by one MFI that exists for agricultural loans and also the somewhat longer loan period, 24 months instead of 12 months, given that pineapple needs about 18 months to produce fruit. Producers also noticed that obtaining trainings from PINEX is positively related to getting a loan from MFIs. However, some producers had misinformation that MFIs were refusing their loan applications. Another MFI interviewee mentioned that PINEX producers have already built the capacity as PfD has conducted fieldworks, monitored their cultivation, and provided technical support. Producers now should be able to produce higher quality and quantity and repay their loans in a planned way.

Though both MFIs have increased their investments through loans for pineapple business as a result of PINEX, they also suggested actions that could help them continue building the financial capacity of pineapple producers, processors, and exporters. For example, one interviewee suggested PfD leverage its international and regional network to get more buyers and markets so that their clients (i.e., pineapple value chain actors²³) will make profits and can recoup the investment. Another interviewee suggested PfD to refer more clients, as the current number of referrals is below their expectations.

²³ Pineapple value chain actors stands for the producers, processors, and exporters.

3.4 Relevance

3.4.1 Sector Contribution: Policy and Programs

The goals of PINEX, outlined in the beginning of the report, perfectly aligned with the policies and priorities of the Government of Benin. According to the Strategic Plan for Re-launching Agriculture (SPRA) adopted in 2011, the Government of Benin aimed at improving agricultural productivity and competitiveness and creating employment particularly for youth and women. In 2014, the Government of Benin developed the Agricultural Development Plan and emphasized using a value chain approach and identified the key crops that will receive public and private investment including pineapple. The Government of Benin has identified pineapple as one of the high value-added sectors in Benin agriculture and included developing/strengthening pineapple value chain as one of the 45 flagship projects²⁴. The government plans to increase pineapple yields to 70 tons per ha, reduce quantities eliminated during sorting to 20% by 2021 (vs. 80% in 2015), develop/strengthen value chains, increase exports, and improve local processing. One interviewee from the Ministry of Agriculture mentioned that government has established targets for different types of pineapple products to export to different markets. PINEX is aiming to improve the whole value-chain of pineapple, increase the productivity, increase the employment opportunities, especially female and young labor force and increase both the value and volume of sales of various pineapple products. The government has identified access to inputs as one of the key areas for intervention. The PINEX project is also aiming to increase access to improved inputs (e.g. improved fertilizer), increase the marketing infrastructure (e.g. market stalls) and storage facilities (e.g. cold and dry storage facilities).

The Government of Benin has also initiated a pineapple sector development program by creating an agency, the Territorial Agency for Agricultural Development, to facilitate and coordinate pineapple related stakeholders, programs, and projects, including the PINEX project. This agency coordinates all pineapple related projects and programs in terms of synergies and complementary actions. Such coordination and collaboration with the government directly will benefit the implementation of the PINEX project. PINEX is also working on building and strengthening the networks of pineapple actors.

The objectives of the project were also in line with the departmental governments' needs²⁵. A 2009 study from the Department of Atlantique found that the pineapple production system in the Department of Atlantique was not sustainable as it created less value on the land it used compared to other crops and did not ensure food safety. As mentioned earlier, the project is aiming to improve the productivity and overall value chain of pineapple by providing technical assistance to producers, processors, and exporters; improving access to markets; and helping stakeholders apply for food safety and quality certifications.

Based on the group interview with nine members of Benin's Ministry of Agriculture, the PINEX project was the lead in providing suggestions on technology and addressing all pineapple related stakeholders' concerns. The PINEX project has assisted pineapple producers in increasing their

²⁴ Government Action Programme 2016-2021 Flagship Projects.

²⁵ Benin is divided into "departments" geographically, similar to states or provinces in other countries.

production largely. In addition, PfD actively got involved in coping with the Ethephon problem and helped set up a monitoring system for food safety, which contributed to the lifting of the ban.

The project is also leveraging private resources by creating or strengthening private-public partnerships. In FY 2017 and FY 2018, fourteen partnerships were formed as a result of the project in agricultural production, processing, and exporting, for example, Songhai Center, Dutch organization/SNV's Agriculture Business Center, and Europe-Africa-Caribbean-Pacific Liaison Committee (COLEACP), and government partners, including the Territorial Agency for Agricultural Development and MOA. The project has also collaborated with local non-governmental organizations (NGOs), producer/processor/exporter associations and other projects. For example, processors and exporters interviewed who are benefiting from the project are working with associations, such as ANATRAB (16 processors), PPNB/RePAB, PADA (6 processors), COLEACP (2 exporters), and ANEAB (1 exporter).

3.4.2 Employment Increased in the Local Area

Based on the 2018 November FAIS Performance Report submitted by PfD to the USDA, the project has created 2,883 jobs for females and 2,090 jobs for males and aims to increase 13,768 jobs by the end of the project. Interviewed processors mentioned that they increased employment for the past three years because of the increasing profits of their businesses.

3.5 Sustainability

3.5.1 Factors Influencing the Sustainability of the PINEX Project

Figure 14 below presents key factors and the way these factors influence project sustainability.

Factors	How this factor will influence the sustainability of the PINEX project
Conducive policy environment and government support	The Benin government has prioritized pineapple as one of the areas for intervention, has implemented a development plan, and emphasized public and private investment in pineapple production, processing, and export. Ten people from government have attended a short-term agricultural sector productivity or food security training in FY 2017. In addition, PINEX established the Pineapple Stakeholders' Council (PSC), which has started working for policy advocacy and programmatic support to strengthen the pineapple sector. All efforts will help institutionalize the project approaches (e.g., value-chain approach) in the government and other civil society organizations.
Level of institutionalization of project approach within various networks and associations	One interviewee from RePAB mentioned that the association did not have technical support before the project and now has a technical team of 6 field technical agents and 20 Master producers. The project enables them to provide technical support to the associated 1,600 producer members of the network. The project has collaborated with the association, e.g., COLEACP, to host trainings for businesspeople, and a representative of COLEACP said that the training has increased participants' knowledge and changed their practices. The international fairs and market information supported and shared, respectively, by the project also can be seen as the starting point for the associations to continue developing the market and keeping the relationship with international partnerships even after the project implementation period. It's critical that the project be a model and that the association or network leads can replicate what the project has done to train their members, thus ensuring long-term

Factors	How this factor will influence the sustainability of the PINEX project sustainability.
Continued public and private partnership and dialogue	The project has created a dialogue between the public and private sectors, e.g., between the government and private-sector associations, which was mentioned in stakeholder interviews. Continuing this dialogue will help sustain the benefits created by the project.
Motivation of continuing private and public investment	PINEX has built four Community-Based Centers that host a training room and inputs storage facilities close to the producers that allows their associations to attract opportunities of private and public investment in pineapple sector. In addition, PINEX initiated a Cold Room installation at Cotonou International Airport that will increase partnership between airport managers, pineapple exporters and the EU pineapple exporters. All these efforts will positively contribute to help increase private and public investment. However, shortage of funding—e.g., for production costs, equipment upgrades, transportation tools, and building facilities—is a big challenge for the stakeholders.
Motivated producers, processors, and exporters	In general, pineapple value chain actors are very motivated to continue the cultivation and pineapple business. The Benin government would like PfD to help put together a new sustainability plan for pineapple development. Community-based associations are interested in continuing staff training on techniques, developing business development practices, receiving market information and so on. Yet the attitude of micro finance institutions with respect to sustainability is not clear based on the interviews. Please refer to the Section 3.5.2 for more details.

Figure 14. Factors influencing the sustainability of the PINEX project

3.5.2 Motivation for Sustainability

All producers who attended the FGDs and interviewed processors and exporters felt that the pineapple cultivation and business could be an attractive and lucrative sector for all involved in the pineapple sector.

“Even if PINEX leaves, everything we’ve gained in knowledge and practices, it stays.”

Fifty-nine percent of surveyed producers who attended the trainings are less than 40 years of age. This finding might suggest that the project will have a long-term influence on these younger producers, which will benefit the sustainability of the project. Producers participating in the FGDs also mentioned that they are returning producers (who abandoned pineapple cultivation a few years ago because of low profits) in pineapple cultivation now because they have seen the change of the pineapple sector and believe it will be profitable again. The majority of processors and exporters demonstrated their motivation to continue their pineapple businesses irrespective of external support. They explicitly demonstrated their interest and engagement in planning their continuation and expansion of business. They are also confident that they will continue to reap the benefits of the training and support they received from PINEX after the completion of PINEX project. In addition, 93% of the 768 surveyed producers have profits, and 40% have profits over 500,000 XOF (approximately 849 USD). Half of the processors interviewed are also expanding and hiring more people, which indicates that they are generating more profits and could continue the business after the project ends. The other half of these 24 processors said that their businesses would need to be more profitable for them to continue or experience growth.

Currently, a very high proportion of producers depend on PINEX for technical services for pineapple cultivation (72%), pineapple cultivation training (98%), and agricultural financial management training (74%). If the project can increase the number of individuals from government, associations, other community-based organizations who attend the trainings in pineapple cultivation, farm management, food security, financial management, and business management, this will help diversify the sources of training and sustain the training and dialogue to improve the value chain after the project period.

Other stakeholders, including associations and the government, are also motivated to continue the project. An interviewee from the Ministry of Agriculture mentioned that it is best if PfD can help develop a new sustainability plan with the government. They mentioned that the pineapple project has helped Benin develop an international presence and thought that the government will continue opening the international market. Representatives from the associations who were interviewed also highlighted the trainings and the resources that have been introduced by the project. They would like to continue working with the project to train their human resources staff to master the techniques, market information, develop business development practices, and so on. However, they indicated that the role of microfinance institutions has reflected ambivalence.

3.5.3 Project Sustainability Plans

During the remaining project years, PfD is planning to focus on building the direct link between processing companies/exporters and the market, especially the most promising regional markets in West Africa (e.g., Nigeria). PfD is also prioritizing to help more processors with the certification processes such as HACCP and ISO 22000. These plans correspond with the interviewed processors' needs as receiving market information and linking with buyers are two of their biggest acknowledgements of PINEX support as well as other communicated needs from the project. The help to build the direct link between processors/exporters and market (buyers) will benefit all the value chain actors in the long run.

To develop the trade to Nigeria, PfD is planning to hold a three-day trade conference in Benin in the latter part of 2019 which would seek to create at least incremental progress in rationalizing trade between Benin and Nigeria in the pineapple value chain.

PfD is also thinking about incubating a one-stop service management consulting firm that will hire one of the program officers to be the manager of this consulting firm. This firm will not compete with the associations but help them to grow, catalyze investment, and strengthen the entrepreneurial ecosystem.

3.6 Challenges Identified by the Beneficiaries and Suggestions

3.6.1 Market Challenges

The government voluntarily banned pineapple export in December 2016, due to ethephon problem, which created operational problems for exporters. The ban also weakened the identity of the Benin pineapple in the international market and the profitability of the industry. The problem trickled down to the farming communities, resulting in rotten pineapples in the fields of those depending on this market. Though the ban was lifted in August 2017, the exporters and other stakeholders are

struggling to regain market share. Nearly all exporters (six of the seven exporters interviewed) discussed the difficulties because of the ban they faced in exporting. Even if the producers and exporters get GLOBAL G.A.P. certification it may take some time to regain the export market in Europe. Four of the exporters and stakeholders interviewed asked PINEX to assist in exporters' recertification efforts to regain their foothold in the global market.

All key pineapple value-chain actors clearly indicated that they have been operating without formal contracts, which has forced them to remain uncertain about the terms of the agreements. Verbal contracts and agreements are often not followed properly. Processors discussed this difficulty as being most prevalent with the transportation of raw and processed goods. They suggested PINEX assist them with writing and/or reviewing more formal contracts with producers and other vendors. Additionally, market information was not readily and formally available to these actors. Access to regional and international supply chains is limited for producers, which compels them to sell their produce in small neighboring markets, with low negotiation power and marginal profits. The majority of all actors interviewed discussed increasing markets as both a challenge and an opportunity for PINEX to assist in the sustainability of the Benin pineapple industry in the project's final years.

Selling pineapple juice in the local market is also difficult as it is expensive compared to other juices and drinks. The highly competitive market also limits producers' profit margins. Processors are less knowledgeable about balancing the supply of their products with the demand of the local, national, and regional markets.

3.6.2 Raw Material Supply Challenges

There are difficulties in the availability of quality pineapple throughout the year, primarily due to the variation of production seasons and producers' preference to produce in certain seasons, affected by weather and climate. At the time of low production, pineapple is expensive. Processors and exporters, at times, encounter supply difficulties with producers due to lack of contracts and lack of available quality pineapple. Processors and exporters are also not able to help producers access credit or loans to make sure that the producers supplied their products on time. Processors and exporters experience delays in the delivery of pineapple supplied by producers.

3.6.3 Production Challenges

Shortage of the means of production (e.g., pineapple-specific fertilizer, labor, and water) and inadequate practical knowledge and skills about improved cultivation have been limiting factors to increasing the quality and quantity of pineapple production. Also, based on the discussion with PfD staff, with the launch of new airport construction, many producers had to return the public land in that area, which is suitable for (and also has been under) pineapple cultivation thereby limiting their ability to grow and produce pineapple. Pineapple farmlands are mostly rain-fed, making producers more vulnerable to crop yield in drier seasons due to erratic rains.

Many processors operate at a lower scale than they have hoped, due to their limited capacity to access efficient equipment. They shared that they have been operating year-round, including holidays, in an attempt to meet demand. Though they discussed making incremental progress over

the last three years in their ability to process pineapple into different products, some stated they are not able to meet the market demand or to increase quality or quantity of product due to the lack of proper equipment. Individuals did not specify what specific equipment was lacking during the interviews.

3.6.4 Transportation and Storage Challenges

Transportation of pineapples in the sub-region and the neighboring country (e.g., Burkina Faso) is challenging (e.g., coinciding transportation time with the supply time) and expensive. A few producers discussed that pineapples are damaged during transport due to rough roads, poor handling, and lack of proper packaging. This damage results in a loss of profits and products, and potentially future customers. Many processors face transportation challenges when bringing pineapples to and from their facilities, sometimes because contracted drivers are unreliable and costly. Exporters discussed challenges relating to export transportation, such as boats and planes. Their challenges include unreliable flights, high cost, and lack of cold storage rooms at the airport. While PINEX and other stakeholders have begun assisting in constructing cold storage at the airport, exporters are requesting continued support in negotiating and addressing these transportation issues.

3.6.5 Packaging Challenges

Exporters prefer wooden pallets for shipping to transport their pineapple safely. However, there is a lack of high capacity scanners to scan the entire wooden pallets of pineapple when it arrives at the fret zone of the airport. Pineapple scanning is currently done via one cardboard box of 12 pineapples, which results in more damage while scanning/handling. Processors discussed new juice packaging bottles that need to be imported and are either not readily available on the market or expensive when available. Therefore, processors clean and reuse old bottles, which is difficult, non-hygienic, and time-consuming.

3.6.6 Capacity-Building and Information Challenges

Though PINEX has extensively conducted commendable trainings in cascade model, there are still challenges to provide all the pineapple producers with adequate, locally suitable knowledge and skills. As most of the producers are illiterate or less educated²⁶ and they have been using traditional cultivation practices for a while, it is challenging to make the capacity-building efforts effective and introduce new cultivation practices as local people at times are not ready to abandon their traditional practices. Also, there is not a pineapple-specific vocational training center or vocational educational program that is accessible to the producers and the factory workers.

Producers indicated that they are not able to get accurate, adequate, and complete information about the market partly due to their poor long-standing relationships with processors and exporters. Producers and small processors have limited ability to keep systematic records of their activities, including cost and benefits. Some processors find it difficult to train staff, streamline their

²⁶ A total of 44% surveyed farmers did not have formal education and 29% had only a primary education.

processing line and reduce processing time (some of them are taking 12 hours for processing and want to bring the processing time down to eight to 10 hours).

3.6.7 Financial Challenges

Having reasonable access to working capital (and fixed capital to expand the business) in the form of credit or loans is a challenge for several producers, processors, and exporters. They may not have all the requirements—such as an adequate business plan, clear documentation, and financial guarantee - to access a loan. Also, the interest rate and the level of risks involved in the pineapple value chain is high in relation to the income or profit. Some processors reported that due to lack of operating capital, they are not able to send their products to the northern part of the country, despite having a market in that region. Another challenge is to control the processing costs to be competitive in the markets.

3.6.8 Compliance Challenges

Processors and exporters face administrative issues related to compliance with their certification processes and customs in Benin and abroad.

3.6.9 Waste Management Challenges

Pineapple value chain actors manage their waste in their own conventional ways, which is not efficient and effective. Many discussed having to pay for services to dispose of waste, which is expensive. Few actors have found sustainable options for disposing of waste, while several actors indicated that they are interested in managing their waste in a better, useful, and profitable way, primarily by recycling the waste, and requested assistance with resources to achieve these goals.

4. Recommendations

Based on this evaluation study, the following recommendations are made to help PINEX adapt its future activities to achieve its objectives in increasing agricultural productivity, improving agricultural processing and ultimately expanding agricultural trade, and to sustain the program actions and achievements.

Market and Trade

1. PfD should focus more on expanding the trade of diverse and different pineapple products in the next two to three years by supporting more project beneficiaries to attend more national, regional and international trade fairs.

PfD has achieved great success in building producers and processors' capacity in pineapple cultivation and processing. The average harvest quantity of pineapple per hectare of pineapple cultivation land was significantly higher in the last pineapple cultivation season (29.15 metric tons per hectare) than the average in 2016 (10.98 metric tons per hectare).²⁷ PfD has either fully achieved

²⁷ Different from this mid-term evaluation baseline results, PfD's independent baseline report in 2016 indicated a yield per hectare of 24.29 metric tons. A few contexts need to be kept in mind when interpreting the result of the average harvest per hectare of pineapple cultivation land in 2016 from this evaluation. First, 92% of total surveyed producers

or at least achieved 70% of its end of project targets on the number of individuals who received a diversity of trainings indicators. Eight out of 10 indicators related to the goal of increasing use of improved agricultural techniques and technologies have been at least 70% achieved. Yet indicators related to expanding trade are still below 50% of achievement.²⁸ For example, only two national and regional market forums have been attended by project beneficiaries, which is lower than half of the end of project target (seven). Value and volume of fresh pineapple sales by exporters have not increased compared to the baseline which is mainly due to the impact of the export ban of the fresh pineapple to European market and that regaining the market share takes time and is difficult. PfD has supported project beneficiaries to attend eight national, regional and international trade fairs, while the end of project target is 26. 20 out of 29 interviewed processors and five out of seven interviewed exporters highlighted the positive impact of attending trade fairs on networking with potential buyers and developing new market. Based on one interview with PfD staff, PfD is also planning to focus on connecting producers and processors directly with market in the remaining project years. Focus on expanding the trade in next couple of years by supporting more project beneficiaries to attend more national, regional and international trade fairs will connect more production with trade and increase individual profits of pineapple business.

2. Pay extra attention to increasing market access, especially West Africa market, and building linkages between sellers and buyers in the next few project years. This will include two steps. Step 1. Conduct a market research study to figure out the appropriate target international market and then share the results with exporters and let exporters understand their strengths, weakness, opportunities and challenges exporting to different international markets and explain why West Africa regional market is more effective and valuable. Step 2. Organize and facilitate more regular workshops and business meetings across the West Africa region, particularly between Nigeria and Benin, and bring together a wide range of stakeholders (e.g. business associations, policy makers, donors, International organizations and non-government organizations, etc.).

Based on the interviews with PfD staff, they shared difficulties in competing in the European market or entering the open US market in the near future as there are so many competitors, e.g., Dole or Del Monte. In addition, the transportation costs are very high for fresh pineapple. PfD staff is more positive about the regional market in West Africa, especially the Nigerian market, which

have 0.25 to 2 hectares of pineapple cultivation land. The average harvest per hectare might be higher if more big pineapple producers are selected. Second, it's the average harvest per hectare of pineapple cultivation land instead of pineapple harvest land. Third, evaluators asked producers to indicate their average harvest per hectare of pineapple cultivation land in 2016 directly rather than the total harvest in 2016. Therefore, producers might not have a good estimate of the average harvest per hectare of pineapple cultivation land directly.

²⁸ As mentioned earlier in the report, much of 2016, the first full year of the project, was to set up systems, and thus for many indicator results for that year could be close to zero or at zero. There would thereafter be a steady ramping up of results as systems become more mature and success builds upon itself. In addition, based on one interview with PfD staff, there is a high chance that the project will have a no-cost extension for one year, which means that there are essentially three more years beyond 2018. Therefore, PfD still have at least medium chance to achieve its end of project. Please refer to more details in Section 3.1.1 Level of Achievement of Objectives and Targets.

currently accounts for 40% of the sales of fresh pineapple. In addition, based on the exporter interviews, exporters could not identify actionable target clients for their business and instead would like to expand their business as far as possible, e.g. beyond Europe to Asian countries and the United States. Such misalignment in target market expansion strategy is counter-productive and should be addressed quickly. No systematic market research has been done to study if West Africa is a viable market. PfD should conduct a market research study to compare the potential demands and economic costs and benefits of the West Africa market compared to other international markets and select the appropriate target markets. Then PfD should share the market research results with the exporters and explain why the West Africa regional market is more valuable.

Exposure of pineapple market information leads to increased market access. However, the FAIS performance report suggests that 1,228 individuals accessed the pineapple market information as a result of USDA assistance in FY 2017 and FY 2018, which is lower than its end of project target (i.e. 5,275). Since the West Africa market, particularly Nigerian market will be the main target of market expansion, organizing and facilitating more regular business meeting and workshops between Nigeria and Benin will help value chain actors have more access to the pineapple market information and incubate potential business opportunities.

3. Diversify the pineapple product market or facilitate producers' entry into markets using pineapple as an input of a product, for example, dried pineapple, fruit cocktail, pineapple cake or bread, and juice cocktail markets, or organic trade fairs, so that they can avoid dire competition among the recently glutted international market.

Currently the main pineapple product sold and exported is fresh pineapple in Benin. For example, the value and volume of fresh pineapple sold by producers dominated the sales in FY 2017 and FY 2018 (the value of sales of fresh pineapple sold by producers have increased by four times in FY 2018 (\$26, 838,748) compared to the 2015 baseline (\$5,324,375), which has achieved the end of project target). Yet the value and volumes of sales of pineapple juice sold by processors are lower than the end of project target (e.g. only 29% of the volume of pineapple juice were sold by processors indicator has been achieved up to now compared to the end of project target 54,295 metric tons). These findings indicate that the dominant pineapple product is fresh pineapple. However, more market research has demonstrated that there is an oversupply of fresh pineapple and a trend of low prices and low demand in the European market as well as sufficient supply in other international markets.²⁹ Thus this makes the competitive demand for Benin fresh pineapple harder. PfD should conduct more research on the markets of a variety of products that use pineapple as an input, consider the costs, feasibility and benefits of different pineapple products, and promote production of different varieties of final products to diversify the products within markets, and promote the diversification of such products, derivatives and by-products of fresh and processed

²⁹ Overview Global Pineapple Market, retrieved from <https://www.freshplaza.com/article/2198655/overview-global-pineapple-market/>

pineapple. Experience from other pineapple countries, e.g. Philippines has showed that diversification in pineapple product sales will help increase profits from high-value added products and expand various market access.³⁰ The pineapple co-op in the Philippines developed various pineapple products, e.g. dehydrated pineapples that serve as a counterpart of the famous dried mangoes, all-natural pineapple juice, pineapple jam, jelly, chunks and purees.

Capacity Building

4. To sustain the current expert knowledge, PfD should continue training local associations and government on pineapple related knowledge and technical skills, and continue training local associations and government on how to conduct trainings, prepare materials and follow up after the training to make sure the value chain actors gradually apply the best practices learned from the training.

PINEX has achieved or even exceeded their end of project targets in training government people or local associations (e.g. 81 people, almost five times the end-of-project target, in civil society have received short-term agricultural sector productivity or food security training as a result of PINEX assistance. 10 people in the Benin government have attended short-term agricultural sector productivity or food security trainings (e.g. farm management) as a result of USDA assistance). Based on the interview with associations, they have already co-hosted a few trainings with PfD together and developed a team of technicians who can provide similar technology consulting to their members. PfD can debrief the experience that they gained from co-hosting the trainings with associations and continue training the team of the technicians on how to conduct the training workshop with a large number of producers beyond one-one-one hands-on assistance to scale such trainings which have proved to significantly contribute to know how to produce and improve the quality of pineapple production.

As mentioned earlier, not all trainees apply all knowledge they learned from the workshop immediately. For example, the producer survey showed that 81% of respondents still practiced intercropping in the last pineapple cultivation season. PfD should also train the associations on how to follow up with producers who attend the training on a regular basis and help develop a follow up plan (e.g. the frequency of follow up and answer questions if they have when applying the technologies).

5. Invite producers to visit and observe pineapple farm of those who have successfully applied improved technologies and techniques.

Studies have shown that farmers attitudes have a positive correlation with farmers' intents to implement improved technologies or techniques.³¹ If farmers are aware that applying improved

³⁰ Diversification Lead Pineapple Cooperative to Success, retrieved from <https://www.bar.gov.ph/index.php/digest-home/digest-archives/765-2014-2nd-quarter/5910-diversification-lead-pineapple-cooperative-to-success>

³¹ Menozzi, D., Fioravanzi, M., & Donati, M. (2015). Farmer's motivation to adopt sustainable agricultural practices. *Bio-based and Applied Economics Journal*, 4(1050-2016-85714), 125-147.

technologies or techniques will help them improve their profits and productivity, they will be more likely to apply the techniques or technologies. Evaluation findings showed that not all producers who have attended the trainings applied improved techniques or technologies, e.g. 81% of the total 768 surveyed producers are still intercropping instead of monocropping. Therefore, by inviting producers, especially small producers to observe and visit other farmland that have successfully applied improved technologies and techniques and learn the positive impacts of these improved technologies and techniques on production and profits will be helpful for them to implement improved technologies. We know that if technology and techniques are used, the quality of pineapple production will not only increase, but so will scale as this is how Dole and Del Monte or other private companies achieve scale in low cost countries.³²

6. Continue raising awareness and increasing application of improved techniques or technologies, especially business management training, new processing techniques, and safety and certification training for small processors.

24 of 29 processors highlighted PfD's training on processing techniques, business management, and hygiene. Processors also suggested PINEX provide training on business management, which can help them make their businesses profitable and sustainable.³³ Additionally, they recommend continuing to provide processing-related technical training, especially to those who are transitioning from artisanal to industrial processing and operating at a small scale. Though there could be some initial resistance from the artisanal processors to some extent, a continued effort in motivating them and building their capacity for efficient processing would be helpful. PINEX's continued follow up support which accompanies the processors until the activities are completed (e.g., certification process audit) was well received and appreciated by processors, thus PINEX may want to continue its efforts on such front.

Outreach Activities

7. Do more research on how to make more effective use of the radio program to advertise outreach events and trainings and share production and market information with broader audience.

Based on producer survey results (n=768), the top five sources of information for pineapple cultivation practices rated by the surveyed producers are PINEX project (87%), friends/family/neighbor (59%), cooperative (17%), farmer association (17%) and Radio (13%). The top five sources of market information rated by the surveyed producers are friends/family/neighbor (68%), buyers/traders (44%), PINEX project (39%), cooperative (15%), farmer association (14%) and radio (7%). These findings suggest that the word-of-mouth and radio are the top two ways to

³² Bartholomew, D. P., Hawkins, R. A., & Lopez, J. A. (2012). Hawaii pineapple: the rise and fall of an industry. *HortScience*, 47(10), 1390-1398.

³³ Many articles have also discussed the positive correlation between business management training and business performance and profits in the pineapple industry. For example, Mugonola, B., & Baliddawa, C. (2014). Building capacity of smallholder farmers in agribusiness and entrepreneurship skills in Northern Uganda. *Agricultural Information Worldwide*, 6, 122-126; Danielou, M., & Ravry, C. (2005). *The rise of Ghana's pineapple industry*. Africa Region Working Paper Series 93. Washington DC: The World Bank, Africa Region.

share information. Given the low literacy rate in the local area and the fact that TV and other technologies are not popular, radio is an appropriate media outlet for advertising. In addition, radio is one of the cheapest and most accessible forms of advertising besides word-of-mouth in rural and remote areas. According to a BBC study, radio is the main source of information particularly in rural areas of Benin because of its use of local languages.³⁴ Therefore, evaluators recommend that the program should continue using radio as a medium to advertise and share information, but might want to do more research on how to make more effectively use radio (e.g. use prime time, frequency of the advertisement) in order to reach a larger audience.

Input Supply Chain

8. PfD should explore the best ways to create a local market of input supplies e.g. lobbying government to build input supply production and market.

In Benin, a lack of market of input supplies greatly halts the quality and yield of pineapple production. Ten out of 29 interviewed processors mentioned the need for local equipment or supplies provided to the market and automated processes for pineapple processing, particularly juice production so as to reduce the processing costs and achieve a higher quality juice. Ten interviewed processors identified the challenges of no packaging materials, e.g. new bottles for pineapple juice. The exporters also mentioned the lack of cardboard for packing fresh pineapple to export. Only one third of the surveyed producers (n=768) felt the support on connecting them with input supplies (e.g. planting materials and fertilizer) has been moderately or very useful. PINEX may lobby the state for the establishment of a local market for acquisition of processing equipment, instead of importing from overseas, which cannot be afforded by most processors and exporters. PfD should also discuss the challenge of lacking a local pineapple specific fertilizer market and high cost of pineapple specific fertilizer during the PFC meeting and leverage any existing resources to improve the input supplies, especially the support from Benin government. For example, Benin government can import and provide pineapple specific fertilizer and cover the cost, but then deduct the cost at the point of supply after the harvest and sale.³⁵ To pay extra attention to improve the input supplies will help improve the quality of the pineapple and expand trade, e.g. pineapple specific fertilizer is very critical to quality and yield of pineapple.

Certification

9. Instead of one by one coaching, PfD should host a larger workshop so that they can have reach to broader audiences on certification application training. Then PfD can develop a video or audio recording of the application procedure to sustain the knowledge.

One agricultural product has been certified as meeting international standards with USDA assistant compared to three as the end of project target. There are only 164 GLOBAL G.A.P. certified producers correctly applied GLOBAL G.A.P. standards compared to 600 as the end of project target. One of the top three challenges identified by interviewed processors is lacking certification to

³⁴ Benin profile-Media. <https://www.bbc.com/news/world-africa-13040368>

³⁵ Ghana shared similar experience: <https://www.idhsustainabletrade.com/block-farm-model-for-pineapple-production/>

expand quality trade and export. These certifications (e.g., GLOBAL G.A.P., HACCP, ISO 22000, organic product, and fair-trade) are crucial not only for good agricultural practices, food safety and hygiene, and fair trade but also expanded and continued export to new markets. PfD is also prioritizing to help more processors with the certification processes such as HACCP and ISO 22000. To save time for PfD to coach more than one value chain actor at a time, PfD can host a hands-on workshop or a training to multiple producers, processors or exporters on how to apply for a specific type of certification. PfD can record the training and share it as a sustainable resource by playing the video as many times as needed in front of different groups of audiences, thus not only can they reduce the personnel costs to conduct the in-person training in the future, but maybe also record such verbally and play such over the radio to reach more audiences. Small processors indicated that the certification cost is very high for them (e.g., can cost up to 6 million XOF, approximately 10,000 USD). PINEX can consider supporting the cost in certification and renewal processes so all key pineapple value chain actors, especially small-scale actors but then deduct the costs after they make profits.

Financial Sector

10. Show cases of people who get loans and successfully use the loans to expand their business. Organize a peer-experience sharing meeting so that people can hear from their peers about how they use the loans, learn about the risks and how they manage these risks yet repay the loans. Take producers or processors to visit those successful cases and see how successfully processors and producers use loans and what they produced with the financing from the loans.

Only 13 out of the 28 interviewed processors mentioned that they have received a loan from microfinance institutions. Up to now, only 72 processors have received financial services as a result of USDA assistance, which is only 10% of the end of the project target. 918 loans were disbursed as a result of USDA assistance, which only accounts for one third of the end of project target. The end of project target of indicators of values of loans provided to producers and processors are only 30% or lower achieved. Nine out of 20 interviewed processors openly discussed the challenges they were facing and when they did, they mentioned the financial inability to grow or satisfy the market because of a lack of education about loans; Ten interviewed processors mentioned the inability to increase quality or quantity due to the lack of efficient equipment; ten interviewed processors mentioned the difficulty of getting new bottles in Benin and that they cannot afford to import the bottles. All these major challenges identified by the interviewed processors are related to funding combined with market challenges related to access to affordable equipment and supplies as mentioned in the prior section. Yet interviewed processors and surveyed producer indicated that the biggest hurdle preventing them from using the financing accessible to them is the high perceived risks and lack of education. Therefore, by helping to education and showcase people who get loans and successfully expand their business by using the loans might be helpful to relieve the perceived risks and motivate people to use financial services.

11. PfD should consider various options in supporting sustainability of PINEX, which could include, but not be limited to, engaging a local consultant to monitor and facilitate the financial partnership with microfinance institutions, continuing to strengthen key partners such as the producer and processor associations, and/or incubating a small management consulting firm that could provide fee-based services to key actors in the pineapple value chain.

Ten out of 20 interviewed processors who mentioned financial services highlighted the financial support especially the connection that they made with the microfinance institutions and the lack of automated equipment due to the budget constraints to expand the processing. The producer focus group highlighted the high fertilizer costs and input supply costs. Given the current low achievement in increasing access to financial capital or the lack of education around how to use such, it is expected that PfD may need another couple of years support in this area. Engaging a local consultant to monitor and facilitate the financial partnership with microfinance institutions, further strengthening of current key partners, or incubating a local, small business to provide services will help the pineapple value chain actors enhance the financial capacity to continue and/or increase their production, processing and trade efforts in the long term by better understanding financing arrangements and how it can be attributable to economic decision-making as it relates to scale and production. PfD has successful experience in using this method in another program where this part-time financial consultant has helped successfully continue the support after the program ends.³⁶

Sustainability

12. Sustain the program by making the Benin government take more ownership of the project initiatives and create a national task force to sustain the activities.

As mentioned by the interviewee from Benin Ministry of Agriculture, they want PfD to help create a sustainability plan of pineapple development together with the Benin government. PINEX should also support the Benin government to take more ownership of the project initiatives for sustainability. Other cases with successful pineapple development, e.g. Ghana has demonstrated the importance of the government support in pineapple development (e.g. on training, input supply, marketing, getting pineapple product certified) with and/or after international non-profit organization assistance.^{37 38} In addition, a PfD interviewee mentioned that the US government (USDA, USAID, U.S. Embassy, etc.), under its “whole of government” approach, should consider asking the Benin government to prioritize or increase their spending in strengthening the agricultural sector, specifically ensuring adequate budgeting for Ministry of Agriculture Extension Officers.

³⁶ PfD staff shared that, after they closed their office and operations in Bosnia and Herzegovina, they retained their former local accountant as a part-time consultant in Bosnia and Herzegovina in 2010 to help PfD monitor loans that were still outstanding to Bosnian microfinance institution partners.

³⁷ Badu-Gyan, F. (2015). Factors affecting adoption of alternative pineapple production systems in Ghana (Doctoral dissertation, University of the Free State).

³⁸ Ravry, C., & Danielou, M. (2012). The rise of Ghana's pineapple industry: from successful takeoff to sustainable expansion.

These key staff participants will be important in continuing to provide technical assistance to those in the pineapple value chain following the end of PINEX to help ensure financial and operational sustainability long term. In this regard, perhaps the USG can use its leverage via the current Millennium Challenge Corporation Benin Compact.

Appendix I: Terms of Reference



(VIA ELECTRONIC MAIL)

04 December 2018

Traci Shirachi
CEO/President
SmartStart Evaluation & Research
4482 Barranca Parkway, Suite 220
Irvine, CA 92604

Dear Ms. Shirachi:

Based on the SmartStart Evaluation & Research (hereinafter “SmartStart” or “the company”) proposal of October 14th, 2018 in response to the October 2nd Request for Proposals from Partners for Development (PfD) we are pleased to offer your company a contract to perform an independent midterm evaluation of the Pineapple Processing for Export (PINEX) project in Benin, West Africa. Terms and conditions of the contract are outlined below. Please sign the contract and email a copy and mail one original back to our address. The offer remains open for four calendar days after which time it is automatically withdrawn.

1. Purpose and Cost of Contract: This contract is executed in order to complete a midterm (interim) evaluation of the PINEX project, implemented by PfD and core-funded by the U.S. Department of Agriculture (USDA). The evaluation shall be completed as described in the SmartStart Proposal and per the agreed upon Timeline – refer to Annexes One and Four, respectively, in this regard. Cost of the contract shall not exceed \$95,106.

2. Contract Documents: The entirety of this contract also includes the following annexes:

Annex One: Request for Proposals from PfD, 02 October 2018
Annex Two: SmartStart Proposal from 14 October 2018
Annex Three: SmartStart Final Budget, dated 29 November 2018
Annex Four: Resumes of Key Personnel: Luintel, Sanders, Ouedraogo, and Gulati.
Annex Five: Timeline for Performance of the Evaluation
Annex Six: Three references from SmartStart
Annex Seven: SmartStart Policy on Informed Consent

3. Necessary Information: This shall include, but not necessarily be limited, to: USDA guidance on monitoring and evaluation; project information such as Grant Agreement, Progress Reports, Baseline Survey, and raw data. For ease of access to information, PfD will create a Google Drive or One Drive within five business days after signing of the contract.

4. Key Points of Contact: For PfD: for field work and draft report, Cynthia Taha, Benin Country Program Director, or her designate; for contract matters, Jack Marrkand, Executive Director, or his designate. For SmartStart: Dr. Sanders for the field work phase; Dr. Luintel for report completion; and Traci Shirachi, for contract matters.

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5. Payments: PfD will wire funds to SmartStart as follows:

5.1 Ten percent (10%) of the contract cost as an advance within five working days after execution of the contract.

5.2 Sixty percent (60%) of the contract cost on submission of First Draft of Evaluation Report.

5.3 Thirty percent (30%) of the contract cost on submission of and acceptance by PfD of the Final Evaluation Report.

6. Expenses: SmartStart agrees to keep detailed records of its expenses for the evaluation, including timesheets and out of pocket costs, and agrees to provide such on request by PfD or USDA. Any expenses that PfD might pay on behalf of SmartStart – such as hotel room and tax or car transport in Benin -- shall be deducted from the overall contract value, and PfD shall provide a detailed accounting and receipts of such to SmartStart, if requested.

7. Commitments: SmartStart agrees not to commit PfD either programmatically or financially in any manner without first consulting PfD

8. PfD Mission: SmartStart agrees to abide by PfD's humanitarian mission of providing appropriate relief and development assistance without regard to race, religion, ethnic group, political belief, or sex.

9. Confidentiality: SmartStart acknowledges that during this contract period, PfD will make available certain financial and technical information pertaining to staff and the organization or documents that are private property of PfD ("Confidential Information"). During and after the contract period, the company shall not be allowed to use (unless it is for the purpose of the services stipulated in this contract), divulge or to make available to any third-party, confidential information given to it without prior approval from PfD. SmartStart agrees to return all confidential information in his possession as promptly as possible to PfD at the conclusion of the contract.

10. Proprietary Rights: All work produced during this assignment remains the property of PfD and cannot be released without permission from PfD.

11. Waiver and Indemnification: SmartStart acknowledges and agrees that the work of PfD may involve personal risk, danger and mental stress. Therefore, SmartStart agrees not to hold PfD or any of its officers, directors, or employees responsible for any bodily injury, death, or property damage experienced by any of its employees or consultants in the course of activities on behalf of PfD except to the extent covered by applicable insurance.

SmartStart shall defend and indemnify PfD and its directors, officers, employees, and stakeholders from and against all allegations, claims, actions, suits, demands, damages, liabilities, obligations, losses, settlements, judgments, costs and expenses (including without limitation attorneys' fees and costs) which arise out of, relate to or result from any act or omission by SmartStart.

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12. Termination: PfD may terminate this agreement as a result of unsatisfactory performance or for other reasons. If possible termination would be due to unsatisfactory performance per the terms and conditions of this contract then PfD would provide at least one calendar week's notice of such intent but provide SmartStart with three business days to correct any noted deficiency.

13. Applicable Law: This contract and its execution and its interpretation are governed by the laws of the State of Maryland, USA.

14. Force Majeure: Neither PfD nor SmartStart shall be responsible for failing to provide the services in this contract should events or circumstances beyond the control of either party occur and which could include but not necessarily be limited to Acts of God (floods, hurricanes, etc.) or civil strife, war, or terrorism.

15. Notices: Notice to request a change in the contract terms should be made to or by the Executive Director for PfD or to or by the President/CEO of SmartStart.

16. Other: Use of space within the PfD/Benin office by SmartStart representatives during the field work in January 2019 may be possible on request by SmartStart to the PfD/Benin Country Program Director.

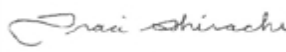
PfD looks forward to working with SmartStart on this evaluation.

Please contact me with any questions.

Sincerely,



Jack Marrkand
Executive Director
Partners for Development

Agreed to by SmartStart:  Date: _____

Print Name and Title: _____

Appendix II: Evaluation Team Members and CVs of Lead Evaluators

Team member	Overall role	Specific roles	Report to
Harisharan Luintel	Evaluation Director	Overall lead and direction of the evaluation, Desk review, Inception workshop, Inception Workshop report, Instrument design and development, Field work monitoring, Data analysis, and Report writing.	SmartStart Directors and CEO and PfD
Catherine Sanders	Field Team Leader	Participate in Inception Workshop, Lead field work, Coordinate with PfD Benin and SmartStart during the field work, Mobilize CRAD survey team and Zakaria to collect survey data, Together with Zakaria, conduct FGDs (4) – based on similar characteristics such as women, youth, low socio-economic status people, and scale of cultivation whichever make sense and feasible, Together with Zakaria, conduct interviews (30 processors; 8 exporters; 5 key informant producers; 9 other stakeholders) – other stakeholders include: PfD staff, three private sector associations, Pineapple Stakeholders' Council (PSC), MOA, financial and microcredit institutions, other related government institutions, and other relevant development partners Record/document all information, Take photographs where possible (e.g., pineapple production sites, processing sites, local market stalls, storage, shipping facilities) and write observation notes during the field visit, Share interview/FGD notes and all other documents, Contribute to qualitative data analysis, Review report.	SmartStart CEO, Evaluation Director, and PfD Benin
Kajal Gulati	Agricultural Economist	Conduct desk review, Design and develop survey instrument, Design data analysis plan, Contribute to reviewing and finalizing FGD and interview protocols, Prepare survey data analysis framework/plan, Participate in Inception Workshop,	Evaluation Director and IMPAQ Directors

Angelos I Deltsidis	Subject Expert	Contribute to Inception Workshop report, Conduct desk review, Design and develop interview and focus group protocols, Contribute to reviewing and finalizing survey instrument, Prepare interview data analysis framework/plan, Participate in Inception Workshop, Contribute to Inception Workshop report, Contribute to data analysis and report review/finalization.	Evaluation Director
Zakaria Ouedraogo	Field manager	Under guidance of Catherine: Conduct enumerator training in consultation with Catherine and CRAD team, Help test the questionnaires and make it locally relevant, Day-to day supervise CRAD's work and provide necessary support to ensure that the data are collected as intended, Daily report to Catherine and provide support to her if needed, Together with Catherine, conduct FGDs (4), Together with Catherine: conduct interviews (30 processors; 8 exporters, 5 key informant producers and 9 other stakeholders) – other stakeholders include: PfD staff, three private sector associations, Pineapple Stakeholders' Council (PSC), MOA, financial and microcredit institutions, other related government institutions, and other relevant development partners Record/document all information, Take photographs where possible (e.g., pineapple production sites, possessing sites, local market stalls, storage, shipping facilities) and write observation notes during the field visit, Share interview/FGD notes and all other documents, Provide necessary information to understand the data and/or context after completing the field work.	Field Team Lead, Evaluation Director, and IMPAQ Directors
CRAD	In-country data collection partner	In guidance of, consultation with, and support of Catherine and Zakaria: Recruit qualified enumerators, Organize tablets and survey software, Organize and conduct enumerator training (2-4 days), Upload the survey in the tablet, Test the survey questionnaires and help make the questions locally suitable, Conduct survey of 768 randomly selected farmers	Field Team Lead, Field manager, Evaluation Director, and SmartStart CEO (enumerators report to

		located at 8 municipalities, 16 districts and 64 villages/clusters in Antlantique province, Ensure that all collected data is good quality and in good order, Take photographs where possible (e.g., pineapple procedures, production sites, land management techniques, cultivation and harvesting techniques/ process) and record those with proper caption, Ensure that all enumerators write short observation notes, preferably on daily basis during the field visit to capture their insights, reflection, and new information they gained during data collection (that are not captured in the survey questionnaires), Report to Zakaria/ Catherine on daily basis about the progress, Share the data with Hari every other day.	survey supervisors, survey supervisors report to Field Team Lead, Field Manager, and Evaluation Director)
Megan Key	Data Analysis	Analyze the data, primarily qualitative data (interviews, FGDs, and open-ended survey responses), Support quantitative data analysis, Help draft report.	Evaluation Director

Evaluation Director: Harisharan (Hari) Luintel, PhD

4482 Barranca Parkway, Suite 220
Irvine, CA 92604

October 2018

Education

Degree	Major subjects	Institution	Year
Ph.D.	Earth, Environment and Society	Portland State University	2016
Post Graduate Diploma	Forestry Management	Indian Institute of Forest Management	2002
B. Sc.	Forestry	Institute of Forestry Nepal	1996

Select research, and publications

Luintel H, Bluffstone RA and Scheller RM. 2018. The effects of the Nepal community forestry program on biodiversity conservation and carbon storage, *PLOS ONE*, 13(6):1-19.
<https://doi.org/10.1371/journal.pone.0199526>

Luintel H, Bluffstone RA and Scheller RM. 2017. The Effect of the Nepal Community Forestry Program on Equity in Benefit Sharing. *Journal of Environment and Development*, 26 (3): 297–321.

Luintel H, Silori CS, Frick S and Poudyal BH. 2013. Grassroots Capacity Building for REDD+: Lessons from Nepal. *Journal of Forest and Livelihood*, 11(2): 1-13.

Patel T, Dhiaulhaq A, Gritten D, Yasmi Y, Bruyn T D, Paudel N S, Luintel H, Khatri D B, Silori C and Suzuki R. 2013. Predicting Future Conflict under REDD+ Implementation. *Forests*, 4, 343-363.

Luintel H and Bhattarai B. 2006. Exploring Priority Problems of the Forest Dependant Poor in Nepal. *Journal of Forest and Livelihood*, 5(1):1-13.

Luintel H. 2006. Do Civil Society Organizations Promote Equity in Community Forestry? A Reflection from Nepal's Experiences. In S. Mahanth, J. Fox, M. Nurse and L. Mclees (Eds), *Hanging on the Balance: Equity in Community-Based Natural Resource Management in Asia*, pp 122-142. East-West Centre and RECOFTC, Bangkok.

Timsina NP, Luintel H, Kattel S, Chapagain A and Ghimire K. 2008. *Review Report of Livelihood and Forestry Programme's Mid-West Partnership Programme*. ERI and LFP/DFID Kathmandu, Nepal.

Luintel H and Timsina NP. 2008. *How Effective is the Community Forestry in Recognizing Women as Empowered Agencies? A research report on "Decentralization and Promotion of Women's Rights in Nepal: Exploring Constraints, Opportunities and Intervention Avenues"*. ForestAction and IDRC.

Chhetri RB, Luintel H and Regmi R. 2006. *Pre Mid-Term Review of Animation and Social Mobilisation Programme implemented by Livelihood and Forestry Programme*. ERI and DFID Nepal.

Banjade, MR; Luintel, H and Neupane, HR 2004. Action Research Experience on Democratizing Knowledge in Community Forestry in Nepal. In H. Ojha, N. Timsina, R. Chhetri and K Paudel (Eds), *Knowledge Systems and Natural Resources: Management, Policy and Institutions in Nepal*, pp 110-134. Cambridge University Press India Pvt. Ltd. New Delhi.

Editor: Journal of Forest and Livelihood, Vol 13(1), Vol 11(2), Vol 10(1), Vol 8 (2), Vol 7(1) and Vol 6 (2).

Reviewer: Journal of Forest and Livelihood, American Journal of Experimental Agriculture, Forest Science, Forest Policy and Economics, Peer J, PLOS ONE.

Professional Experience

Senior Evaluator at SmartStart Evaluation and Research July, 2017- Present

- Lead the theoretical and methodological design of evaluation and research projects, including meta-analysis, quasi experimental evaluation designs and logic models, outcome metrics, and evaluation instruments preparation;
- Lead and manage an evaluation/research team to conduct evaluation and/or research on multiple nationwide and/or international projects related to natural resources politics, governance and conflict.
- Collect data through surveys, focus groups, interviews, field observation, and direct measurement;
- Analyze data using both quantitative and qualitative analyses techniques;
- Write reports using innovative, user-friendly visuals.

Visiting Scholar at Portland State University Sept., 2016- Jun, 2017

- Publish 4-5 scientific papers using information from a World Bank sponsored project on “Community Forestry as a Pro-poor Carbon Sequestration Policy” by collaborating researchers from USA and Nepal.

National Coordinator at RECOFTC Nov. 2009-Oct. 2012

- Planned, organized, coordinated and implemented the REDD+ capacity building activities in Nepal;
- Prepared capacity building needs assessment reports, and informational/educational/communication materials;
- Conducted research in REDD+ and conflict, community forestry governance and timber trade in community forestry;
- Mobilized mass communication media for awareness raising on climate change and REDD+.

Researcher at ForestAction Nepal Apr. 2002-Oct. 2009

- Prepared concept notes and project proposals for research projects in collaboration with national and international organizations and Universities and secured funds.
- Led, managed and contributed in multi-partner collaborative research projects on:

- experimentation of participatory knowledge generation process at community institutions to address natural resource related concerns;
- assessment of women's inclusion in forest decentralization processes;
- assessment of indigenous knowledge in biodiversity conservation;
- analysis of policy and regulations for local natural resource governance;
- assessment of tenure security and rights of forest dependent people in Nepal;
- identification of priority problems of forest dependent poor;
- Provided technical support to National Planning Commission and Ministry of Forest and Soil Conservation to prepare Forestry Sector's Three-Year Interim Plan 2011-2013;
- Created networks and built strategic alliances with civil society organizations for policy advocacy to secure community rights over natural resources;

Forest Ranger at Department of Forest
1998

Feb. 1992-Jul.

- Planned, implemented, supervised and monitored community forestry development programs;
- Facilitated Community Forest User Groups in preparing forest management plans;
- Conducted forest survey, forest inventory, and social survey and prepared reports;
- Established forest nurseries; carried out plantations and forest management practices;
- Conducted training, workshop and study tours for capacity building of forest-managing communities;

Professional training

Community Forestry Orientation and Management Training

Conflict Resolution in Community Forestry

Free Prior Informed Consent Training

Leadership Training

Language

Language	Reading	Writing	Speaking	Understand
English	Excellent	Excellent	Excellent	Excellent
Hindi	Good	Good	Fair	Good
Nepali	Excellent	Excellent	Excellent	Excellent

Institutional affiliation

- Member - The American Association for the Advancement of Science
- Member – Dynamic Ecosystem and Landscapes Lab, Portland State University/North Carolina State University
- Member – Kathmandu Forestry College
- Member – ForestAction Nepal
- Member – Nepal Forester Association

Field Lead: Catherine Sanders, PhD

CATHERINE L. SANDERS

Current Role

Expanding Opportunities, Belfast, ME

Assistant Director and Senior Researcher

May, 2018-Present

Oversee program implementation and evaluation for US and Kenya-based youth programming; grant-writing and reporting; data analysis and interpretation; manage teams in Kenya and US; develop proposals and contribute to learning in the international community; provide thought leadership for Theory of Change and Logic Model for the organization's core pursuits. Manage external evaluation contracts for quasi-experimental and other impact and performance evaluations in Kenya.

Education

Ph.D., Anthropology, emphasis in Medical Anthropology, The University of Montana 2012
National Science Foundation-funded dissertation fieldwork in Humla District, Nepal.
Advisor: Dr. Kimber H. McKay.

M.A., Anthropology, emphasis in Medical Anthropology, The University of Montana 2009
Advisor: Dr. Kimber H. McKay.

B.A., Anthropology, Miami University 2001

Areas of Expertise

Research, Monitoring and Evaluation: use of mixed methods to monitor and evaluate ongoing economic, health, and education needs, risks, and programs in international and national fieldsites; design and implement qualitative and quantitative research and analysis techniques for directed and exploratory research in concert with field teams, using Stata, NVivo, SPSS, ArcGIS, EpiInfo, and Gephi (social network analysis software); manage research assistants in the field and lab settings; synthesize and explain findings to diverse audiences.

Medical Anthropology: Emphasis on the cross-cultural study of environmental health and illness related behavior; socio-economic determinants of health and the anthropology of public health; cultural models of health; health disparities, political ecology and disease; livelihoods and vulnerability; ethnomedicine.

East Africa Ethnology: Fieldwork experience among Kikuyu, Kalenjin, Samburu, Kamba, Turkana, and Masaai peoples of Kenya and Banyankole and Baganda peoples of Uganda; risk and decision-making about livelihoods and healthcare; sustainable community agriculture; community-based healthcare; hospital-community relations and politics; some Swahili and Luganda language comprehension.

Applied Research Experience

Senior Evaluator II, SmartStart Evaluation and Research

July, 2016-

Relevant evaluations: Lead researcher/evaluator for quasi-experimental design studies investigating Government of Kenya evaluation of graduation approaches to livelihood sustainability among poor, rural Kenyans in Samburu and Kitui Districts, Kenya.

Research Affiliate, Social Science Research Lab, University of Montana

Jan, 2016-

Founder and Evaluation Specialist, Asha Consultants

July, 2016

Develop and implement needs assessments, impact and program evaluations, and theory of change evaluations for organizations providing services to communities worldwide, primarily in public health, agriculture, and education sectors.

Research Associate, Adara Development (USA)

July, 2012-

Faculty Affiliate, The University of Montana

Jan, 2016

Design and implement research that investigates program needs, efficiency, and efficacy for the organization's socioeconomic and health aims in northwestern Nepal and Nakaseke District, Uganda field-sites. Conduct yearly fieldwork to keep abreast of local needs and challenges. Manage research assistants in the US, Nepal, and Uganda. Disseminate findings to policy makers and academics in a variety of disciplines and venues.

Relevant ventures in Uganda: Research, monitoring and evaluation of Adara Community-Based Health Care program through Kiwoko Hospital, including antenatal, postnatal, HIV, immunization, disability support, adolescent sexual health, and traditional birthing programs and policies. Use of qualitative and quantitative methods.

Research Assistant, Adara Development

Nov, 2005-

Analysis of social determinants of health and development, innovation efficacy, and social change for remote Nepal & Uganda program sites. Excel, SPSS, and ArcGIS software.

July, 2012

Fieldwork- Dissertation

June, 2009-

Research funded by the National Science Foundation in Humla District, Nepal, investigated local-level responses to resource change, political conflict, and development efforts. Qualitative-quantitative analysis of decision making and risk management in response to rapid social change.

Sept, 2010

Research Assistant, University of Montana, Missoula

Sept, 2007-

Conducted interviews and collected, managed and analyzed data for NIH-funded research assessing the use of the internet in the misuse of drugs for student and non-student populations in Missoula, Montana. QSR NVivo, interviewing, and qualitative analysis of decision making about risks.

April, 2009

Peer-reviewed Publications

- Birney, L., McNamara, D., Sanders, C., Luintel, H., & Penman, J. (2018 *forthcoming*).
 "Curriculum and Community Enterprise for Restoration Sciences: The Expansion and Future of the Model" in *International Journal in Higher Education* 3(4).
- Sanders, Catherine L. and Kimber H. McKay (2014). Where Have All the Young Men Gone? Social Fragmentation during Rapid Neoliberal Development in Nepal's Himalayas. *Human Organization* 73(1): 25-37.
- Sanders, Catherine L. and Kimber H. McKay (2013). The Search for "Strong Medicine": Pathways to Healthcare Development in Remote Nepal Using GIS. *Technology & Innovation* 15: 109-124.
- Sanders, Catherine (2010). Getting more greens from the greenhouse: Opportunities for adoption in remote regions of Nepal. *Contributions to Nepalese Studies* 37(2): 249-260.
- McKay, Kimber, Alex Zhand, Catherine Sanders, and Govinda Nepali. (2007). Responses to Innovation in an Insecure Environment in Rural Nepal. *Mountain Research and Development* 27(4): 302-307.

Selected Grants and Academic Awards

- | | |
|--|------|
| Society for Applied Anthropology, Kushner Travel Award: \$500 | 2012 |
| Bertha Morton Scholarship: \$2000 for tuition and fees through the University of Montana | 2009 |
| National Science Foundation Doctoral Dissertation Improvement Grant, \$14,989 for research on the adoption of development programs in rural, Himalayan Nepal | 2008 |
| Foreign Language and Area Studies Fellowship. \$5000, South Asian Summer Language Institute, University of Wisconsin, Madison, Nepali language studies | 2007 |

References:

- Dr. Kimber Haddix McKay, Professor, Department of Anthropology and School of Public and Community Health Sciences; Kimber.mckay@umontana.edu; (406) 546-9816
- Beverly Stone, Director, Expanding Opportunities; bev@expandingopportunities.org; (M):+1 (321) 512-5137
- Linda Lee, Director of Learning and Evaluation, Reach Out; linjlee@ucla.edu; (607) 339-5076
- Deborah Lester; Former CEO/Director at Adara Group; debbielester@globalhealthlife.org

Field Evaluator/Manager: Zakaria Ouedraogo

Burkina Faso/Benin

Summary of professional experience

With seven years' experience in project design and management, Mr. Ouedraogo has strong expertise in conducting quantitative and qualitative designs. Specifically, he has been extensively involved in design and implementation of surveys; coordination of data collection; supervision of data entry; usage of electronic tools such as SurveyCTO and ODK; and statistical analysis of data. He has been engaged not only with ensuring the successful completion of complex and dynamic evaluations, but also has provided assistance contributing to the formulation of new projects and enhancing the capacity of local institutions to conduct monitoring and evaluation. Through his education and trainings, Mr. Ouedraogo has deep knowledge of impact evaluation methodologies and software such as Stata, SPSS, and R.

Education

M.S. (Public Economics and Applied Statistics), African School of Economics / Institute for Empirical Research in Political Economy (IERPE), Benin 2011

B.A. (Economics and Management of Business and Organization), University of Ouagadougou, Burkina Faso 2008

Relevant Certificates and Trainings

Certificate Course in Monitoring and Evaluation, Capacity Africa Training Institute, 2016

Training on Monitoring and Evaluation and Use of ACCESS software, GIZ, 2018

Introduction to Quasi-accounting Modeling Techniques for the Development of Macroeconomic and Budgetary Frameworks, Afritac Ouest, 2017

Training on Tools for Monitoring and Evaluating Gender-Sensitive Programs, GIZ, 2015

Online Training on Monitoring and Evaluation Fundamentals, MEASURE Evaluation and USAID, 2015

Training on Results-Based Monitoring and Evaluation, GIZ, 2014

Training and Management on Program Budget for Results, ENAREF, 2013

Work Experience

Monitoring and Evaluation Officer, GIZ, Ouagadougou, Burkina Faso ----- August 2012 – July 2018

As the M&E Officer, Mr. Ouedraogo performed a variety of tasks, both strategic and operational, to support an effective and streamlined M&E system for GIZ. His duties included the design of M&E systems suitable for tracking performance data, development of data collection tools, and preparation of quarterly and annual reports. He oversaw evaluation missions of all GIZ projects and served often as a field coordinator of these studies.

Highlighted Experiences in this Position

Trainer, M&E of Projects and Programs for the Ministry of Agriculture, Expertise Plus International

- Responsible for developing an M&E plan as well as providing input on the logical framework guiding the project; in addition, provided support creating and piloting the data collection tools

Trainer in Strategic Planning, Operations, and M&E, Program of Economic Growth in the Agricultural Sector (PCESA), Expertise Plus International

- Responsible for strategic planning, operations, preparation of logical framework, and set up of an M&E system

Trainer in M&E, Strengthening Agricultural Resilience Program (PRRIA), Expertise Plus International

• Responsible for M&E of the socioeconomic and environmental impacts of this program
Field Coordinator, Final Evaluation of the USDA McGovern-Dole Food for Education Beogo-Biiga II Project, IMPAQ International

- Responsible for developing quantitative and qualitative data collection tools using SurveyCTO, as well as the training and supervision of enumerators

Trainer in M&E, National Program of Hydraulic Facilities, Expertise Plus International

- Responsible for developing M&E concepts and the evaluation of projects and programs, including the conduct of an impact evaluation.

Coordinator, Annual Monitoring Survey of Implementation of Children's Rights Programs,

- Responsible for quantitative data collection in 44 schools across Ouagadougou, and tasks included support programming tablets and testing instruments on SurveyCTO; also assisted in the qualitative data collection that occurred in 5 of these 44 schools

Intern/Consultant, GIZ, Ouagadougou, Burkina Faso ----- September 2011 – July 2012

Mr. Ouedraogo coordinated and conducted statistical surveys related to public finance and macroeconomic modeling. He also supported the development of a strategy to support civil society organizations.

Intern, Commission of West African Economic and Monetary Union (WAEMU), ---- April 2011 – July 2011

In this role, Mr. Ouedraogo analyzed the fiscal environments in WAEMU countries to understand optimal taxation structures that could be applied to the informal sector.

Languages

(1 = Excellent; 5 = Basic Knowledge)

Language	Reading	Speaking	Writing
French	1	1	1
English	2	2	2
German	3	4	4
Moore		1	
Dioula		3	

Appendix III: Evaluation Timeline

Activity	Due date	Deliverables	Who is Responsible
Sign the contract.	November. 30th		PfD and SmartStart
Request program documents from PfD	December. 3rd		Hari Luintel
PfD provides program documents.	December. 5th		PfD Benin
Kickoff meeting with subcontractors.	December. 6th		SmartStart & Catherine Sanders
Complete Desk Review.	December 19th		Hari Luintel, Kajal Gulati, & Angelos Deltsidis
Team Coordination Meeting (Summarize Desk Review and Discuss Next Steps for Starting Instrument Development)	December 19th		Hari Luintel, Kajal Gulati, & Angelos Deltsidis
Start design, development, construction and translation of data collection tools	December 20th		Hari Luintel, Kajal Gulati, & Angelos Deltsidis
Draft Inception Workshop Report (including evaluation plan and instruments) and send to PfD for feedback	December 26th	Draft evaluation plan, including survey instrument, interview protocol, and focus group protocol.	Hari Luintel & Kajal Gulati
Provide feedback on data collection instruments and evaluation plan	December 28 th or 31st		PfD Benin
Finalize Inception Report, including finalizing all data collection tools.	January 3rd	Final evaluation plan, survey instrument, interview protocol, and focus group protocol.	Hari Luintel & Kajal Gulati
Field work team arrives in the field.	January 6th		Catherine Sanders, Zakaria Ouedraogo, & CRAD
First in field meeting with PfD (Benin).	January 7th		PfD, Catherine Sanders, & Zakaria Ouedraogo
Enumerators' training.	January 9 th -January 12th		Catherine Sanders, Zakaria Ouedraogo, and CRAD
Start Data Collection: survey, interviews, FGDs, and observation.	January 7th-January 24th	Raw data collected.	Catherine Sanders, Zakaria Ouedraogo, & CRAD
Fieldwork update with PfD (Benin).	January 18th	Update on data collection progress	SmartStart & PfD

Data transcribing, translating, monitoring and cleaning.	Start January 8th-January 31st	Organized field notes and translation of field data every other day.	Hari Luintel, Catherine Sanders, Zakaria Ouedraogo, & translation consultant
Data analysis.	February 1st-15th		Hari Luintel, Angelos Deltsidis, Catherine Sanders, Megan Key
Meeting to summarize data analysis before start to draft report.	February 18st	Outline and summary of data (via email and discussion).	SmartStart and PfD
Draft full final report writing and share with PfD for feedback.	February 25th	First draft report.	SmartStart, Kajal Gulati, Angelos Deltsidis, Catherine Sanders
Review and feedback provided.	March 1st		SmartStart Directors, and PfD
Final report (edited, revised version) incorporating feedback from PfD and SmartStart Directors.	March 8th	Final report.	Hari Luintel, Kajal Gulati, Angelos Deltsidis, Catherine Sanders

Appendix IV: List of Documents Reviewed

1. PINEX Baseline report
2. PINEX Activity reports
 - a. Market prospection (fair participation, context reports)
 - b. Pineapple stakeholder council (PSC)
 - c. Standards
 - d. Success stories
 - e. Trainings
 - f. USDA & Visits
3. FAIS (Food Aid Information System) reports- narrative & tables
4. Monthly Reports
5. Monitoring plans and reports
6. PINEX related study report and extension materials
 - a. Processor relevant images
 - b. Simulation guides for facilitators, producer notes
 - c. Report on estimated volume of pineapple exported to Nigeria
 - d. HACCP (Hazard Analysis and Critical Control Points) Processor Diagnostics
7. Certifications and standards
 - a. GLOBAL G.A.P. standards
 - b. HAACP Recommendations
8. Documents providing contextual information
 - a. USDA documents
 - b. Collection tools
 - c. FCFA exchange rate
 - d. Agreements (PfD, USDA)
 - e. USDA progress indicators and policy
9. Other pineapple-related study reports conducted by others (partners, collaborators and or any other agencies)
 - a. Argument for lifting of the self-suspension by Benin of exports of éthrélé pineapple to the EU
 - b. Lifting of the ban on the export of colored pineapple to markets from Benin)
10. Partnership documents, including information about partners role and responsibilities
 - a. MFI (Micro Finance Institution)
 - b. OPIC (Overseas Private Investment Corporation)
 - c. Partnerships implemented
 - d. Providing partnerships
 - e. The Benin Airport Management Agency (UGAB)
 - f. Agreement documents
11. Relevant policy and regulatory documents
 - a. State of the scene and actions reports

Appendix V: Sampling Design

Randomized Cluster Sampling of PINEX Pineapple Producers

Evaluation population definition: PINEX's target producer population is 3545 pineapple farmers both male and/or female and located in Atlantique Province. The list of pineapple if provided by the project team of Benin. We took the entire pineapple producer as our sampling frame or population of interest.

Sample size determination: As per the RFP, a sample size of 768 has been determined, at a margin of error of plus or minus 5, with 95% confidence level corresponding to 1.96. Sample size was calculated using the formula:

$$n = (Z_{\alpha})^2 pq \text{ Deff} / d^2$$

Where: $Z_{\alpha} = 1.96$, corresponding to a confidence level of 95%

$p = 0.5$, corresponding to estimated coverage, when it is unknown

$q = 1 - 0.5 = 0.5$

$\text{Deff} = \text{Design effect of } 2$

$d = \text{Desired accuracy level of } 5\%$

Therefore,

$$n = (1.96)^2 * 0.5 * 0.5 * 2 / (0.05)^2$$

$$n = 768$$

Appendix VI: Sample Pineapple Producers for Survey

Municipality: ABOMEY-CALAVI

District: GLO-DJIGBE

Village	Producers' name	Telephone
GOLO-FANTO	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Agongbé	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Alladacomè	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Zèkanmey	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[illegible]

Municipality: ABOMEY-CALAVI

District: Kpanroun

[illegible]

Municipality: ABOMEY-CALAVI

District: ZINVIE

Village	Producers' name	Telephone
WAWATA	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
GBODJOKO	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Dangbodji	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Zinvié-ZOUN	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[illegible]

Municipality: ALLADA

District: AHOUANNONZOUN

Village	Producers' name	Telephone
Loto-Dénou	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
HESSA	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Hêtin	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[illegible]

Municipality: ALLADA

[illegible]

SOYO

Producers' name

Telephone

ALLADA

Village	Producers' name	Telephone
GANDAHO		

GANDAHO

Producers' name

Telephone

[illegible]

[illegible]

Municipality: ALLADA

District: TôgôUDO

Village	Producers' name	Telephone
Tôgô	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
KPODJAVA	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Govié	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

Municipality: KPOMASSE

District: DEDOME

Village	Producers' name	Telephone
Dédomè Kpodji	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

Municipality: TOFFO

District: COLLI

Village	Producers' name	Telephone
Agbamè	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Hounyèmè	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
Hélita	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]

Municipality: TOFFO

District: DAME

Village	Producers' name	Telephone
AGON	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Cogbo-	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

AGBOTAGON	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]
	[REDACTED]		[REDACTED]

Municipality: TOFFO
District: HOUEGBO

Village	Producers' name	Telephone
HOEGBO GAR	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Houègbo Toho	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

Municipality: TORI-BOSSITO

District: TORI CADA

Village	Producers' name	Telephone
Soklogbo	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
HETIN-YENAW	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Sogbé	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Zoungoudo	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

Lokossa			
Anavié			
Zèbè			

[illegible]

Tori-Cada Cen			
Adjahassa			
Gbohouè			

Municipality: ZE

District: Adjan

Village	Producers' name	Telephone
Zanzoun	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Tanta	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
Dodji-aga	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Wassa	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[illegible]

Village	Producers' name	Telephone
Anavié	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Tangbo-Do	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
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	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Tangbo-Aga	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[illegible]

Glégbodji Do	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

Municipality: ZE

District: Yokpo

Village	Producers' name	Telephone
Yokpo-Centre	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
Awonsédja	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

[illegible]

Municipality: ZE

District: ZE

[illegible]

Appendix VII: Survey Instrument for Pineapple Producers

INFORMED CONSENT

Variable Name	Questions		Options	Skip Pattern
	Hello, my name is _____ and I am part of a team hired by Centre de Recherche et d'Appui-conseils pour le Développement (CRAD) to conduct a survey of pineapple production. We were hired to conduct a study on pineapple production by Partners for Development. This project is working with pineapple farmers, like you, to help improve profits and productivity from pineapple production. With your permission, we would like to ask you questions about your experiences with or thoughts about pineapple cultivation. This study will improve our understanding of pineapple production activities in the area. Your answers will be kept confidential and will not be used for any purpose other than to inform the Partners for Development project intended to help develop the pineapple sector. The interview should last about 45-60 minutes. Your participation is voluntary, and you can choose to refuse to participate in this survey. You can also choose to refuse to answer any questions you are uncomfortable with or do not want to answer. Please note that everything you say to me is confidential. We will never identify you or anyone in your business in any reports or information we release. Confidentiality and anonymity will be maintained through the use of aggregate datasets in which no individuals will be identified by name nor will any identifying information be used in the datasets or any reports resulting from this study. There are no penalties to you for not participating or not answering a question. We are conducting this survey as an independent entity and are not associated with any government body. Please feel free to be open and honest with us in your responses. In case of any further questions after you have participated, you can contact data collection team members like me, or you can call Moustapha Gibigaye from CRAD at _____ or write him at mgibigaye@yahoo.fr at CRAD Benin or Cynthia Taha at 229 21 30 69 19 or write her at ctaha@pfd.org at Pfd, Benin. <i>Ask if they have any questions about anything that was just mentioned and clarify all doubts before proceeding further.</i>			
consent	Are you willing to participate in this interview?	1	Yes	
		2	No	<end survey> If no, thank respondent for his/her time and

				<i>conclude interview.</i>
--	--	--	--	----------------------------

1 HOUSEHOLD INFORMATION

		Questions		Options	Skip Patterns
1	dept	Department	1	Atlantic	
1.2	commune	Commune	1	Abomey-Calavi	
			2	Allada	
			3	Kpomasse	
			4	Ouidah	
			5	Toffo	
			6	Tori-Bossito	
			7	Ze	
	arrondissement	arrondissement		text	
1.3	village	Village			
1.5	ID	Producer (Household) ID			
1.7	number	What is the contact phone number we can reach you at?		<Open text> _____	
1.9	name	What is your name ?		<Open text> _____	
1.10	hh	Are you the head of the household?	1	Yes	
			2	No	
1.12	hh_relation	What is your relation to the head of the household?	1	Son/daughter	If hh==2
			2	Spouse	
			3	Other family relationship	
			4	No family ties	
			5	Other, specify	
1.13	hh_sex	What is the sex of the household head?	1	Male	If hh==2
			2	Female	
1.14	sex_respondent	What is the gender of the respondent? (Do not ask, just enter)	1	Male	
			2	Female	
1.15	age	What is your age?		<numeric value>	
1.16	instruction	What is your highest level of education completed?		Without any Education	
			1	Education	
			2	Primary	
				Secondary cycle one	
			3	Secondary cycle two	
			4	Superior	
			5	Professional training	
1.18	ethnic	What is your ethnicity?	1	Fon	

			2	Goun	
			3	Mina	
			4	Yoruba	
			5	Tori	
			6	Nago	
			7	Aizo	
			8	Xwla	
			9	Wemenou	
			10	Other, specify	
1.20	fam_size	How many family members currently live in the household, including yourself <i>Household is defined as a group of people (related or not) who eat and live together in the same home for at least six months in a year. This includes the employees and visitors provided that they eat and live with one family most of the time. However, the household excludes the family members who live elsewhere most of the time, whether more 6 months in a year or 4 days in a week</i>		<numeric value> _____	

2 HOUSEHOLD CHARACTERISTICS

(Note for all the questions asked in the survey, we will be thinking only about the last pineapple cultivation season for you.)

		Questions		Options
2.1	hh_activity	What is the primary livelihood activity of the household (based on income earned) in the last pineapple cultivation season? <i>(Select only one)</i>	1	Crop production
			2	Agriculture trade
			3	Food processing
			4	Livestock production (breeding?)
			5	Fishing
			6	Construction (craft?)
			7	Entrepreneurship/Business
			8	Student (scholarships, house rehearsal, trainee, etc.)
			9	Retired / not working
			10	Domestic work
			11	Public sector employee
			12	Private sector employee
			13	Other, specify (e.g., staff of public or private sector)

2.3	walls	What is the main construction material of walls of the respondent's dwelling? <i>(Select only one)</i>	1	Brick/stone
			2	Mud brick/mud
			3	Metal sheet
			4	Cement
			5	Bamboo
			6	Straw
2.5	roof	What material is the roof made up of? <i>(Select only one)</i>	1	Tiles
			2	Metal sheet
			3	Wood
			4	Dirt/mud
			5	Straw
			6	Cement
2.7	light	What was the main source of lighting for your dwelling in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	Electricity (SBEE)
			2	Domestic private electricity (solar panel, dynamo, generator, etc)
			3	Oil/kerosene lamp
			4	Candles
			5	Battery torch
			6	Solar torch
2.8	assets	Which of the following assets belongs to your household?	1	Beds
			2	Electric fan
			3	Gas cooker
			4	Air-conditioner
			5	TV
			6	Sewing machine
			7	Bicycle
			8	Motorcycles/Tricycle
			9	Car
			10	Refrigerator/Fridge
			11	Mobile phone

3 AGRICULTURAL LAND

		Questions		Options	Skip Patterns
3.1		How much land did you cultivate (all agricultural crops) in the last pineapple cultivation season (including any land that you rented)?		<numeric value>	cult must be less than or equal to land_owned
3.2	unit_land	Unit <i>(select only one)</i>	1	m ²	
			3	Hectares	
			4	Kanti (big)	
			5	Kanti (small)	

3.3	unit_kanti	How many Kanti are in 1 hectare of land?		<numeric value> _____	If unit==2 or 3
3.4	land_pine	How much land area was dedicated to pineapple cultivation in the last pineapple cultivation season?		<numeric value> _____	land_pine is less than or equal to cult
3.8	unit_pine	Unit <i>(select only one)</i>	1	m ²	
			3	Hectares	
			4	Kanti (big)	
			5	Kanti (small)	
3.9	land_rent	Did you rent or share-in any land for cultivating pineapple in the last pineapple cultivation season?	1	Yes	
			2	No	
3.10	land_rent_cost	What was the approximate cost of renting or sharing-in land in the last pineapple cultivation season? <i>(Enter in XOF)</i> <i>For sharing-in, work with the farmer to estimate the monetary cost.</i>		<numeric value> _____	land_rent=1
3.12	soil_pine	What were the type of soil on which pineapple is grown on your plots? <i>(Select all that apply)</i>	1	Wet soil or swampy soil	
			2	Red soil	
			3	Other specify __	
3.13	Q3_13	What year is your last pineapple crop?		<numerical value> _____	Must be between 2015-2019 inclusive

4 PRODUCTION AND PRACTICE

		Questions		Options	Skip Patterns
4.1	labor	During pineapple cultivation in the last pineapple cultivation season, which of the following types of labor did you use? <i>(Think about all the labor that you used for all pineapple cultivation tasks, including **)</i> <i>(Select all that apply)</i>	1	Household male labor	
			2	Household female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	

5 LAND PREPARATION AND PLANTING

		Questions		Options	Skip Patterns
5.1	season	In which months did you plant pineapples in the last pineapple cultivation season?	1	January	
			2	February	
			3	March	
			4	April	
			5	May	
			6	June	
			7	July	
			8	August	

			9	September	
			10	October	
			11	November	
			12	December	
5.2a	cult_land	How much kanti of land was used in the cultivation of the following pineapple varieties in the last pineapple cultivation season? <i>(select all that apply) (Enter 0 if the variety is not grown).</i>	1	Cayenne Smooth	
			2	Sugarloaf (Abacaxi)	
			3	Other, specify	
5.2b	cult_land	How much hectares of land was used in the cultivation of the following pineapple varieties in the last pineapple cultivation season? <i>(select all that apply) (Enter 0 if the variety is not grown).</i>	1	Cayenne Smooth	
			2	Sugarloaf (Abacaxi)	
			3	Other, specify	
5.2c	cult_land	How much m² of land was used in the cultivation of the following pineapple varieties in the last pineapple cultivation season? <i>(select all that apply) (Enter 0 if the variety is not grown).</i>	1	Cayenne Smooth	
			2	Sugarloaf (Abacaxi)	
			3	Other, specify	
5.4	obtain_mat	Where did you obtain your planting material in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	From previous harvested field	
			2	Other producers	
			3	Other, specify	
5.5	plant_mat	Which pineapple planting materials did you use in your plots in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	Rejects (Slips)	
			2	Wreaths	
			3	Other, specify	
5.6	equip	What equipment did you use in preparing land and planting for pineapple cultivation in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	Hoe	
			2	Plow	
			3	Tractor	
			4	Other, specify	
5.8	equipment_access	How did you access equipment for pineapple cultivation in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	Purchased	
			2	Rented	
			3	Had own from the past (maintained from the past)	
5.9	costs_plant	What was the total cost of purchasing/renting/maintaining equipment and obtaining planting materials for land preparation and planting in the last pineapple cultivation season? (Enter total amount in XOF for the entire area under pineapple cultivation)		<numeric value>_____	
5.10	arrange_cay	How did you arrange the plants in beds in the last pineapple cultivation season for growing Cayenne Smooth?	1	Single row	If cult_land included "1"
			2	Double row	
			3	Other, specify_____	
5.11	density_cay	How many plants did you plant per land unit area (m^2) for Cayenne Smooth cultivation in the last pineapple cultivation season? <i>(Enter in plants/m^2)</i>	1	Kanti	If cult_land included "1"
			2	Hectares	
			3	m^2	
5.14	arrange_su	How did you arrange the plants in beds in the last	1	Single row	If cult_land

	gar	pineapple cultivation season for growing Sugarloaf?	2	Double row	included "2"
			3	Other, specify_____	
5.15	density_sugar	How many plants did you plant per land unit area (m^2) for Sugarloaf cultivation in the last pineapple cultivation season? <i>(Enter in plants/m2)</i>	1	Kanti	
			2	Hectares	
			3	m^2	
5.18	intercrop	Did you engage in intercropping pineapple in the last pineapple cultivation season?	1	Yes, intercropped	
			2	No, monocropping only	
5.19	other_crop	What other crops did you grow along with pineapple in the last pineapple cultivation season?	1	Maize	<i>If intercrop==1</i>
			2	Cassava	
			3	Groundnut	
			4	Tomato	
			5	Pepper	
			6	Other, specify	
5.20	landprep	How many days of the <<types of labor>> did you use in land preparation and planting on all your pineapple plots in the last pineapple cultivation season? <i>(1 day = 8 hours)</i>	1	No. of days Family male labor	<i>Ask for only those options selected in <labor></i>
			2	No. of days Family female labor	
			3	No. of days Permanent male labor	
			4	No. of days Permanent female labor	
			5	No. of days Casual male labor	
			6	No. of days Casual female labor	
5.21	wage_land prep	How much did you pay for casual labor per day for land preparation for pineapple farming during land preparation and planting? <i>(Enter in XOF)</i>		<numeric value>_____	<i>If landprep = 5 or 6</i>

6 IRRIGATION

		Questions		Options	Skip Patterns
6.1	irrigation	What are the primary sources of water for pineapple cultivation in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	Irrigation using gas-powered pumps	
			2	Irrigation using solar-powered pumps	
			3	Rain / Tank	
			4	Bottom	
			5	Rain	
			6	Well	
			7	Other, specify	
6.2	times_irrigate	How many times did you irrigate your plots on the pineapple cultivated in the last pineapple cultivation season?		<numeric value>_____	<i>If irrigation=1</i>
6.3	costs_irrigate	What was the total cost of irrigation (e.g., payment for water, energy, etc.) on all your plots on which pineapple was cultivated excluding labor costs of irrigation in the last pineapple cultivation season? <i>(Enter total amount in XOF)</i>		<numeric value>_____	<i>If irrigation=1</i>

6.4	labor_irrigate	How many days of the <<types of labor>> did you use for all pineapple irrigation activities in the last pineapple cultivation season? (1 day = 8 hours)	1	Family male labor	If irrigation=1
			2	Family female labor	Ask for only those options selected in <labor>
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
6.5	wage_irrigate	How much did you pay for casual labor per day during your pineapple irrigation activities? (Enter in XOF)		<numeric value>_____	If labor_irrigate = 5 or 6

7 FERTILISER USE

		Questions		Options	Skip Patterns
7.1	fertilizer_type	What type of fertilizer did you apply for growing pineapples? (select all that apply)	1	No restrictions used	Do not ask any further questions in this module if fertilizer_type=1
			2	Urea	
			3	NPK	
			4	Potassium sulphate	
			5	Biological fertilizer	
			8	Other, specify	
7.2	quant_fert	How much quantity of the <<type of fertilizer>> did you use for pineapple cultivation in the last pineapple cultivation season? (enter quantity and specify unit in kg bag of 50kg)	1	Urea	Ask for options selected in fertilizer_type
			2	NPK	
			3	Potassium sulphate	
			4	Biological fertilizer	
			7	Other, specify	
7.3	times_fert	How many times did you apply fertilizer for pineapple cultivation in the last pineapple cultivation season?		<numeric value>_____	
7.6	obtain_fert	What was the source of obtaining fertilizer in the last pineapple cultivation season? (Select all that apply)	1	Input dealer shops	
			2	Other farmers/Farmer association/Cooperative	
			3	ATDA	
			4	Other, specify	
7.5	cost_fert	What was the total cost of using fertilizer in the pineapple cultivation (including transportation costs but excluding labor costs) in the last pineapple cultivation season? (Enter in XOF)		<numeric value>_____	
7.6	days_fert	How many days of the <<types of labor>> did you use for all fertilizer application activities in pineapple in the last pineapple cultivation season? (1 day = 8 hours)	1	Family male labor	Ask for only those options selected in <labor>
			2	Family female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
7.7	wage_fert	How much did you pay for casual labor per day for fertilizer application during last pineapple cultivation season? (Enter in XOF)		<numeric value>_____	If days_fert = 5 or 6

8 CHEMICAL USE

		Questions		Options	Skip Patterns
8.1	chem	Which of the following chemicals did you use for pineapple cultivation in the last pineapple cultivation season? <i>(Select all that apply)</i>			
			1	No chemicals used	If cult_land included "1"
			2	Carbide of Calcium/Chemicals for inducing flowering	
			3	Herbicides	
			4	Ethephon/Chemicals for pineapple skin color change	
			5	Insecticide (eg against mealybugs)	
			6	fungicides	
			7	nematicides	
			8	Other, specify (any pesticides, insecticides)	
8.2	times_chem	How many times did you apply each of the <<type of chemical>> for pineapple cultivation in the last pineapple cultivation season? (enter whole numbers)			
			1	Carbide of Calcium/Chemicals for inducing flowering	Ask this question if chem (Q8.1) is different from "1"
			2	Herbicides	
			3	Ethephon/Chemicals for pineapple skin color change	
			4	Insecticide (eg against mealybugs)	
			5	fungicides	
			6	nematicides	
			7	Other, specify (any pesticides, insecticides)	
8.3	months_chem	How many months after planting did you use chemicals such as calcium carbide to encourage pineapple production during the last season of pineapple production?		<numeric value>_____	If chem_cay=1
8.4	times_chem_cay	How many times did you apply chemicals such as carbide of calcium for inducing pineapple bloom/flowering in the last pineapple cultivation season?		<numeric value>_____	If chem_cay=1
8.5	skincolor	How many months after planting did you use chemicals such as ethephon to change the pineapple color during the last pineapple season?		<numeric value>_____	If chem_cay=4
8.11	crit_chem	What criteria did you consider for deciding whether to apply any chemicals for changing the skin color for pineapple cultivation in the last pineapple cultivation season? (select all that apply)			
			1	Number of months after flowering induction (maturity)	If chem_cay=1 or chem_sugar=4
			2	Pineapple size	
			3	Delivery/Selling time	
			4	Other, specify	

8.12	cost_chem	What was the total cost of applying all chemicals (excluding labor cost) for growing pineapples (seedling and/or plant treatment) in the last pineapple cultivation season? (<i>Enter in XOF</i>)		<numeric value>_____	
8.13	days_chem	How many days of the <<types of labor>> did you use for all chemical application activities in pineapple in the last pineapple cultivation season? (<i>1 day = 8 hours</i>)	1	Family male labor	<i>Ask for only those options selected in <labor></i>
			2	Family female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
8.14	wage_chem	How much did you pay for casual labor per day for chemical application activities in the last pineapple cultivation season? (<i>Enter in XOF</i>)		<numeric value>_____	<i>If days_chem = 5 or 6</i>

9 WEEDING

		Questions		Options	Skip Patterns
9.1	weed	Did you weed any of your pineapple plots in the last pineapple cultivation season?	1	Yes	
			2	No	
9.1 a	Weed_type	What kind of weeding did you do in your pineapple cultivation in during the last pineapple cultivation season? (<i>select all that apply</i>)	1	Use of herbicide	
			2	Manual weeding	
9.2	Freq_chenweed	How often did you do the weeding with the use of herbicide during the last pineapple cultivation season?		<numeric value>_____	
9.2 a	Freq_manweed	How often did you do the manual weeding during the last pineapple cultivation season?		<numeric value>_____	
9.4	days_weed	How many days of "types of labor" did you need for all weed control activities with herbicide use during the last season of pineapple production? (<i>1 day = 8 hours</i>)	1	Family male labor	<i>If hand_weed = 1 Ask for only those options selected in <labor></i>
			2	Family female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
9.4 a	days_weed	How many days of "manpower types" did you need for all weeding activities with manual weeding during the last pineapple production season? (<i>1 day = 8 hours</i>)	1	Family male labor	
			2	Family female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
9.5	wage_weed	How much did you pay for casual labor per day for all hand weeding activities? (<i>Enter in XOF</i>)		<numeric value>_____	<i>If days_weed = 5 or 6</i>

10 OTHER ACTIVITIES

		Questions		Options	Skip Patterns
10.4	protect	Have you protected your pineapple in your	1	Yes	

		plots against sunburn in the last pineapple cultivation season?	2	No	
10.5	tech_prot	Do you know about the techniques for protecting your pineapple on the field against sunburn?	1	Yes	Ask if protect==2
			2	No	
10.6	protect_fruit	What (types of materials) did you use to protect your pineapple on the field against sunburn in the last pineapple cultivation season? (<i>protect all that apply</i>)	1	Palm leaves	If protect=1
			2	Maize leaves	
			3	Dry weeds	
			4	Other, specify	
10.7	costs_protecting	What was the total cost incurred (excluding labor costs) for gouging (cutting/slashing) and protecting pineapple in the last pineapple cultivation season? (<i>Enter in XOF</i>)		<numeric value>_____	If protect = 1
10.8	days_sunprot	How many days of the <<types of labor>> did you use for gouging and sun protecting in the last pineapple cultivation season? (<i>1 day = 8 hours</i>)	1	Family male labor	If tech_prot = 1 Ask for only those options selected in <labor>
			2	Family female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
10.10	cropinfect	Did you face any crop disease or insect issues in pineapple cultivation in the last pineapple cultivation season?	1	Yes	
			2	No	
10.11	cropdisease	What kind of crop disease issues did you face in the last pineapple cultivation season?	1	Wilt	If cropinfect = 1
			2	Other, specify_____	
10.12	cost_disease	What were the total costs incurred in managing crop diseases and insect issues in pineapple cultivation in the last pineapple cultivation season? (<i>Enter in XOF</i>) Only for this question, also include any labor costs incurred for disease control.		<numeric value>_____	If cropinfect = 1

11 HARVEST AND DISTRIBUTION

11.1	harvest_pineapple	After how many months of planting did you harvest pineapple in the last pineapple cultivation season? (<i>Enter in months</i>)		<numeric value>_____	
11.2	months_pineapple	In which months did you harvest pineapple in the last pineapple cultivation season? (<i>Enter the months that best matches the period of harvest</i>)	1	January	
			2	February	
			3	March	
			4	April	
			5	May	
			6	June	
			7	July	
			8	August	

			9	September	
			10	October	
			11	November	
			12	December	
11.3	type_labor	How many days of the <<types of labor>> did you use for pineapple harvests in the last pineapple cultivation season? (1 day = 8 hours)	1	Family male labor	Ask only for relevant options selected in <labor>
			2	Family female labor	
			3	Permanent male labor	
			4	Permanent female labor	
			5	Casual male labor	
			6	Casual female labor	
11.4	wage_harv	How much did you pay for casual labor per day during harvest? (Enter in XOF)		<numeric value>_____	If type_labor = 5 or 6
11.5	quant_pineapple	How much total quantity of each variety of pineapple did you harvest in the last pineapple cultivation season?			Ask unit for each type if cultivated. If cult_land included "1"
			1	Cayenne Smooth (Abacaxi) _____	
			2	Sugarloaf (Pain de sucre) _____	If cult_land included "2"
			3	Other, specify _____	If cult_land included "3"
11.6	unit_pineapple	Unit	1	Trucks	
			2	Metric ton	
			3	Kilogram	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
11.7	cap_truck	What was the capacity of each vehicle in ton?			Ask if unit_pineapple= 1
			1	Truck	
			3	Pickup truck	
			4	Moped (tricycle)	
			5	Tercel vehicle	

13 OUTPUT USE AND SALES

		Questions		Options	Skip Patterns
13.1	use_pineapple	What did you do with the pineapple harvested in the last pineapple cultivation season? (Select all that apply)	1	Own consumption	
			2	Sell at farmgate	
			3	Sell at local market	
			4	Sell at urban market	
			5	Sell at regional market	
			6	Sell to processing	

				company	
			7	Sell to exporting company	
			8	Other, specify	
	For each <<type>> of pineapple harvested, indicate the quantity sold or used of each grade in the last pineapple cultivation season?				
13.3	unit_jumbo	Indicate the cayenne smooth quantity sold or used in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.5	Unit_large		Indicate the cayenne smooth quantity sold or used in the last pineapple cultivation season.	1	Trucks
		2		Metric ton	
		4		Bâchée / Pick Up Truck 404	
		5		Moped (tricycle)	
		6		Tercel vehicle	
		7		Quarantine	
13.7	Unit_medium	Indicate the cayenne smooth quantity sold or used in the last pineapple cultivation season.		1	Trucks
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7a	unit_small		Indicate the cayenne smooth quantity sold or used in the last pineapple cultivation season.	1	Trucks
		2		Metric ton	
		4		Bâchée / Pick Up Truck 404	
		5		Moped (tricycle)	
		6		Tercel vehicle	
		7		Quarantine	
13.3	unit_jumbo	Indicate the price of cayenne smooth per unit sold in the last pineapple cultivation season.		1	Trucks
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.5	Unit_large		Indicate the price of cayenne smooth per unit sold in the last pineapple cultivation season.	1	Trucks
		2		Metric ton	
		4		Bâchée / Pick Up Truck 404	

			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7	Unit_medium	Indicate the price of cayenne smooth per unit sold in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7a	unit_small	Indicate the price of cayenne smooth per unit sold in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.3	unit_jumbo	Indicate the quantity of sugar loaf sold or used in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.5	Unit_large	Indicate the quantity of sugar loaf sold or used in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7	Unit_medium	Indicate the quantity of sugar loaf sold or used in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7a	unit_small	Indicate the quantity of sugar loaf sold or used in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	

			7	Quarantine	
13.3	unit_jumbo	Indicate the price of sugar loaf per unit sold in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.5	Unit_large	Indicate the price of sugar loaf per unit sold in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7	Unit_medium	Indicate the price of sugar loaf per unit sold in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	
13.7a	unit_small	Indicate the price of sugar loaf per unit sold in the last pineapple cultivation season.	1	Trucks	
			2	Metric ton	
			4	Bâchée / Pick Up Truck 404	
			5	Moped (tricycle)	
			6	Tercel vehicle	
			7	Quarantine	

14 TRANSPORTATION AND BUYER ATTRIBUTES

		Questions		Options	Skip Patterns
14.1	transport_pineapple	How did the pineapple harvest get transported to your buyers in the last pineapple cultivation season? (<i>Select all that apply</i>)	1	Buyers come to your doorstep	
			2	Farmer travels to sell produce	
			3	Other, specify	
14.2	cost_transport	What was the total transportation cost for selling produce to buyers in the last pineapple cultivation season (<i>Enter amount in XOF</i>)?		<numeric value> _____	if transport_pineapple = 2 or 3
14.3	buyer	What were your criteria in choosing buyers (who to sell to) in the last pineapple cultivation season? (<i>Select all that apply</i>)	1	Best price offer	
			2	Proximity to sale point	
			3	Buyer who puts down deposit before harvest	

			4	Buyer who provides inputs at credit	
			5	Buyer who offers best price for good quality	
			6	Buyer who is reliable	
			7	Buyer is a monopoly	
			8	Other, specify	
14.4	quality_buyer	What are the quality attributes that your buyers are looking for when purchasing pineapple in the last pineapple cultivation season? <i>(Select all that apply)</i>	1	Cut	
			2	Maturity	
			3	Variety	
			4	Level of decay/mold	
			5	Firmness	
			7	Other, specify	
14.5	arrangement_buyer	Please indicate the type of prior arrangement that you had with your buyers in the last pineapple cultivation season. <i>(Select all that apply)</i>	1	No prior arrangement	<i>Ensure when arrangement_buyer==1, no other option can be selected</i>
			2	Verbal arrangement	
			3	Written arrangement	
			4	Other, specify	
14.6	duration_arrangement	What was the duration of the arrangement that you had with your buyers in the last pineapple cultivation season?	1	One harvest	<i>If arrangement_buyer is not equal to 1</i>
			2	One season	
			3	Several seasons	
			4	Other, specify	
14.7	num_arrange	How many such arrangements did you have with your buyers in the last pineapple cultivation season?		<numeric value>_____	<i>If arrangement_buyer is not equal to 1</i>
14.8	supportserv	Did you receive any support services from your buyers in the last pineapple cultivation season (e.g., training, transportation, credit, technical advice, etc.)?	1	Yes	
			2	No	
14.9	type_supportserv	What kind of support services did you receive from buyers in the last pineapple cultivation season? <i>(Select all apply)</i>	1	Training/capacity building/technical support	<i>If supportserv==1</i>
			2	Transportation services	
			3	Provide inputs at credit	
			4	Provide deposit before harvest	
			5	Provide crop disease and management advice	
			6	Other, specify	
14.10	rejected	Was any of your pineapple produce rejected by any of your buyers or spoiled (due to not being sold) in the last pineapple cultivation season?	1	Yes	
			2	No	

14.11	prop_rejected	What proportion of your produce was rejected?		<percentage>	If rejected==1
14.12	change_harvest	How has the quantity you harvested per hectare in the last pineapple cultivation season changed in comparison to the quantity harvested per hectare in 2016 or before?	1	No change	
			2	Increased	
			3	Decreased	
14.13	reason_change	What do you think are the key reasons for changes in your harvest performance?	<open text> -----		If change_harvest = 2 or 3
14.14	change_sold	How has the quantity you have sold to others changed between 2015 and the last pineapple cultivation season?	1	No change	
			2	Increased	
			3	Decreased	
14.15	keyreason_change	What do you think are the key reasons for changes in your output sales performance?		<Open text> _____	if change_sold = 2 or 3

15 INFORMATION AND TRAINING

	Variable Name	Questions		Options	Skip Patterns
15.1	years_pineapple	For how many years have you cultivated pineapple?		<numeric value> _____	
15.2	sources_info	What were your sources of information for pineapple cultivation practices in the last pineapple cultivation season? (Select all that apply)	1	Friends/family/neighbor	
			2	Cooperative	
			3	Farmer association/group	
			4	Newspaper/magazines	
			5	Radio	
			6	Television	
			7	Government extension services	
			8	Research center	
			9	Ministry of Agriculture, Livestock and Fishing	
			10	SONAPRA	
			11	Input suppliers	
			12	Buyers/Traders	
			13	PINEX- Pfd	
			14	Other, specify	
15.3	market_info	What were your sources of market information, such as prices and avenues for selling pineapple, in the last pineapple cultivation season? (Select all that apply)	1	Friends/family/neighbor	
			2	Cooperative	
			3	Farmer association/group	
			4	Newspaper/magazines	
			5	Radio	
			6	Television	

			7	Government extension services	
			8	Research center	
			9	Ministry of Agriculture, Livestock and Fishing	
			10	SONAPRA	
			11	Input suppliers	
			12	Buyers/Traders	
			13	PINEX- PfD	
			14	Other, specify	
15.5	safety	Did you exercise safety measures while performing tasks on pineapple plots in the last pineapple cultivation season? (Select all that apply)	1	No safety measures used	Ensure if safety=1, then no other option is selected
			2	Wore boots	
			3	Wore gloves	
			4	Other, specify	
15.6	training	What training topics did you receive in the last pineapple cultivation season? (Select all that apply)	1	No training	
			2	Farm financial management	
			3	Cultivation practices	
			4	Farm management	
			5	Marketing	
			6	Other, specify	
15.7	farm_management	What type of financial farm management training did you receive in the last pineapple cultivation season? (Select all that apply)	1	Input supply planning	if train_typ = 2
			2	Output sales (distribution) planning	
			3	Bookkeeping (financial record keeping) of costs and revenues	
			4	Cash flow planning (Expenses and revenues)	
			5	Financial management	
			6	Support for the request for a microcredit	
			7	Loan repayment planning	
			8	Other, specify -----	
15.8	farm_management_source	From where did you receive the financial farm management training in the last pineapple cultivation season? (Select all that apply)	1	Government agencies, such as ATDA	if train_typ = 2
			2	PINEX-PfD	
			3	Non-profit organizations (other than PfD)	
			4	Cooperative organization/farmer association	

			5	Input suppliers	
			6	Buyers/Traders	
			7	Other private organizations	
			8	Other, specify	
15.9		What type of cultivation practices training did you receive in the last pineapple cultivation season? (Select all that apply)	1	Planting materials to use for cultivation	
			2	Planting densities and spacing	
			3	Fertilizer application (including timing of application)	
			4	Flowering induction (including timing)	
			5	Hand weeding techniques	
			6	Prune and protect pineapple	
			7	Crop disease and management	
			8	Other, specify	
	cult_training				if train_typ = 3
15.10		From where did you receive the cultivation practices training in the last pineapple cultivation season? (Select all that apply)	1	Government agencies, such as ATDA	
			2	PINEX-PfD	
			3	Non-profit organizations (other than PfD)	
			4	Cooperative organization/farmer association	
			5	Input suppliers	
			6	Buyers/Traders	
			7	Other private organizations	
			8	Other, specify	
	cult_practice				if train_typ = 3
15.15		Did you receive any of these services for pineapple cultivation in the last pineapple cultivation season? (Select all that apply)	1	None	
			2	Provision/supply of planting materials	
			3	Provision/supply of other inputs such as fertilizer and chemicals	
			4	Provision/supply of storage facilities	
			5	Provision of post-harvest storage and handling inputs	
			6	Output procurement by buyers	
			7	Other, specify	
	services				
15.16		From where did you receive the technical services for pineapple	1	Government agencies, such as ATDA	
	services_provider				if services = 1-6

		cultivation in the last pineapple cultivation season? (Select all that apply)	2	PINEX-PfD	
			3	Non-profit organizations (other than PfD)	
			4	Cooperative organization/farmer association	
			5	Input suppliers	
			6	Buyers/Traders	
			7	Other private organizations	
			8	Other, specify	

17 CREDIT AND GROUP MEMBERSHIP

	Variable Name	Questions		Options	Skip Patterns
17.1	loan	Did your household apply for any loans in the last pineapple cultivation season?	1	Yes	
			2	No	
17.2	loan_part	Did you receive the whole amount you requested or just a part of the loans that you applied for in the last pineapple cultivation season?	1	Whole amount	if loan = 1
			2	Partial	
			3	Did not get approved	
17.3	credit_cult	Why did you not apply/obtain any credit in the last pineapple cultivation season? (Select all that apply)	1	Insufficient funds	if loan = 2
			2	Lack of collateral	
			3	Insufficient savings	
			4	Interest rate	
			5	Complicated formalities	
			6	No need for credit	
			7	Too risky	
			8	Previous problems	
			9	No local credit institution	
			10	Unlikely to be approved	
			11	Other, specify	
17.4	loans_amount	How many loans did you obtain in the last pineapple cultivation season?		<numeric value> _____	If loan = 1 and loan_part = 1 or 2, value must be greater than 0
17.5	amount_borrowed	How much did you borrow in the last pineapple cultivation season??		<numeric value> _____	If loan = 1 and loan_part = 1 or 2, value must be greater than 0
17.6	purpose_loan	What were the primary purposes for obtaining loans in the last pineapple cultivation season? (Select all that apply)	1	Personal spending/expenses	if loan_part = 1 or 2
			2	Fertilizer and other input purchase	
			3	Seeds purchase	
			4	Hired labor purchase	

			5	Agricultural equipment investment	
			6	Non-agricultural investment	
			7	Transportation	
			8	Other, specify	
17.7	source_loan	From which sources did you receive loans in the last pineapple cultivation season? (Select all that apply)	1	Formal sector banks	if loan_part = 1 or 2
			2	Money lender	
			3	Family, friends, neighbors	
			4	Microfinance	
			5	Producer organization	
			6	Buyers/Traders	
			8	CLCAM	
			9	CARDER/ADTA	
			10	Other, specify	
17.8	fin_prod	Did you start using any new financial product, such as crop insurance or microfinance etc., in the last pineapple cultivation season?	1	Yes	
			2	No	
17.9	product_cult	Which new financial products did you start using in the last pineapple cultivation season? (Select all that apply)	1	Insurance (flood, drought, crop)	if fin_prod = 1
			2	Microfinance lending	
			3	Agricultural or business loans	
			4	Other, specify	
17.10	groups_cult	Were you a part of any of the following groups (that support pineapple cultivation and marketing directly or indirectly) in the last pineapple cultivation season ? (Select all that apply)	1	Not a member of any group	
			2	Farmer association	
			3	Cooperative	
			4	Extension club	
			5	Formal credit group	
			6	Informal credit group	
			7	Cultural or religious group	
			8	Other, specify	
17.11	benefits	What kind of benefits or services pertaining to pineapple cultivation did you obtain from these groups in the last pineapple cultivation season? (Select all that apply)	1	Cultivation knowledge and market information	if groups_cult = 1-8
			2	Credit	
			3	Agricultural equipment	
			4	Inputs such as fertilizer	
			5	Group selling support, including transportation	
			6	Other, specify	
17.12	farm_mang	Did you use any of the following farm/business management practices	1	None	
			2	Input supply planning:	

		for your pineapple cultivation in the last pineapple cultivation season? (Select all that apply)		Plan ahead of time how and from where they will procure inputs	
			3	Output sales planning (distribution): Plan ahead of time where and how they will sell output	
			4	Bookkeeping (financial record keeping), revenue and expenses planning	
			5	Finance management	
			6	Agricultural calendar planning	
			7	Support for the request for a microcredit	
			8	Loan repayment planning	
			9	Other, specify	

20 PfD CONTRIBUTION

	Variable Name	Questions		Options	Skip Pattern
20.1	pinex	Are you aware of PINEX-PfD?	1	Yes	
			2	No	
20.2	engag_pinex	What types of support have you had with PINEX-PfD since October 2016? (Select all that apply)	1	Received trainings	<i>if pinex=1</i>
			2	Been connected to input suppliers	
			3	Been connected to buyers and exporters	
			4	Received input directly	
			5	Received input for storage facilities	
			6	Become member of pineapple association	
			7	Received training on using storage facilities	
			8	Other, specify	
20.3	keychanges	Since October 2016, list the key changes you have had or made in your pineapple cultivation? (Select all that apply)	1	Yield	
			2	Income/Profitability	
			3	Cultivation/Production practices	
			4	Information availability and access	
			5	Market access	
			6	Input access	
			7	Labor access/used	

			8	production	
			9	Other, specify	
20.4	changes_engage	To which of the following changes has engagement with PfD contributed the most? (Select all that apply)	1	Yield	if pinex=1
			2	Income/Profitability	
			3	Cultivation/Production practices	
			4	Information availability and access	
			5	Market access	
			6	Input access	
			7	Labor used	
			8	Production	
			9	Other, specify	
20.5	area_pineapple	What was your average area under pineapple cultivation in 2016?		<numeric value> _____	
20.6	unit_cult	Unit	1	m ²	
			2	kanti (big)	
			3	Kanti (small)	
			4	Hectares	
20.7	av_yeild		1	Trucks	
			2	Metric ton	
			3	Bâchée / Pick Up Truck 404	
			4	Moped (tricycle)	
			5	Tercel vehicle	
			6	Quarantine	
			7	Trucks	
20.8	av_profit_2015	What was your average profit per hectare of pineapple cultivation in 2015?	1	Negative profit	
			2	Positive but lower than 100,000 XOF	
			3	Between 100,000 and 500,000 XOF	
			4	Between 500,000 and 1,000,000 XOF	
			5	Between 1,000,000 and 5,000,000 XOF	
			6	Higher than 5,000,000 XOF	
20.9	av_profit	What is your average profit per hectare of pineapple cultivation in the last pineapple cultivation season?	1	Negative profit	
			2	Positive but lower than 100,000 XOF	
			3	Between 100,000 and 500,000 XOF	
			4	Between 500,000 and 1,000,000 XOF	
			5	Between 1,000,000 and 5,000,000 XOF	

			6	Higher than 5,000,000 XOF	
--	--	--	---	------------------------------	--

21 USEFULNESS PERCEPTION

How useful were the following PINEX activities for you to increase production of and benefits from pineapple cultivation? Please let us know if they were useful, little useful, somewhat useful, or very useful?

	Activities	Not useful	Slightly useful	Somewhat useful	Very useful	Not applicable
21.1	Farm management training					
21.2	Trainings on pineapple cultivation					
21.3	Connections to input suppliers					
21.4	Connections to buyers and exporters					
21.5	Receiving inputs directly, such as planting material, chemicals, and fertilizer					
21.6	Receiving storage facilities and training on using storage facilities					
21.7	Becoming part of pineapple farmers' association					

Appendix VIII: Training Plan

First day (Jan 9, afternoon to early evening)

Topic	Coverage	Responsible person	Duration
PINEX project overview	Project background, coverage, objectives, activities and monitoring, target groups, outcome indicators.	Francois Cokou, PfD M&E Manager	1 hours
Overview of mid-term review	Objectives, evaluation questions, importance of quality data and data collection, data collection activities, field sites (e.g., take the reference of RFP, proposal, etc.).	Francois Cokou, Zakaria, CRAD	1 hour
Survey sites and respondents (household)	Present information about the survey sites, Present information about sample producers (the persons listed or their adult family member), and alternative sample producers -- - talk about general/possible features of sample characteristics (e.g., educational level, gender, socio-economic status, etc.) and their possible implication on the survey.	CRAD, Zakaria	1 hours
Roles of enumerators	Pre-enumeration duties: Attend enumerators' training, Clearly understand the questionnaires, Clearly understand their roles and duties, Receive survey materials and equipment, Review their assigned field and prepare logistics, During enumeration duties: Locate/identify sample members and contact them if possible, to set survey dates and venue, Visit to the respondents, Verify household addresses and ensure that all names and addresses of respondents are correct, Introduce/Identify themselves with respondents, Briefly tell about the survey (what is it, why is it, how will the data be used, briefly tell about the confidentiality and anonymity i.e., IRB content), Conduct survey with respondents, Record responses appropriately as instructed during the training, Consult supervisors immediately if they have any confusion or questions. Participate in daily reflection on fieldwork, both as a group and individually. Communicate daily reflections to supervisors. Post-enumeration duties: Report any unusual situations to the supervisor, Return all the questionnaires, data, materials, and equipment that were used to the designated person, Turn over all literature and materials used in the survey to the team leader, Follow confidentiality and security procedures to ensure respondent privacy is protected.	Zakaria, CRAD	1 hours

Second day (Jan 10, afternoon to early evening)

Topic	Coverage	Responsible person	Duration
Survey instruments	Present the survey instrument to the enumerators, Clarify the meaning of each questions, answer options, measurement units and/or levels, Edit the questions for clarity to make it more relevant to local context if required, Provide the guidance to collect the data for each question and discuss the possible challenges and/or variations, Allow enumerators adequate time to understand and develop confidence to collect quality data, Make sure that enumerator understand the survey instruments, Explain how to write short answers uniformly (e.g., use same language French, but not in Fon or English; write numbers uniformly by all), Plan for the field test of the survey instrument – tell enumerators about survey implementation (e.g., greetings, introducing themselves and the survey, IRB language, literally ask the same question as they were written and follow the order of questions and technical instructions provided),	Zakaria, CRAD	6 hours

Third day (Jan 11, whole day)

Topic	Coverage	Responsible person	Duration
Test survey instrument	Field test the survey by each enumerator (complete at least 2 surveys by each enumerator),	CRAD	4 hours (in the morning)
Reflection on the field test	Facilitation of the discussion on the field test experience, Figure out whether and what types of challenges appeared in the survey during field test, Slightly revise the survey to fit to the local situation if required, Make a strategy to address the challenges appeared during the field test, Set the final survey and make it ready to implement,	CRAD, Zakaria,	4 hours (in the afternoon)

Fourth day (Jan 12, afternoon)

Topic	Coverage	Responsible person	Duration
Finalize the survey and logistic plan	Finalize the survey, Recap for the whole training and addressing any remaining issues.	CRAD, Catherine, Zakaria (Catherine should be there to make sure the survey is well prepared – if need be ask PfD to reschedule some of the interviews)	2 hours
Logistic management	Communication, coordination, support, reporting, and supervision of the survey, Logistic preparation for the survey, Closing of the training.	CRAD	1 hours

Appendix IX: CRAD's Survey Report



Etude à mi-parcours du projet PINEX-PfD

Rapport général



Centre de Recherche
et d'Appui-conseils
pour le Développement

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Février 2019

English Summary

Introduction

As part of the consultation agreement with SmartStart Evaluation and Research for the mid-term evaluation of PfD's PINEX project, CRAD Sarl is committed to supporting the entire process of data collection with pineapple producers. This mission had several phases and took place from 9 to 27 January 2019: (i) preparation and recruitment of data collection staff (ii) design of the survey form and training of field staff (iii) pretest of questionnaire and survey methodology (iv) collection of actual data from pineapple producers and supervision of the survey (v) compilation and clearance of collected data.

Interviewers training

In collaboration with SmartStart and PfD, CRAD organized the training for field data collection staff at INFOSEC and Codiam in Cotonou. This session was held from January 9 to 12, 2019, ie four (4) days including one (1) day of pre-testing collection tools. In total, 14 investigating officers were trained. In addition to the investigating officers, the training was attended by the CRAD team, Smart Start and PINEX-PfD. The training was done in three main stages.

- **Presentation of the study, data collection methodology and roles and responsibilities:** the interviewers were coached on the objectives of the study, the roles of each stakeholder of the study
- **Questionnaire study:** each question was explained in French and translated into the local language (Fon and Aizo). Exchanges were made with the interviewers on how to ask each question to get the correct answers. Amendments were made to the initial questionnaire. These amendments were made by both CRAD and the PINEX technical team.
- **Testing of the collection form on the tablets:** all participants of the training tested the form. The aim is to assess the conformity between the forms and the final questionnaire chosen.
- **Pilot survey:** the pre-testing was made in the commune of Abomey Calavi with pineapple producers unsampled. A total of 28 forms were completed during the pilot survey. At the end of the pilot survey, corrections were made to the final version of the data collection form.

Data collection

1- Data collection

Data collection officially started on Saturday, January 19, 2019 and ended on January 27, 2019. At the end of the data collection, a total of 768 pineapple producers were surveyed in all municipalities as included in the booklet. charge of CRAD. A total of 12 interviewers divided into 6 groups of 2 people were mobilized for data collection. The data is collected from the producers selected by SMARTSTAT. In case of absence of one of the selected producers, he is replaced by another who is on the reserve list. The data is synchronized day-to-day on the CRAD server by the interviewers.

2- Data collection supervision

Supervision of the data collection was done by three different teams. This is the team from CRAD, SmartStart and the PINEX project. The supervision of CRAD began on Sunday, January 20th and ended on January 25th, ie 6 days of supervision as established in the contract between SmartStat and CRAD. The supervision was carried out by 2 supervisors who are researchers at CRAD who have at least the Master's degree in Sociology. Supervision was used to coach the interviewers on the registration of the forms. It allowed to answer all the questions, doubts and misunderstanding of a possible question.

3- Data quality control

During data collection, the data manager receives the data collected by each team every evening or every 24 hours on the server and carries out the necessary verifications. A data quality control program is written on SPSS and is used every day to identify suspicious data and the investigators concerned are immediately called upon and if there are errors, they are documented and corrected at the same time in the field and integrated into the data. the final database. SmartStat also made the same observations all these observations were integrated into the final database. The data quality control activity was carried out during all days of data collection by the data manager.

Data processing and clearance

A data processing program has been implemented on SPSS. The treatment involved developing a data recovery program that consisted of labeling all variables and modalities. In fact, the raw data from the server requires this preliminary processing in order to make the data comprehensible to any user of the database. In addition to the treatment, a clearance was made. This is the integration of field-corrected data into the raw database obtained from the server. A first version of the database was sent by CRAD on January 21st, two days after the start of data collection. A second version was sent on January 24th. Hari sent his first comments on January 31 with the response from CRAD that was sent on February 1st. The latest version of the database was sent on February 5, 2019 in SPSS, STATA and Excel formats.

Difficulties

No major difficulties affecting the quality of the data collection. Nevertheless, it must be said that the revision of some aspects of the questionnaire after the training involved a week late and forced the CRAD has made an update at the level of the investigating agents implying an extra cost for the CRAD.

Lessons learned

- It is important to finalize the questionnaire more than 90% with the project implementation team before starting the training of the interviewers
- It is important to produce a manual describing the definitions of all the questions in order to better orient each team on the information sought in each question.

- A supervisor should not attend an interview between the interviewer and the respondent. The role of the supervisor is to coach his investigating officers. It must come in support of better collection. Supervision should not become a mere control activity.
- A questionnaire should contain simple and easy-to-understand questions. It is not worthwhile to have the interviewers perform additional calculations before answering the questions as we did through the labor issues.
- In the future, we should further improve communication from one institution (SmartStart) to another (CRAD). Good communication is always beneficial for good collaboration and therefore for successful missions.

French version report

Note introductive

Dans le cadre de l'accord de consultation conclu avec SmartStart Evaluation and Research pour l'évaluation à mi-parcours du projet PINEX de Pfd, le CRAD Sarl, s'est engagé à accompagner l'ensemble du processus de collecte des données auprès des producteurs d'ananas. Cette mission a connu plusieurs phases et s'est déroulée du 9 au 27 janvier 2019 : (i) préparation et recrutement du personnel de collecte des données (ii) conception du formulaire d'enquête et formation du personnel de terrain (iii) prétest du questionnaire et de la méthodologie d'enquête (iv) collecte des données proprement dite auprès des producteurs d'ananas et supervision de l'enquête (v) compilation et apurement des données collectées.

Préparation et formation du personnel de collecte

En prélude à l'enquête sur le terrain, CRAD a dans un premier temps procédé à la lecture des outils et de la méthodologie puis au recrutement du personnel d'enquête. En collaboration avec SmartStart et Pfd, CRAD a organisé une session de mise à niveau du personnel de collecte de données de terrain à l'INFOSEC et au Codiam à Cotonou. **Cette session s'est déroulée du 9 au 12 janvier 2019, soit quatre (4) jours dont un (1) jour de pré test des outils de collecte.**

Le mercredi 9 janvier 2019 était le premier jour de l'atelier de formation des agents enquêteurs à l'INFOSEC dans la salle Plateau. Démarré à neuf heures, l'atelier a connu la présence de plusieurs catégories d'acteurs à savoir :

les formateurs du CRAD ;
l'équipe de Smart Start ;
l'équipe du projet PINEX-Pfd,
les agents enquêteurs.

Liste du personnel de collecte et des équipes d'encadrement

N°	NOM ET PRENOMS	Sexe	Profil/Formation
1		F	Economiste
2		M	Géographe
3		M	Géographe
4		M	Géographe
5		M	BAC + 2 ans en sociologue
7		F	Sociologue
8		M	Géographe
9		F	BTS GRH ³⁹ et Licence Anglais
10		F	Sociologue
11		M	Sociologue
12		M	Géographe

³⁹ Brevet de Technicien Supérieur en Gestion des Ressources Humaines

13		M	Psychosociologue
14		M	Statisticien
Equipe de Suivi			
	NOM ET PRENOMS		Profil
		M	Directeur des opérations
		M	Statisticien/spécialiste suivi
		M	Sociologue
		M	Sociologue, Doctorant

Equipes de Pfd et SmartStart			
	NOM ET PRENOMS		Profil
		M	Statisticien
		M	Statisticien
	Catherine Sanders	M	SmartStart
	Zakaria OUEDRAOGO Yasmin TAHA	M	SmartStart

Le menu du programme de la journée s'est articulé autour des points ci-après :

le mot de bienvenue du directeur des Opérations du CRAD et des consignes sur le déroulement de la formation ;
la présentation des participants ;
l'adoption du code de conduite pour le bon déroulement de la formation ;
la présentation de la mission ;
lecture et échange sur les rôles et responsabilités des acteurs à divers niveaux dans la chaîne de la réalisation de la mission ;
l'étude approfondie du questionnaire.

Dans son mot de bienvenue, le Directeur des opérations du CRAD, a formulé ses vœux les meilleurs de santé et de bonheur à tous les participants de la formation qui se fait dans la ferveur de la nouvelle année qui vient de commencer. Il remercie les uns et les autres pour leur disponibilité et les invite à une réelle participation aux travaux pour améliorer le questionnaire qui est l'outil de la collecte des données sur le terrain. Il n'a pas manqué de mettre un accent particulier sur la nécessité de faire un sérieux travail de terrain en respectant les consignes méthodologique retenues au cours de la formation qui puissent permettre de produire un rapport de qualité.

En ce qui concerne les présentations d'usage, chaque participant a donné son identité et les différentes formations qui constituent le moule de sa personnalité professionnelle. La présentation de la mission qui est faite par le spécialiste du suivi-évaluation situe le projet dans son contexte, ses objectifs, ses axes stratégiques et les activités menées dans le cadre de sa mise en œuvre, les bénéficiaires et les indicateurs ont été également développés.

De la nomenclature des rôles et responsabilité, il est établi cinq niveaux hiérarchiques dont les différentes tâches y afférentes doivent s'accomplir dans une dynamique de lien articulatoire. Il s'agit de la responsabilité des enquêteurs, des chefs d'équipe, des superviseurs, du gestionnaire des données et des membres de l'équipe technique de coordination.

La lecture approfondie du questionnaire est l'étape au cours de laquelle, l'outil est revu question par question afin d'y apporter des amendements. Le tableau suivant présente l'éventail de ce qui est retenu ensemble par tous les participants par rapport aux différentes préoccupations du questionnaire.

Tableau 1: Récapitulatif des questions abordées à la première journée

N°	Questions soulevées	Décisions retenues
1	Administration du questionnaire à la maison ou au champ	Question à revoir après
2	Confidentialité des réponses fournies par l'enquête	Tous les participants sont d'accord
3	L'enquête peut-il se faire remplacer ?	Question à revoir
4	Terminologie échange retenu ensemble dans la note introductive au lieu d'évaluation	Tous les participants sont d'accord
5	Ajouter arrondissement à la rubrique information sur le ménage	Tous les participants sont d'accord.
6	Pertinence ou non de la modalité hameau dans la rubrique information sur le ménage	Les participants ne trouvent pas sa pertinence.
7	Q1.5 Identité du ménage dans la rubrique informations sur le ménage	Revenir sur la préoccupation
8	Q1.6 Adresse du ménage dans la rubrique informations sur le ménage	Revenir sur la préoccupation
9	Q1. 9 de la rubrique informations sur le ménage	Question à revoir
10	Q1. 10 Chef du ménage et lien avec le chef du ménage	Question à revoir
12	Q1.13 et Q1.14 Parler de sexe et non du genre	Tous les participants sont d'accord.
13	Q1.16 de la rubrique information sur le ménage	Suivre les informations du Baseline pour reformuler la question.
14	Q2.1 de la rubrique caractéristique du ménage	Revoir les modalités avec le commanditaire
15	Q2.2 de la rubrique caractéristique du ménage	Revoir les modalités et remplacer les chiffres par les lettres
16	Q2.6 de la rubrique caractéristique du ménage	Corriger la consigne qui est dans la parenthèse
17	Q2.7 de la rubrique caractéristique du ménage	Corriger la consigne dans la parenthèse et ajouter les modalités panneau solaire et dynamo
18	Q2.8 de la rubrique caractéristique du ménage	Reformuler la question en ces termes : parmi les biens suivants, lesquels ont appartenu au ménage.
19	Q2.9 de la rubrique caractéristique du ménage	Reformuler la question en ces termes : parmi les biens suivants, lesquels ont appartenu au ménage
20	Q3.2 Q3.5 Q3.8 de la rubrique terre agricole	Il faut se renseigner par rapport aux modalités
21	Q3.9 de la rubrique terre agricole	Il faut faire un saut si la réponse est non et aller à Q3.11
22	Q4.1 de la rubrique productions et pratiques	Il faut chercher à savoir si les mains d'œuvre permanente et temporaire sont rémunérées.

Source : Atelier de formation des enquêteurs, janvier 2019

Des questions sont retenues unanimement par tous les participants pour être reformulées. Ce sont les questions Q5.4, Q5.5, Q5.6. Par ailleurs, les exposés et explications de l'ingénieur agronome du projet PINEX ont permis aux différents participants de comprendre davantage, d'une part les concepts de « rejets », de « gourmets », etc. et d'autre part l'unité de mesure de la terre à savoir le

kanti qui existe en deux catégories à savoir le kanti grand et le kanti petit. Il précise toutefois que les données du pré-test vont édifier énormément pour avoir une idée de la réalité qui prévaut sur le terrain. Il n'a pas occulté dans son exposé le « tif » qui est le traitement d'induction florale et « l'étrilage » qui est le traitement qui se fait avec « l'éthéphon ».

Le jeudi 10 janvier était la deuxième journée de formation qui a effectivement démarré à 8h40 avec la présentation du rapport de la première journée.

Cette deuxième journée a été consacrée à la poursuite de la lecture du questionnaire qui a démarré par la question Q5.6 de la session « Préparation du sol et semis ». Il a été retenu pour cette section de la mettre au pluriel. La Q5-7 remplace la Q3-10 de la session Terre agricole qui doit être supprimée. Dans cette même session, un réaménagement a été fait et où la Q3-1 a été supprimée et remplacée par la Q3-4 formulée comme suit: Quelle a été la superficie cultivée pendant la dernière saison de production d'ananas (y compris celle de l'ananas). De même, il a été procédé au remplacement de la Q3-4 par la Q3-7 stipulée comme suit : quelle a été la superficie dédiée à la culture d'ananas pendant la dernière saison de production d'ananas. Les questions Q3-6 et Q3-11 ont été supprimées de cette session.

Revenant à la session Préparation du sel et semis, la Q5-8 a été mis au pluriel. Au niveau de la Q5-10, il a été retenu qu'elle est à poser si la $Q5-2=1 \neq 0$. Ainsi, la Q5-14 est également à poser si la $Q5-2 \neq 0$. L'unité de mesure retenue pour les superficies est le kanti. Les questions Q5-12, Q5-13, Q5-14 et l'expression plate bandes doivent faire objet de clarification par M. SOGLO Alain.

Dans la session Irrigation, il a été ajouté au niveau de la modalité 3 'citerne', puis supprimé et remplacé la modalité autre par 'pluie' dans la Q6-1. La Q6-2 a également connue la suppression de l'option *si irrigation=1*.

Pour ce qui est de la session Utilisation d'engrais, plusieurs remarques ont été faites telle que : mettre le Q7-6 au pluriel ; définir le coût total de l'utilisation d'engrais en aidant les enquêtés à identifier le nombre de sac par kanti qu'on ajoute au transport.

Dans la session Produit Chimique, à revoir la numérotation au niveau de la Q8-7.

En ce qui concerne la session Récolte et Distribution, inséré au niveau des unités de mesure : le « tricycle », la « tercelle » et la bâché. La question manquante de la Q11.7 est celle-ci : Quelle est la capacité de l'unité de mesure ?

La session Entreposage préalablement prévu pour être supprimer a finalement été maintenue.

Au niveau de la session Output use and sales, des classifications de M. Alain SOGLO ont été sollicitées pour la question vendue ou utilisée pour chaque classement (Q13-2) du prix du kilogramme de chaque classement vendu sur les marchés et la définition du concept maladies fongiques.

Dans la session14 (transport et attributs de l'acheteur), il a été corrigé au niveau de la modalité 4 de la Q14-4 pourriture au lieu de pourissure et ajouté à la modalité 5 solidité.

En ce concerne la session 15, il a été demandé de faire ressortir au niveau la Q15-7, les modalités mis en exemple dans autre au même titre que les autres modalités.

La question Q15-15 a été reformulée en ces termes : quels sont les services que vous avez reçus pendant la dernière saison de production d'ananas ? De même, la modalité * non * de cette question a été supprimée et remplacée par aucun. Et si la réponse à cette question n'est aucun, aller dans 16-1.

Au niveau de la session 17 Crédit et Affiliation à des Groupements, la question Q17-1 a connu une reformulation qui est la suivante : est-ce que vous avez demandé des prêts pendant la dernière saison de production d'ananas. Le sigle CARDER a été remplacé par ATDA dans la Q17-7. Au niveau de la Q17-12, il a été demandé par PFD de prendre en compte les modalités se trouvant dans autre de la Q15-7. De même la question a été reformulée comme suit : parmi les pratiques de gestion agricole suivante, laquelle ou lesquelles avez-vous eu l'occasion d'utiliser. Dans cette même session une clarification a été faite entre les mots : coopérative et association.

Les sessions 18 et 19 respectivement connu sous les noms : Niveau des principales prises de décision et responsabilités/ producteur et Prise de décision ont été supprimé du questionnaire de commun accord des parties prenantes.

La dernière session consacré la contribution de PFD a connu de légères modifications telles que : la modalité autre se retrouvant dans la Q20-3 doit remonter à la Q20-2 ; les questions Q20-5 ; Q20-7 et Q20-8 ont respectivement été modifié et se présentent comme suit à : Q20-5 quelle a été la superficie totale estimée de votre plantation d'ananas en 2015 ; Q20-7 quel a été votre rendement total en kg à hectare d'ananas en 2015 ? Q20-8 quelle a été votre rentabilité totale par hectare d'ananas cultivé en 2015 ?

Quant au troisième jour en date du vendredi 11 janvier 2019, l'atelier de formation a démarré à 8h50 mn en présence de tous les acteurs concernés.

Le menu du programme de la journée s'est articulé autour des points ci-après :

- la présentation du rapport de la journée antérieure suivie de son amendement et de son adoption ;
- la simulation du questionnaire version papier en langue locale « fon » et « aïzo » ;
- la simulation et évaluation du questionnaire version ODK en langue locale fon et aïzo ;
- la rectification des erreurs remarquées dans l'application lors des simulations.

Après la lecture du rapport quelques inquiétudes sont soulevées sur la relation de dépendance qu'il y a entre les sections 15 et 20 du questionnaire. A ce niveau l'enquêteur est invité à être beaucoup plus vigilant pour le renseignement de la section 20 tout en tenant compte des réponses que l'enquêteur avait servi dans la section 15 pour pouvoir maintenir la cohérence entre les réponses fournis par l'enquêteur.

L'exercice de la simulation du questionnaire version papier en langue locale fon et aïzo nous a permis d'évaluer le questionnaire papier et de faire un glossaire des mots des thèmes français qui seront difficile à traduire en langues locales.

La simulation et évaluation du questionnaire version ODK en langue locale « fon » et « aïzo », quant à elle a permis de vérifier si les champs sont obligatoires, si l'énoncée des questions et des modalités sont conforme à ce qui a été retenu sur la version papier, si les sauts ont été bien observé.

Tableau2: Récapitulatif des questions abordées à la troisième journée

Questions	Modifications apportées
Q1-14	Changer genre en sexe
Q1-15	Limité l'Age du répondant à 90 ans
Q2-8.13 et Q6-1	Revoir la disposition de la question dans la tablette
Q2-9	Enlever cultivateur et mettre « rato »
Q5-11	La phase est revue
Q5-16	La phrase à est corrigée
Q6-3	Se rappeler si Q6-1 différent de 3 ; 4 et 5
Q7-1	Rendre la question au choix de réponse multiple
Q7-2, Q7-2, Q7-3	Mettre les numéros à cote du libellé des questions.
Q7-4	Donne la main pour renseigner le champ
Q8-2	Changer les modalités pour permettre de renseigné les réponses
Q8-7	Rendre non obligatoire le champ qui a énoncé la question
Q11-3	Ne donne pas la main
Q11-5 à Q11-6	Ne donne pas la main pour cocher deux modalités
Q13-8	Est-ce que les producteurs seront capables de répondre à cette question de façon fiable ?
Q14-11	La proportion doit être exprimée en pourcentage
Q16	Les modalités ne répondent pas aux questions posées
Q16-4	Donner la main pour préciser la modalité autre
Q17-10	Un message d'erreur qui bloque l'évolution dans l'administration du questionnaire
Q20-7	Préciser l'unité dans laquelle le rendement sera exprimé

pré-test du formulaire de l'enquête

Le dimanche 13 janvier l'ensemble des membres du personnel de collecte et les superviseurs sont descendus dans la commune de ZINVIE pour tester le questionnaire. Chaque agent enquêteur est invité à renseigner deux questionnaires avant la fin du test. Au total 28 formulaires étaient attendus.

Pour ce prétest, l'équipe de Pfd a mobilisé ses relais pour faciliter la mobilisation des producteurs d'ananas. Cette étape a duré une demi-journée (entre 9 heures et 15 heures).

A la suite du prétest, une séance de débriefing est faite en salle pour recueillir les difficultés méthodologiques, les problèmes liés au formulaire d'enquête et la compréhension des questions par les producteurs.

Il faut noter que dans l'ensemble, le questionnaire était bien compris et la grande difficulté était la longueur du formulaire pour les producteurs.

Déroulement de l'enquête

Collecte des données

La collecte des données a officiellement démarré le samedi 19 Janvier 2019 et a pris fin le 27 janvier 2019. Au bout de la collecte des données, au total 768 producteurs d'ananas ont été enquêtés dans toutes les communes tel que retenu dans le cahier de charge de CRAD. Ci-dessous un tableau récapitulatif.

Tableau 3 point du nombre de producteurs enquêtés par équipe

Communes	Equipe	Agent enquêteur	Producteur total enquêté
Abomey Calavi Allada	Equipe 1	AWO Sylvain (Chef d'équipe)	144
		KOUKOUI Sandra (Membre)	
Abomey Calavi Allada	Equipe 2	HOUESSINON David (Chef d'équipe)	132
		NATTA Raoul (Membre)	
Tori	Equipe 3	DADJEDJI Francis (Chef d'équipe)	114
		DEHA Armelle (Membre)	
Toffo Allada	Equipe 4	LALY Ambroise (Chef d'équipe)	108
		BINAZON Rothiry (Membre)	
Zè, Abomey Calavi, Tori et Kpomassè	Equipe 5	OTCHERE Salomon (Chef d'équipe)	126
		ATTOLOU Nadège (Membre)	
Zè, Tori et Kpomassè	Equipe 6	BEKOU Charles (Chef d'équipe)	144
		- BECOUDE Wilfried (Membre)	

Trois (3) jours après le lancement de la collecte des données, SmartStart à travers Mme Cathérine a demandé à ce CRAD change la compréhension commune qui a été retenue des questions liées aux mains d'œuvre. Pour rappel, un premier consensus avait été fait de ces questions au cours de formations. L'information a été automatiquement relayées chez toutes équipes qui se sont conformées automatiquement à la nouvelle méthodologie de collecte de ces types de données. Les informations concernant les producteurs enquêtés les 3 premiers jours, la correction de ces données a été faite par CRAD à la fin de la collecte après un rappel systématique de tous les producteurs concernés.

Quelques images des observations faites sur le terrain

Image 1



Cette image montre des plants d'ananas ayant contracté la maladie de wilt dans le village de Soyo dans la commune d'allada

Image 2



Cette image montre l'application de la technique de culture intercalaire dans les champs d'ananas. Les acteurs sociaux ont recours à la production de l'arachide, la saison suivante sur une parcelle qui a servi à produire de l'ananas

Image 3 ;



Cette image montre les équipements de travail d'un producteur dans le village d'Agon. Ce sont des équipements que les agriculteurs ont déjà. Toutefois, ils les renouvellent compte tenu de leur détérioration.

Supervision de la collecte des données

La supervision de la collecte des données a été faite par trois différentes équipes. Il s'agit de l'équipe de CRAD, de SmartStart et du projet PINEX. La supervision du CRAD a débuté le dimanche 20 janvier et a pris fin le 25 janvier soit **6 jours** de supervision comme établi dans le contrat entre SmartStat et CRAD. La supervision a été réalisée par 2 superviseurs qui sont des chercheurs au CRAD qui ont au moins le Master en Sociologie

La supervision a permis de coacher les agents enquêteurs sur l'enregistrement des formulaires. Elle a permis de répondre à toutes les questions, doutes et mal compréhension d'une éventuelle question.

Contrôle qualité des données

Au cours de la collecte des données, les data manager reçoivent les données collectées par chaque équipe tous les soirs ou toutes les 24 heures sur le serveur et procèdent aux vérifications nécessaires.

Un programme de contrôle qualité des données est rédigé sur SPSS et est utilisé chaque jour pour identifier les données douteuses et les enquêteurs concernés sont immédiatement interpellés et s'il y a des erreurs, elles sont documentées et corrigées en même temps sur le terrain et intégrées dans la base de données finale. SmartStat a effectué également les mêmes observations toutes ces observations ont été intégrées dans la base de données finales. L'activité de contrôle qualité des données a été réalisée pendant tous les jours de la collecte des données par le data manager

Traitement et apurement des données

Un programme de traitement des données a été mis en place sur SPSS. Le traitement a consisté à élaborer un programme de récupération des données qui a consisté en la labélisation de toutes les variables et de toutes les modalités. En effet, les données brutes issues du serveur nécessitent ce

traitement préliminaire afin de rendre les données compréhensibles à toute utilisateur de la base de données. En plus du traitement, un apurement a été fait. Il s'agit de l'intégration des données corrigées sur le terrain dans la base de données brutes obtenues du serveur. Une première version de la base de données a été envoyée par CRAD le 21 janvier, deux jours après de démarrage de la collecte des données. Une deuxième version a été envoyée le 24 Janvier. Hari a envoyé ses premières observations le 31 janvier avec la réponse de CRAD qui a été envoyée le 1^{re} février. La dernière version de la base de données a été envoyée le 5 février 2019 sous les formats SPSS, STATA et Excel.

Difficultés

Pas de difficultés majeures entachant la qualité de la collecte. Néanmoins, nous présentons quelques-unes rencontrées par les différentes équipes.

Sur le processus de la mission, il faut noter que le fait que le questionnaire n'a pas été définitivement harmonisé entre PfD et SmartStart a perturbé le déroulement de la mission car beaucoup de correction sont apportées au questionnaire après la finalisation du formulaire, ce qui a nécessité plus de travail que prévu sur le formulaire. Cette situation engendré un retard d'une semaine sur le calendrier initial. En effet, la dernière version du questionnaire a été mis à la disposition de CRAD le **19 janvier 2019**.

Sur le déroulement de la collecte des données :

Il s'agit entre autres de :

la non disponibilité de certains enquêtés ;

le temps de l'entretien jugé trop long par la majorité des enquêtés ;

les réponses aux questions Q5, Q7, Q8, Q9 ont été très difficiles aux enquêtés de s'en souvenir ;

la présence de certains membres de l'équipe de supervision lors de l'entretien n'a pas été du tout apprécié par certains enquêtés ;

l'identification de certains producteurs dont les noms sont mal écrits au niveau de la liste. On peut signaler à cet effet, les noms des producteurs du village Zinvié-Zoun qui ont été précédés de la lettre M. A titre d'exemple au lieu de KPODO Marie ; on a "MKPODO Marie". Dans ce village MAGBAMOU Léonie et MLIHOUNOU Bernadin ont été remplacé par MMENOU Julien et MOKE Cécile. Dans le village de Wawata DJEDO Cyprien a été changé par AHOTON Alain ;

doublon dans le village de Loto-Dénou ; il s'agit de VIGNIKOU Djiman et VIGNINO Mathias. Il a été donc procédé à un changement de VIGNINO Mathias par HOUNDEGNON Rosette. De même, BOSSOU Gaston a été remplacé par WINSOU Azondjehoum dans le village de Dodji Aliho ;

le nombre de jours et le coût payé par type de main d'œuvre. Car dans la réalité, les producteurs ne raisonnent pas en termes de jour, mais plutôt en termes de kanti. De même, de la préparation du sol jusqu'à la plantation des rejets par les producteurs, il y a plusieurs sous-activités comme le défrichage et la mise au feu des herbes et arbustes et par conséquent, plusieurs sous-questions ou petites questions mériteraient d'être dissociées et posées à l'avenir et ceci en termes de kanti prioritairement, y inclure ensuite le nombre de jours et le nombre de personnes par type de main d'œuvre. Cela permettra d'éviter les nombreux calculs et de suivre aisément la logique de toutes les réponses données par les producteurs ;

l'absence de certains producteurs d'ananas de leurs maisons, du fait de leurs activités agricoles surtout d'ananas et pour qui il fallait emprunter les sentiers sinueux pour aller les voir dans leurs champs et les interviewer ;

l'absence d'autres catégories de producteurs de leur village depuis près de deux à trois mois. C'est le cas par exemple des frères VINASSE JUSTIN ayant pour identifiant 530 et VINASSE YACINTHE dont l'identifiant est 536, tous du village de TORI CADA CENTRE et qui sont absents, parce que séjournant en prison. Quant aux producteurs SOYONON GABRIEL (458) et SOYONON DVID(459) tous de LOKOSSA (arrondissement de TORI CADA), respectivement étudiant et conducteur, ils vivent actuellement à Cotonou compte tenu de leurs activités secondaires. Avec la permission de nos superviseurs, nous avons procédé à leurs remplacements sur la base de la liste qu'ils nous ont envoyée. Ainsi, VINASSE JUSTIN a été remplacé par VINASSE DENIS dont l'identifiant est 926 et VINASSE YACINTHE a été remplacé par VINASSE KARIM ayant pour identifiant 923. De plus, SOYONON GABRIEL (458) a été remplacé par AZANKPO GUALBERT (901) et SOYONON DAVID (459) a été remplacé par ATOSSI MATHIAS (900). Faisons aussi remarquer que le producteur enregistré sous le nom de AMOUANOU FERDINAND et dont l'identifiant est 533 dans le village de TORI CADA CENTRE, n'a pas en réalité pour nom de famille AMOUANOU mais plutôt HOUNGBEMIN. Il en est de même du producteur GNINASSOU CELESTIM lui aussi de TORI CADA CENTRE et dont l'identifiant est 540. Contrairement à ce qui avait été enregistré lors du recensement, ce dernier s'appelle en réalité ADJIDE CELESTIN et non GNINASSOU CELESTIM. Au regard des consignes reçues lors de la

formation, nous n'avons pas apporté de corrections au niveau de ces noms, mais nous tenons à faire ces observations pour qu'à l'avenir, ces mêmes erreurs ne soient pas répétées. Le seul niveau où une correction a été faite et ceci par ma coéquipière qui ne m'a pas consulté, c'est celui du producteur AIWANON NESTOR dont l'identifiant est 557 dans le village GBOHOUE dans l'arrondissement de TORI CADA (Commune de TORI-BOSSITO). En réalité, ce producteur a pour nom de famille AIWANOU et non AIWANON. De même, il a pour prénom ISIDORE et non NESTOR. D'après les informations reçues sur le terrain, l'appellation NESTOR provient des personnes d'un âge avancé et qui éprouvant de difficulté à prononcer ISIDORE, ont pris l'habitude de l'appeler NESTOR qui est devenu populaire ;

les contacts téléphoniques se trouvant devant les noms de certains producteurs ne leur appartiennent pas forcément. Car, lors du recensement de ces producteurs, ceux d'entre eux qui ne disposaient pas de téléphone portable, mettaient soit le numéro d'un proche, soit celui de leur chef de village. Cela a fait que nous avons appelé à plusieurs reprises ces personnes et gaspillé assez de crédits GSM avant de nous en rendre compte. La correction à ce niveau pour les numéros de téléphone, a été systématique pour les producteurs qui disposent actuellement d'un téléphone portable personnel ;

le cas isolé observé dans le village de LOKOSSA dans l'arrondissement de TORI CADA, concerne Monsieur HOUESOU VICTORIN (dont l'identifiant est le 466) retrouvé sur la liste des producteurs, mais en réalité qui n'est pas un producteur d'ananas. C'est plutôt son grand frère du nom de HOUESSOU MATHIEU qui est un producteur d'ananas reconnu par tous et ayant assisté à toutes les formations données par PINEX que nous avons finalement interviewé. Car, celui-ci était abattu, frustré et disait publiquement qu'il n'assisterait plus aux formations de PINEX pour la simple raison que son nom ne figurait pas sur la liste des producteurs. Sur le conseil du Chef de village qui nous avait conduits dans leur maison, nous l'avions interviewé en lieu et place du jeune frère non producteur d'ananas de surcroît absent pour couper coup à tout ;

la périodicité des jours du marché Houégbo qui est le plus grand du département de l'Atlantique, a influencé le calendrier de la collecte des données sur le terrain, car les enquêtés n'aiment pas perdre leurs temps ce jour pour rencontrer les enquêteurs. Ils doivent se rendre au marché pour vendre leurs produits agricoles, ou acheter d'autres choses ;

les premières pluies de la saison qui ont coïncidé avec la période du terrain n'ont pas également manqué de perturber les travaux de collecte des données ;

les interlocuteurs n'ont pas toujours souvenance des dépenses liées aux étapes de la production de l'ananas qu'ils ont eu à effectuer. La plupart sont des analphabètes qui ne pas consignées ces

dépenses dans un livre des dépenses. Le nombre de jours et le nombre de personnes ayant fait telle ou telle activité sont aussi des modalités pour lesquelles, il faut trouver des techniques d'illustration et d'explication avant de faire comprendre aux enquêtés ce qui est recherché ;

Leçons apprises

Il est important de finaliser le questionnaire à plus de 90% avec l'équipe de mise en œuvre des projets avant de lancer la formation des agents enquêteurs

Il est important de produire un manuel décrivant les définitions de toutes les questions afin de mieux orienter chaque équipe sur l'information recherchée dans chaque question.

Un superviseur ne doit pas assister à un interview entre l'enquêteur et l'enquêté. Le superviseur a pour rôle de coacher ses agents enquêteurs. Il doit venir en appui à une meilleure collecte. La supervision ne doit pas se transformer en une simple activité de contrôle.

Un questionnaire doit contenir des questions simples et faciles de compréhension. Il n'est pas intéressant de faire faire des calculs supplémentaires aux agents enquêteurs avant répondre aux questions comme nous l'avons fait à travers les questions liées aux mains d'œuvre.

Il faudrait qu'à l'avenir nous améliorons davantage la communication d'une institution (SmartStart) à une autre (CRAD). Une bonne communication est toujours bénéfique pour une bonne collaboration et donc pour une bonne réussite des missions.

Appendix X: Focus Group Discussion Guidelines

Greetings and your introduction

Objective of the meeting/interview

IRB and logistic information (e.g., time)

Agreement for interview – Yes/No – If yes, proceed for interview.

Name of the interviewer:

Name of the group:

Date of interview:

Time: from _____ to _____

Name of the participants	Gender of the interviewee	Role/Position of the interviewee/s:	Contact information (phone, email) of the interviewee/s:	Amount of pineapple acreage (how much land do you use for pineapple cultivation?)

A. Farming activities

- What are the activities that you (or the farmers like you) do to produce pineapples?
- Which varieties did you produce in 2018? What are the advantages and disadvantages of each variety?
- How did you get the planting materials?
- How did you prepare the land for pineapple cultivation? Did you use different methods, technologies, tools, or techniques for the land preparation in 2018 (i.e., different from prior to 2018 and/or prior to your participation in PINEX project)?
- How do farmers like you plant pineapple? When (months)? Who works in farming (male/female, HH members, hired labor)?
- What make a producer perform well or poorly in the same variety (e.g., technologies and farming techniques, soil quality and availability of water resources, etc.)?
- Do the farmers like you produce pineapple in multiple sites? What are the advantages and disadvantages of multi-site production?
- How do you care/tend your cultivation?
- Did you change your farming practices after you participated in the PINEX/PfD supported training? What are those changes? Are there any challenges to the practices you've changed? How do they affect production?
- What insects, pests, and diseases are commonly found in your pineapple farming? How do you control such insects, pests and diseases?
- How and when do you use fertilizers? What types of (or which) fertilizers do you use?
- How and when do you use other chemicals (coloring, insect/pest/disease control)?

B. Harvest

- How do you know when to harvest? How do you harvest pineapples? Why?
- How many tons of pineapple are harvested per hectare of plantation per variety?
(participants may also provide volume measures such as pick up or Toyota Tercel capacity, assuming that 1 Pickup is 2-2.5 MT of pineapple and 1 Toyota Tercel is around 1 MT of fruit.)

C. Sale

- How do you sell the products? Do buyers come to you to purchase or you need to take your products to the market?
- How do pineapple growers sell their produce? How are payments made?

D. Access to financial resources

- How do you manage financial resources for pineapple farming (own savings, loan, advance given by processors/buyers)? How much budget is needed to farm pineapple in one hectare or “Kanti”?
- Do you or the farmers like you have access to loans? If yes, how? If not why? What are the advantages and disadvantages of getting loans for pineapple farming?

E. Profitability

- Why do you produce pineapple in your farm?
- Do you think pineapple is a profitable product for farmers like you? How? Why?

F. Challenges and PINEX support

- What were the major difficulties and challenges you faced in 2018 in:
 - availability of labor?
 - land preparation, getting good planting materials?
 - planting, cleaning, weeding?
 - applying inputs (fertilizer, chemical)?
 - selling your products –finding out market, trade negotiation?
 - any other challenges you would like to share?
- How did you (or farmers like you) voice your (their) concerns and/or address such challenges? How did the supporting agencies such as PfD or Pineapple Producers Network of Benin (PPNB) support you in 2018, including in addressing above mentioned challenges? How did PINEX support affect your ability to address challenges? How did it affect your productivity in 2018?
- What do you want to suggest PINEX project to do to support you in the coming two years?
- Will the support you are receiving currently be useful to you in the future?
- Do you want to say anything that we have not covered/discussed yet?
- Do you have any questions for us about the evaluation?

Thank you for your participation.

Appendix XI: List of FGD Participants

N°	Municipalities	Village	Names	Contact	Years cultivated	Acerage under production of pineapple (ha)
Master producers						
1	Allada	Sekou	[REDACTED]	[REDACTED]	8	1,5
2	Allada	Togoudo	[REDACTED]	[REDACTED]	10	1
3	Toffo	Agbamè	[REDACTED]	[REDACTED]	22	1,5
4	Toffo	Houègbo tohomè	[REDACTED]	[REDACTED]	18	1
5	Tori	Zèbè	[REDACTED]	[REDACTED]	15	2,5
6	Tori	Dohinonco	[REDACTED]	[REDACTED]	10	2,5
7	Calavi	Wawata	[REDACTED]	[REDACTED]	14	1,5
8	Calavi	Gbodjoko	[REDACTED]	[REDACTED]	15	4
9	Zè	Yokpo centre	[REDACTED]	[REDACTED]	10	1
10	Zè	Waga	[REDACTED]	[REDACTED]		1,
Women producers						
1	Toffo	Agbamè	[REDACTED]	[REDACTED]		0,5
2	Toffo	Agbamè	[REDACTED]	[REDACTED]		0,5
3	Tori	Zèbè	[REDACTED]	[REDACTED]	10	0,5
4	Tori	Zèbè	[REDACTED]	[REDACTED]		3
5	Calavi	Gbodjoko	[REDACTED]	[REDACTED]		0,5
6	Calavi	Gbodjoko	[REDACTED]	[REDACTED]		2
7	Allada	Kpodjava	[REDACTED]	[REDACTED]	13	2,5
8	Allada	Kpodjava	[REDACTED]	[REDACTED]		0,5
9	Zè	Yokpo centre	[REDACTED]	[REDACTED]		0,5
10	Zè	Zanzoun	[REDACTED]	[REDACTED]		1
Young producers						
1	Tori	Dokanmè	[REDACTED]	[REDACTED]	8	0,5
2	Tori	Gbétaga	[REDACTED]	[REDACTED]		8
3	Calavi	Kpaviédja	[REDACTED]	[REDACTED]	13	3
4	Calavi	Kpé	[REDACTED]	[REDACTED]	11	3
5	Allada	Kpodjava	[REDACTED]	[REDACTED]	11,5	1,5
6	Allada	Kpodjava Cogbo	[REDACTED]	[REDACTED]	13	3
7	Toffo	campement	[REDACTED]	[REDACTED]	17	1
8	Toffo	Agon	[REDACTED]	[REDACTED]	10	1

9	Zè	Tanta			13	2
10	Zè (large producer)	Zanzoun			14	3,5
					18	
Producers large						
1	Toffo	Bossouvi				5
2	Toffo	Soyo				5
2	Tori	Gbétaga				12
4	Calavi	Wawata				8
5	Calavi	Gbodjoko				7
6	Allada	Holansatin				10
7	Allada	Ahouannonzoun				12
8	Zè	Zannoudji				5,5
9	Zè	Tangbo do				7

Appendix XII: List of Processors Interviewed

	Company Name	Responder's Name	Position	Company Address	Contact Number	BPH-BPF-Quality Training	HA CCP	Others support (Marketing, Business)	Prospecting tours and / or fairs	Autres Appuis (Branding, outils, mise en relation avec les banques, etc;.	Credit	Gender
1			Directeur	ALLADA		x		x	x	x		M
2			Directeur	ABOMEY-CALAVI		x	x	x			x	M
3			Gérante	ABOMEY-CALAVI		x	x	x	x	x		W
4			Directrice chargé de la transformation	ZE		x		x	x			W
5			Directrice	Godomey		x		x	x	x		M
6			Promoteur	COTONU		x	x	x	x	x		
7			Gérant	PORTO NOVO		x		x				W
8			Directeur	BOHICON		x		x				M
9			Directeur	ALLADA		x		x	x			W
10			Président	ABOMEY-CALAVI		x		x	x		x	M

11			Responsable	TOFFO		x		x				M
12			Administratar	ABOMEY		x	x	x				M
13			Directeur	COTONO U		x	x	x	x	x	x	
14			Promotrice	Porto- Novo		x	x	x	x	x		W
15			Responsable	SEME- KPODJI		x	x	x	x			
16			Directrice	COTONO U		x		x				W
17			Directeur	ABOMEY- CALAVI		x	x	x	x	x		M
18			Directrice	ABOMEY- CALAVI		x	x	x	x			M
19			Directrice	DJEREGBE		x		x				W
20			Promotrice	PORTO- NOVO		x		x	x			
21			Promotrice	Aglanganda n		x						W
22			Directrice	COTONO U		x		x	x			W
23			Directeur	ABOMEY- CALAVI		x		x		x		M
24			Directrice Générale	ALLADA		x	Iso 2200 0	x	x	x		
25			Directeur Général	ABOMEY- CALAVI		x		x				M

26	■	■	Directeur	ALLADA	■	x	x	x	x	x		M
27	■	■	Directeur	COTONO U	■	x	x		x			M
28	■	■	Directeur	ALLADA	■	x	Iso 2200 0	x	x	x		M
29	■	■	Directeur	ALLADA	■	x	x	x	x			M
30	■	■	Promotrice	COTONO U	■					x	x	W

■

Appendix XIII: Processor Interview Guidelines

Greetings and your introduction

Objective of the meeting/interview

IRB and logistic information (e.g., time)

Agreement for interview – Yes/No – If yes, proceed for interview.

Name of the interviewer:

Name of the company:

Size of the company:

Name of the interviewee/s:

Gender of the interviewee/s:

Role/Position of the interviewee/s:

Geographic location/address of the company:

Contact information (phone, email) of the interviewee/s:

Date of interview:

Time: from _____ to _____

A. Introductory question – background information about company

- How long have you been processing pineapple?
- Does your company operate throughout the year or it operates only certain season or when there is demand from buyers? If seasonal, in which season (which months) does your company work?
- What is your energy source?
- What is the production capacity of your company? How much pineapple did your company process in 2018? How much juice was produced in 2018? How much dry pineapple were produced in 2018? How did this compare to previous years?
- Could you please describe all the pineapple related processing activities that your company does everything from the purchase of fresh pineapple to sale of the processed product?
- What are the different categories of personnel/labor you use? Did you hire new staff /labor in 2018? What are the qualifications – lower to higher levels - of your human resources?

B. Raw materials, transportation, and storage

- Where do you source your fresh pineapple from? Why those sources? Please describe the quality/characteristics of the pineapples you source? If yes, why? If no, why? What efforts did you make in 2018 to source pineapple of high quality?
- Do you personally produce all or part of the pineapple that you process?
- Are you in association with producers?
- How do you transport your fresh pineapple? (Is it by your own means? By which way?)
- How did you store your fresh pineapple before processing in 2018?

C. Processing and packaging (interviewers please make observations to check validity of the responses)

- What machines, tools, and techniques do you use for juice production (for dry pineapple production)? From where you got these processing equipment (e.g., bought from the local market, bought from a regional market, imported from overseas)? What are the costs/benefits of the techniques and tools you use? How do you facilitate and control the quality during production process (e.g., use of thermometer, refractometer, pH meter, etc.)?
- How do you package the processed products? Do you use any additives or supplies materials (e.g., chemical, packaging materials, modified atmospheric materials) for food safety or to increase the products' storage time? Please ask and record each type of packaging used and the origin of the material and equipment.

D. Quality standards

- How do you implement food safety practices in your production unit? Is your company certified for meeting international standards such as Global G.A.P.(Global G.A.P is for fresh pineapple producer as a requirement of European markets), HACCP, and/or ISO 22000? If yes which? If not why? What are the structures and processes that control the quality of your finished product from food safety point of view?

E. Access to financial resources

- How do you manage financial resources? Do you borrow financial resources from financial institutions (e.g., bank, micro-financing institutions)?
- What financing opportunities are available to you (e.g., loan, funding, matching-fund, kind support, etc.)? Did you face challenges in accessing financial resources in 2017/2018?

F. Marketing, transportation, and sales

- Which market do you target to sell your products -- local, national, regional or international? How do you get market-related information (e.g., demand size, demand time, price, quality of products, types of products, etc.)?
- Do you sell directly or through a broker/middleman or through your association?
- How do you store and transport your product (from your location to the final market)?
- Did you participate in national and/or regional trade fairs? If yes, which and when?
- Did you participate in market prospecting tours? If yes, which and when?
- Are/were there any impacts of these participations on the company, particularly in terms of increased sales in existing markets and/or sales in new markets?

G. Environment

- What types of waste do you produce and how do you manage this waste?

H. Profitability

- To what extent your company is making profit? How has this changed over time?
- Did you expand your business in 2018? Are you planning to increase the capacity of your company in the future?

I. Challenges and PINEX support

- What were the major difficulties and challenges you faced in 2018 in:
 - the production process and packaging?
 - sourcing, transporting, and storing fresh fruit?
 - the certification process?

- selling your products – storage, transportation, finding out market, trade negotiation?
 - any other challenges you would like to share?
- How did you voice your concerns and/or address such challenges?
- How did the supporting agencies such as PfD or National Association of Pineapple Processing Companies of Benin (NAPPCB) support you in 2018? How did PINEX support affect your ability to address challenges? How did it affect your productivity/profitability in 2018?
- What do you want to suggest PINEX project to do to support you in the coming two years?
- Will the support you are receiving currently be useful to you in the future?
- Do you want to say anything that we have not covered?
- Do you have any questions for us about the evaluation?

Thank you for your participation.

Appendix XIV: List of Export Companies Interviewed

SN	Company name	Name of Representative	Title	Telephone	Address (E-mail)	Gender
1			Président			M
2			Vice-présidente			W
3			Secrétaire			M
4			Trésorier			M
5			Responsable à la Commercialisation			
6			Comité de surveillance: Rapporteur			M
7			Trésorière Générale			W

Appendix XV: Exporter Interview Guidelines

Greetings and your introduction

Objective of the meeting/interview

IRB and logistic information (e.g., time)

Agreement for interview – Yes/No – If yes, proceed for interview.

Name of the interviewer:

Name of the company:

Name of the interviewee/s:

Gender of the interviewee/s:

Role/Position of the interviewee/s:

Contact information (phone, email) of the interviewee/s:

Date of interview:

Time: from _____ to _____

A. Introductory question

- How long has your company been exporting fresh pineapple? What other products does your company export other than pineapple? Which product do you prefer to export and why?
- Does your company export throughout the year or it exports only during a certain season? If seasonal, in which season (which months) does your company work?
- What is your energy source?
- What is the export capacity of your company? How much fresh pineapple was exported in 2018?
- Could you please describe all the pineapple related exporting activities that your company does -- everything you do from the purchase of pineapple to the sale to the foreign buyer?
- What are the different categories of personnel/labor you use? Did you hire new human resource/labor in 2018? What are the qualifications – lower to higher levels - of your human resources?

B. Supply, storage, packaging and transport

- How do you source/ensure the required quantity and quality of products to export?
- How do you store, package, and transport the fresh pineapple?

C. Market access and quality standards

- Where do you export fresh pineapple? Did you sell your pineapple in a new market/buyer in 2018? How did you get to know or access the new market/buyer?
- How do you meet the requirements of your customers (Global G.A.P, Pallet shipping, carton packaging, etc.)?
- Did you participate in national and/or regional trade fairs? If yes, which and when?
- Did you participate in market prospecting tours? If yes, which and when?

- Are/were there any impacts of these participations on the company, particularly in terms of increased sales in existing markets and/or sales in new markets?

D. Financial resources

- How do you manage financial resources? Do you borrow financial resources from the financial institutions (e.g., bank, micro-financing institutions)?
- How are the opportunities available for financing? Did you face challenges in accessing financial resources? If yes, what are those?

E. Profitability

- To what extent your company is making profit?
- Did you expand your business in 2018? Are you planning to increase the capacity of your company in the future?
- Do you think your company is contributing to the pineapple sector in Benin? If yes, how?

F. Challenges and PINEX support

- What were the major difficulties and challenges you faced in 2018 in:
 - sourcing good quality and adequate quantity of products?
 - storage, packaging, and transportation?
 - selling your products –finding out market, trade negotiations?
 - Ethephon crisis and export ban issues
 - any other challenges you would like to share?
- How did you voice your concerns and/or address such challenges? How did the supporting agencies such as Pfd or National Association of Pineapple Exporters of Benin (NAPEB) support you in 2018? How did PINEX support affect your ability to address challenges? How did it affect your productivity/pofitability in 2018?
- What do you want to suggest PINEX project to do to support you in the coming two years?
- Will the support you are receiving currently be useful to you in the future?
- Do you want to say anything that we have not covered/discussed yet?
- Do you have any questions for us about the evaluation?

Thank you for your participation

Appendix XVI: List of Stakeholders Interviewed

Full name	Organization	Position/title	Phone/email	Type of organization
[REDACTED]	[REDACTED]	Director of Programming and Prospect	[REDACTED]	Benin govt
[REDACTED]	[REDACTED]	Allada branch manager	[REDACTED]	Microfinance institution
[REDACTED]	[REDACTED]	Director of Exploitation	[REDACTED]	Microfinance institution
[REDACTED]	[REDACTED]	Chef service Développement commercial	[REDACTED]	Microfinance institution
[REDACTED]	[REDACTED]	Economic Growth Expert	[REDACTED]	US govt
[REDACTED]	[REDACTED]	[REDACTED] Chairman of the Executive Board	[REDACTED]	Association
[REDACTED]	[REDACTED]	General secretary	[REDACTED]	Association
[REDACTED]	[REDACTED]	Country Program Director Deputy Chief of party M&E Manager M&E Assistant Producer Program Officer Credit Program Officer Business&Marketing Manger Processing Program Officer	[REDACTED]	Implementing agency

[REDACTED]	[REDACTED]	Executive Director	[REDACTED]	Implementing agency
[REDACTED]	[REDACTED]	Regional Coordinator	[REDACTED]	Development partner

Appendix XVII: Stakeholder Interview Guidelines

Greetings and your introduction

Objective of the meeting/interview

IRB and logistic information (e.g., time)

Agreement for interview – Yes/No – If yes, proceed for interview.

Name of the interviewer:

Name of the company:

Name of the interviewee/s:

Gender of the interviewee/s:

Role/Position of the interviewee/s:

Contact information (phone, email) of the interviewee/s:

Date of interview:

Time: from _____ to _____

For Benin Government staff

- How long have you or your organization been engaging in pineapple value-chain in Benin?
- How does your organization contribute to the pineapple value-chain in Benin? Please describe the activities that your organization carried out to support pineapple value-chain in 2018?
- What are the policy provisions that promote pineapple farming, processing, and exported in Benin? Are any policy provisions that constrain pineapple farming, processing, or export? Or are there any policy related issues or concerns?
- What are the Benin government programs to promote pineapple farming, processing, and export?
- To what extent are you aware about the PINEX project? Have you collaborated or partnered with the PINEX project in last 3 years? If yes, what did you do/what are the pineapple sector specific challenges/issues that involve PINEX?
- How are PINEX project activities are in-line with pineapple (farming, processing and exporting) related policies and the programs? How are PINEX project activities supporting to achieve Benin government policy and program objectives?
- To what extent is the institutional restructuring of the agricultural sector of the Benin government impact the implementation and results of the project?
- What do you want to suggest/recommend PINEX project to do to support Benin government's pineapple-related initiatives in the coming two years?
- Do you think the PINEX project support will be critical in the future even after the project termination?
- Do you want to say anything that we have not covered?

For US Government staff

- How long have you or your organization been engaging in pineapple value-chain in Benin?
- How does your organization contribute to the pineapple value-chain in Benin? Please describe the activities that your organization carried out to support pineapple value-chain in 2018?
- What are the policy provisions and programs that promote pineapple farming, processing, and exported in Benin? Are any policy provisions that constrain pineapple farming, processing, or export? Or are there any policy related issues or concerns?
- To what extent are you aware about the PINEX project? Have you collaborated or partnered with the PINEX project in last 3 years? If yes, what did you do?
- To what extent and how (why) do you think that the US government funded PINEX project could be a critical support to strengthen the pineapple value-chain in Benin?
- How are PINEX project activities in-line with pineapple (farming, processing and exporting) related policies and the programs? How are PINEX project activities supporting to achieve Benin government policy and program objectives?
- What do you want to suggest/recommend PINEX project to do to support Benin government's pineapple-related initiatives in the coming two years? How should the PINEX project institutionalize its initiatives to the Benin's government and other local institutions?
- Do you think the current support of PINEX project will be critical in the future even after the project termination? If yes, how? If no, why?
- Do you want to say anything that we have not covered?

For Micro-finance institutions

- How long have you or your organization been engaging in financing pineapple value-chain (farming, processing and exporting) in Benin?
- How does your organization contribute to the pineapple value-chain in Benin? Please describe the activities that your organization carried out to support pineapple value-chain in last 2-3 years?
- How profitable and/or risky for you to finance pineapple farmers, processors, and/exporters? What are the criteria do you consider while making decision for lending?
- What are the challenges for you to sanction loans to pineapple farmers, processors, and exporters?
- What are the policy provisions and programs that provide an environment conducive to you or your organization to finance pineapple farming, processing, and export in Benin? Are any policy provisions constrain your financial support to pineapple farming, processing, or export? Or are there any policy related issues or concerns for you or your organization that hinder you to support pineapple farmers, processors, and/or exporters?
- To what extent and how have you collaborated or partnered with the PINEX project in last 3 years? To what extent this collaboration has been effective to flow loans in such a way that increased the pineapple productivity? Do you think there are areas to improve in your collaboration with PINEX project?
- How are PINEX project activities are in-line with pineapple (farming, processing and exporting) related financial policies and the programs?

- What do you want to suggest/recommend PINEX project to do to support Benin government's pineapple-related initiatives, particularly in financial sector in the coming two years?
- Do you think the PINEX project support (e.g., guarantee fund) will be critical in the future even after the project termination? Or you or your organization may not need such guarantee fund in the long-run?
- Do you want to say anything that we have not covered?

For implementing partners (including producer and processor associations/networks)

- How long have you or your organization been engaging in pineapple value-chain in Benin?
- How does your organization contribute to the pineapple value-chain in Benin? Please describe the activities that your organization carried out to support pineapple value-chain in 2018?
- What are the policy provisions and programs that promote pineapple farming, processing, and exported in Benin? Are any policy provisions that constrain pineapple farming, processing, or export? Or are there any policy related issues or concerns?
- What are the specific PINEX project activities you have been implementing since last 2-3 years? Were these activities implemented as planned? If not, why?
- To what extent do you think the PINEX project activities are effective in achieving the project goals?
- What challenges did you face in implementing the PINEX project activities?
- Have quality private/public partnership formed in accordance with relevant local practices and guidelines?
- In what ways have direct project beneficiaries (producers, processors and exporters) and indirect beneficiaries (i.e., their families or other stakeholders) have been affected by PINEX interventions? Have you observed that the employment increased in the pineapple sector within the project's districts as a result of PINEX?
- Do you think that stakeholders (including your organization) may continue the lessons and project activities beyond the project implementation period? If yes, how? If no, why?
- How are you making sure that the PINEX objectives are achieved?
- Has pineapple productivity increased as a result of improved farm management practices and/or processing practices induced by PINEX?
- How are PINEX project activities in-line with pineapple (farming, processing and exporting) related policies and the programs? How are PINEX project activities supporting to achieve Benin government policy and program objectives?
- To what extent is the institutional restructuring of the agricultural sector of the Benin government impact the implementation and results of the project?
- What do you want to suggest/recommend PINEX project to do to support Benin government's pineapple-related initiatives in the coming two years?
- Do you think the current PINEX project support will be critical and institutionalized in the future even after the project termination?

- Do you want to say anything that we have not covered?

For other stakeholders

- How long have you or your organization been engaging in pineapple value-chain in Benin?
- How does your organization contribute to the pineapple value-chain in Benin? Please describe the activities that your organization carried out to support pineapple value-chain in 2018?
- To what extent are you aware about the PINEX project? Have you collaborated or partnered with the PINEX project in last 3 years? If yes, what did you do?
- How do you think the PINEX project contribution is critical in strengthening pineapple value-chain in Benin?
- How are PINEX project activities are in-line with pineapple (farming, processing and exporting) related policies and the programs? How are PINEX project activities supporting to achieve Benin government policy and program objectives?
- What do you want to suggest/recommend PINEX project to do to support Benin government's pineapple-related initiatives in the coming two years?
- Do you think the current PINEX project support will be critical or institutionalized in the future even after the project termination?
- Do you want to say anything that we have not covered?

Appendix XVIII: Survey Results Summary Tables

Key inputs of pineapple cultivation, processing and export

Land	Producer survey respondents have cultivated pineapple for 12 years on average with a range from half year to 40 years. Surveyed producer respondents' average land cultivated in the last pineapple cultivation season (e.g. 2018) was 2.68 hectares (ha) with a range from 0.17 ha to 30 ha. Pineapple was cultivated in 38% of the total cultivated land. The average land area of pineapple cultivation in 2018 was 1.02 ha with a range from 0.04 ha to 12 ha. Compared to the baseline data of pineapple cultivation land area in 2016 (1.04 ha on average with a range of 0 to 18 ha), the average land area of pineapple cultivation in 2018 did not change significantly. The average cultivated land area of high input producers (2.81 ha) was significantly higher than that of low input producers (2.43 ha). Similarly, the average land area for pineapple cultivation of high input producers (1.08 ha) was also significantly higher than that of low input producers (0.92 ha). Evaluators found two varieties of pineapple cultivated by the surveyed producers, Sugarloaf and Cayenne Smooth. Most respondents (87%, 440 high input producers and 225 low input producers) cultivated Sugarloaf, while 19% of respondents cultivated Cayenne Smooth (91 high input producers and 57 low input producers). Six percent of respondents grew both Sugarloaf and Cayenne Smooth. The proportions are consistent with those in the PINEX Baseline Report. The average land areas of Sugarloaf (0.97 ha) and Cayenne Smooth (0.95 ha) were similar. A majority of surveyed producers (84%) rented land for pineapple cultivation and paid 129,945 XOF (\$226)⁴⁰ on average for renting land in the last cultivation season. High input producers had a significantly higher average land cost (142,420 XOF or \$248) than low input producers (106,650 XOF or \$185).
Planting materials and equipment	All surveyed producers used slips as planting materials and obtained slips from one or more sources. Sixty-eight percent of respondents obtained slips from previous harvested field, while 46% respondents obtained from other producers and 10% from other sources (e.g. PADFA). This finding may suggest that more technical support or training to produce and maintain high quality of slips from PfD might be helpful for the producers. No respondents selected other plant materials, e.g. crowns listed in the questionnaire. Surveyed producers used different types of equipment for preparing land and planting pineapple. For example, all respondents reported that they used hoe. Five respondents said they used tractor and one respondent said that they used plow. Eighty-nine percent of respondents mentioned other conventional farming equipment, such as, machete, arch cut, axe, baskets to carry seedlings, and rope to make lines and planter. Respondents obtained the equipment from various sources. Two-third of respondents purchased the equipment and 59% said that they already owned them. Seven percent of respondents rented some equipment. The average total cost spending on equipment (purchasing, renting or maintaining) was 34,501 XOF (\$60) in the last cultivation season. High input respondents spent significantly more on equipment (40,530 XOF or \$70) than low input producers (23,228 XOF or \$40).
Irrigation and fertilizer use	The primary source of water for pineapple cultivation in the last cultivation season for almost all surveyed producers was rain water. Only three respondents chose other sources besides rain water. Other irrigation sources included pump, well or tank. The major types of source of fertilizer was from shops and the average cost of fertilizer in the last cultivation season was 283, 139 XOF (\$492).
Labor use	Pineapple cultivation is labor intensive. The most frequently reported type of labor used by the respondents in the last pineapple cultivation season is casual labor (92% respondents said

⁴⁰ We took the reference of \$1 = XOF 575.

	they used male casual labor and the same percent of respondents said they used female casual labor) followed by family members (50% of respondents said that they used family male members and 35% said that they used family female members), and permanent labor (9% used permanent male labor and 1% used permanent female labor).
Processing equipment	The most common machines used in the juice preparation process were grinders, extractors, press, pasteurizer, drying machines, electric washer and dryer, and scrambler. For packaging, six processors mentioned using recycled bottles, with only one saying they used new bottles. Three processors each mentioned using an auto filling machine and a capper, with just one discussing the use of an automatic labeling machine.
Transportation	Processors indicated that producers transported pineapple using 3-wheeler or 4x4s to the processing facilities; however, the cost was paid by the processing companies. Processors generally used trucks to transport the finished products.
Waste management in processing	For wastewater, nine processors discussed throwing it into a pit or disposing in a sewage system. Eleven processors pay for garbage disposal, while nine give or sell to pig or cattle farmers for livestock feed. Five processors did convert their waste into compost themselves, or in partnership with local farms or pineapple producers, while two others used a biodigester to convert the waste into electricity or gas.

Appendix table 1. Respondents' household characteristics

Variables	#	%
Household head		
Male	686	89
Female	82	11
Household size – average (standard deviation; min-max)	8.57 (5.43; 1-45)	
Household subsistence activity		
Crop Production	669	87
Livestock Production	16	2
Crafts	13	2
Agricultural Trade	7	1
Private Sector Employee	7	1
Food Processing	6	1
Entrepreneurship/Affaire	4	1
Public Sector Employee	4	1
Student (Scholarships, intern, etc.)	3	0
Fishing	2	0
Other	37	5
Wall		
Bricks de Earth/Earth	466	61
Bricks/Stones	280	36
Cement	20	3
Bamboo	2	0
Roof		
		0
Sheet	735	96
Tiles	27	4
Straw	5	1
Cement	1	0
Light		
Lamp to Oil	378	49
Electricity (Panel Solar Dynamo etc.)	155	20
Electricity SBEE	125	16

Group Generator	19	2
Candles	1	0
Assets		
Mobile Phone	739	96
Motorcycle/Tricycle	664	86
Beds	530	69
Bicycle	324	42
TV	222	29
Sewing Machine	117	15
Car	68	9
Electric Fan	56	7
Refrigerator	9	1
Gas Cooker	6	1
Air Conditioner	1	0

Appendix table 2a. Agricultural characteristics of surveyed farmers

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Cultivated land area (ha)	2.81 (3.03)	0.2-30	2.43 (2.21)	0.17-20	2.68 (2.78)	0.17-30	0.05
Years of pineapple cultivation	12.41 (6.46)	1-40	11.73 (6.91)	0.5-40	12.18 (6.62)	0.5-40	0.19
Pineapple cultivated area (ha) in 2018	1.08 (1.19)	0.04-12	0.92 (0.97)	0.07-9	1.02 (1.12)	0.04-12	0.04
Pineapple cultivated area (ha) in 2016	1.14 (1.70)	0-18	0.86 (1.18)	0-9	1.04 (1.55)	0-18	0.01
Land area under smooth Cayenne (ha) (high input =91; low input n=57)	1.15 (1.66)	0.03-12	0.62 (0.54)	0.08-3	0.95 (1.36)	0.03-12	0.01
Land area under Sugarloaf (ha) high (input n= 440; low input n=225)	0.99 (0.95)	0.04-8	0.93 (1.01)	0.07-9	0.97 (0.97)	0.04-9	0.48
Cost of renting land (XOF) high (input n=422; low input n=226)	142,420.56 (197,452.96)	2,000-2,000,000	106,650.42 (115,760.09)	6,000-800,000	129,945.17 (174,127.17)	2,000-2,000,000	<0.01

Note: Evaluators compared means between high and low input farmers for agricultural characteristics.

Appendix table 2b. Agricultural characteristics of surveyed farmers

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Farmers growing smooth Cayenne	91	57	148	18%	21%	19%	0.332
Farmers growing Sugarloaf	440	225	665	88%	84%	87%	0.206
Farmers growing both smooth Cayenne and Sugarloaf	30	15	45	6%	6%	6%	0.963
Producers rented the land for pineapple cultivation	422	226	648	88%	85%	84%	0.197
Farmers having moist or swampy soil	42	34	76	8%	13%	10%	0.072
Farmers having red soil	371	183	554	74%	69%	72%	0.124
Farmers having other soil	135	83	218	27%	31%	28%	0.259
Male family workforce	249	136	385	50%	51%	50%	0.802
Female family workforce	178	90	268	36%	34%	35%	0.671
Permanent male workforce	49	21	70	10%	8%	9%	0.455
Permanent female workforce	4	2	6	1%	1%	1%	1 (NA)
Temporary male labor	460	248	708	92%	93%	92%	0.701
Temporary female labor	464	243	707	93%	91%	92%	0.521

Note: Evaluators compared the proportions between high and low input farmers for agricultural differences.

Appendix table 3a. Farmers' characteristics related to pineapple cultivation

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Small farmers (< 1 ha)	54	43	97	11%	16%	13%	0.045
Medium farmer (1 - 5 ha)	398	204	602	79%	76%	78%	0.378
Big farmers (> 5 ha)	49	20	69	10%	8%	9%	0.355
Farmers growing Smooth Cayenne	91	57	148	18%	21%	19%	0.332
Farmers growing Sugarloaf	440	225	665	88%	84%	87%	0.206
Farmers growing both Sugarloaf and Smooth Cayenne	30	15	45	6%	6%	6%	0.963
Obtained plant material from old field	340	186	526	68%	70%	68%	0.668
Obtained plant materials from other producers	249	108	357	50%	40%	46%	0.018
Obtained plant materials elsewhere	43	32	75	9%	12%	10%	0.166
Used releases (slips) as plant materials	501	267	768	100%	100%	100%	NA
Used crowns as plant materials	0	0	0	0%	0%	0%	NA
Used other plant materials	0	0	0	0%	0%	0%	NA
Producers rented the land for pineapple cultivation	422	226	648	88%	85%	84%	0.197
Farmers having moist or swampy soil	42	34	76	8%	13%	10%	0.072
Farmers having red soil	371	183	554	74%	69%	72%	0.124
Farmers having other soil	135	83	218	27%	31%	28%	0.259
Male family workforce	249	136	385	50%	51%	50%	0.802
Female family workforce	178	90	268	36%	34%	35%	0.671
Permanent male workforce	49	21	70	10%	8%	9%	0.455
Permanent female workforce	4	2	6	1%	1%	1%	1 (NA)
Temporary male labor	460	248	708	92%	93%	92%	0.701
Temporary female labor	464	243	707	93%	91%	92%	0.521

Note: Evaluators compared the proportions between high and low input farmers for characteristics related to pineapple cultivation.

Appendix table 4a. Preparation (including land preparation) for pineapple cultivation

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Total cost of equipment (purchase/rent/maintain) (high input n=432; low input n=231)	40,530.12 (96,474.52)	10-637,500	23,228.57 (53,335.87)	300-480,000	34,501.98 (84,356.46)	10-637,500	<0.01
# of days for male family workforce (high input n=249; low input n=136)	20 (32)	0-375	25 (62)	0-655	22 (45)	0-655	0.39
# of days for female family workforce (high input n=178; low input n=90)	11 (16)	0-116	11 (14)	0-60	11 (15)	0-116	0.73
# of days for male permanent workforce (high input n=49; low input n=21)	43 (70)	4-493	40 (37)	4-180	42 (62)	4-493	0.83
# of days for female permanent workforce (high input n=4; low input n=2)	12 (9)	0-20	30 (0)	30-30	18 (11)	0-30	0.26 ⁴¹
# of days for male temporary workforce (high input n=460; low input n=248)	72 (120)	0-972	87 (189)	0-2340	77 (148)	0-2,340	0.26
# of days for female temporary workforce (high input n=465; low input n=243)	23 (46)	0-450	22 (44)	0-450	23 (45)	0-450	0.86
Total labor cost (high input n=462; low input n=249)	215,413.11 (351,889.89)	2,000-3,600,000	217,815.99 (351,122.13)	5,500-2,907,520	216,254.62 (351,375.69)	2,000-3,600,000	0.86
Pineapple density - smooth Cayenne (high input n=26; low input n=33)	43,537 (6,456)	27,000-51,200	44,506 (18,838)	64-135,000	44,079 (14,629)	64-135,000	0.78
Pineapple density - Sugarloaf (high input n=440; low input n=225)	44,360 (14,538)	2,250-153,600	43,982 (13,320)	2,000-100,000	44,232 (14,129)	2,000-153,600	0.74

Note: Evaluators compared means between high and low input farmers for preparation for pineapple cultivation.

⁴¹ Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

Appendix table 4b. Preparation (including land preparation) for pineapple cultivation

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Obtained plant material from old field	340	186	526	68%	70%	68%	0.668
Obtained plant materials from other producers	249	108	357	50%	40%	46%	0.018
Obtained plant materials elsewhere	43	32	75	9%	12%	10%	0.166
Used releases (slips) as plant materials	501	267	768	100%	100%	100%	NA
Used crowns as plant materials	0	0	0	0%	0%	0%	NA
Used other plant materials	0	0	0	0%	0%	0%	NA
Used hoe to prepare fields	501	267	768	100%	100%	100%	NA
Used plow to prepare fields	0	1	1	0%	0%	0%	0.749
Used tractor to prepare fields	1	4	5	0%	1%	1%	0.097
Used other equipment to prepare fields	439	246	685	88%	89%	89%	0.073
Purchased equipment	333	178	511	66%	67%	67%	1.000
Rented equipment	45	10	55	9%	4%	7%	0.011
Already owned equipment	284	166	450	57%	62%	59%	0.164
Also cultivated corn	368	178	546	73%	67%	71%	0.058
Also cultivated cassava	216	94	310	43%	35%	40%	0.040
Also cultivated peanuts	78	39	117	16%	15%	15%	0.804
Also cultivated tomatoes	197	96	293	39%	36%	38%	0.403
Also cultivated chili peppers	83	39	122	17%	15%	16%	0.546
Also cultivated other crops	73	31	104	15%	12%	14%	0.303
Practiced intercropping	416	207	623	83%	78%	81%	0.078
Single row array - smooth Cayenne (high input n=92; low input n=58)	20	27	47	22%	47%	31%	0.003
Double row array - smooth Cayenne (high input n=92; low input n=58)	72	31	103	78%	53%	69%	0.003
Single row array - Sugarloaf (high input n=440; low input n=225)	249	124	373	57%	55%	56%	0.779
Double row array - Sugarloaf (high input n=440; low input n=225)	191	101	292	43%	45%	44%	0.779

Note: Evaluators compared the proportions between high and low input farmers for preparation for pineapple cultivation.

Appendix table 5. Irrigation

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Rain as main source of irrigation	499	266	765	99.60%	99.63%	99.61%	1

Note: Only three farmers reported using an irrigation method other than rain. Among these three farmers, two were high input and one was low input. For irrigation, one farmer used well, one farmer used rain and pump, and another farmer used a combination of tank, rain, and well. Of the three farmers, only two (one high input and one low input) reported the cost of irrigation. The high input farmer paid 5,000 for irrigation and the low input farmer paid 900.

Appendix table 6a. Fertilizer

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Quantity of urea used for fertilizer (high input n=484; low input n=254)	9 (17)	0.5-300	7 (12)	0.15-142	8 (16)	0.15-300	0.18
Quantity of NPK used for (high input n=447; low input n=261)	8 (10)	0.25-105	7 (13)	0.15-142	8 (11)	0.15-142	0.54
Quantity of potassium sulphate used for fertilizer (high input n=277; low input n=135)	8 (11)	0.5-80	5 (7)	0.5-60	7 (10)	0.5-80	0.01
Quantity of organic fertilizer (high input n=10; low input n=6)	14 (12)	2-40	5 (6)	2-17	11 (11)	2-40	0.03 ⁴²
Quantity of other fertilizer (high input n=21; low input n=8)	8 (9)	0-40	5 (5)	1-15	7 (8)	0-40	0.64 ⁴³
# of times used fertilizer (low input n=266)	3 (1)	1-6	3 (1)	1-8	3 (1)	1-8	0.71
Total cost of fertilizer (low input n=266)	302,598 (495,648)	6,000-8,000,000	246,489.94 (389,391.53)	5,600-4,402,000	283,139.18 (462,089.44)	5600-8,000,000	0.09

⁴² Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

⁴³ Conducted Mann-Whitney U due to small sample size

Appendix table 6a. Fertilizer (continued)

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
# of days for male family workforce on fertilizing (high input n=183; low input n=109)	3 (3)	1-21	3 (4)	1-21	2.93 (3.37)	1-21	0.54
# of days for female family workforce on fertilizing (high input n=61; low input n=33)	2 (2)	1-12	4 (4)	1-21	2.83 (3.08)	1-21	0.10
# of days for male permanent workforce on fertilizing (high input n=43; low input n=21)	5 (6)	1-36	9 (15)	1-72	5.95 (10.15)	1-72	0.26
# of days for female permanent workforce on fertilizing (high input n=1; low input n=2)	2 (NA)	2-2	2 (0)	2-2	2.00 (NA)	2-2	0.66 ⁴⁴
# of days for male temporary workforce on fertilizing (high input n=388; low input n=181)	6 (24)	1-468	6 (10)	1-84	6.09 (20.83)	1-468	0.95
# of days for female temporary workforce on fertilizing (high input n=113; low input n=41)	3 (4)	1-36	4 (4)	1-16	3.29 (4.47)	1-36	0.49
Cost per day for fertilizing (high input n=407; low input n=190)	2,802 (2,016)	300-15,600	2,794 (1,918)	500-16,000	2,799.71 (1,983.58)	300-16,000	0.96
Total cost for fertilizing (high input n=407; low input n=190)	22,396 (122,073)	600-2,444,490	22,273 (48,059)	1,000-420,000	22,356.86 (104,325.16)	600-2,444,490	0.67

Note: Evaluators compared means between high and low input farmers fertilizer related activities.

⁴⁴ Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

Appendix table 6b. Fertilizer

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Did not use fertilizer	0	1	1	0%	0%	0%	0.749
Used urea for fertilizer	484	254	738	97%	95%	96%	0.418
Used NPK for fertilizer	477	261	738	95%	98%	96%	0.124
Used potassium sulphate for fertilizer	277	135	412	55%	51%	54%	0.240
Used organic fertilizer	10	6	16	2%	2%	2%	1.000
Used other fertilizer	21	8	29	4%	3%	4%	0.529
Obtained fertilizer from shops (low input n=266)	457	240	697	91%	90%	91%	0.747
Obtained fertilizer from other farmers (low input n=266)	61	45	106	12%	17%	14%	0.089
Obtained fertilizer from ATDA (low input n=266)	85	31	116	17%	12%	15%	0.065
Obtained fertilizer elsewhere (low input n=266)	32	19	51	6%	7%	7%	0.805

Note: Evaluators compared the proportions between high and low input farmers for fertilizer qualities.

Appendix table 7a. Weeding

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
By herbicide (high input n=20; low input n=15)	1.5 (1.14)	1-6	2.6 (3.83)	1-12	1.97 (2.66)	1-12	0.298
Manually (high input n=476; low input n=257)	10.6 (4.43)	1-36	9.84 (4.36)	1-24	10.32 (4.42)	1-36	0.031
Male for herbicide (high input n=13; low input n=10)	4.46 (8.61)	0-30	1.5 (2.17)	0-7	3.17 (6.68)	0-30	0.332 ⁴⁵
Female for herbicide (high input n=10; low input n=8)	5.20 (9.82)	0-30	0.5 (1.068)	0-3	3.11 (7.57)	0-30	0.084 ⁴⁶
Permanent male labor for herbicide (high input n=2; low input n=2)	2.00 (0.00)	2-2	18 (16.97)	6-30	10.00 (13.47)	2-30	0.221 ⁴⁷
Permanent female labor for herbicide (high input n=2; low input n=0)	0.50 (0.71)	0-1	NA	NA	0.50 (0.71)	0-1	NA
Temporary male labor for herbicide (high input n=20; low input n=14)	4.75 (7.47)	0-30	4.78 (6.65)	0-24	4.76 (7.04)	0-30	0.972 ⁴⁸
Temporary female labor for herbicide (high input n=20; low input n=13)	2.70 (7.24)	0-30	1.154 (1.725)	0-5	2.09 (5.73)	0-30	0.933 ⁴⁹

⁴⁵ Conducted Mann-Whitney U due to small sample size

⁴⁶ Conducted Mann-Whitney U due to small sample size

⁴⁷ Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

⁴⁸ Conducted Mann-Whitney U due to small sample size

⁴⁹ Conducted Mann-Whitney U due to small sample size

Appendix table 7a. Weeding (continued)

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Male for manual weeding (high input n=241; low input n=134)	15.35 (22.61)	0-120	16.64 (33.32)	0-280	15.81 (26.89)	0-280	0.689
Female for manual weeding (high input n=172; low input n=88)	5.86 (14.92)	0-96	3.18 (9.76)	0-80	4.95 (13.44)	0-96	0.084
Permanent male labor for manual weeding (high input n=35; low input n=17)	46.86 (70.40)	0-360	94.29 (136.13)	12-570	62.37 (98.09)	0-570	0.191
Permanent female labor for manual weeding (high input n=3; low input n=2)	6.33 (6.03)	0-12	60 (67.88)	12-108	27.80 (45.10)	0-108	0.236 ⁵⁰
Temporary male labor for manual weeding (high input n=447; low input n=241)	56.30 (110.46)	0-960	42.04 (88.20)	0-912	51.31 (103.37)	0-960	0.065
Temporary female labor for manual weeding (high input n=444; low input n=233)	4.41 (15.32)	0-192	4.75 (24.59)	0-320	4.53 (19.01)	0-320	0.848
Paid per day for temporary labor during chemical spreading activity	103791.8 (232,690)	0-25,930,800	73941.34 (144,049.31)	0-1,140,000	93,414.13 (206,627.72)	0-2,593,080	0.029

Note: Evaluators compared means between high and low input farmers for weeding techniques.

⁵⁰ Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

Appendix table 7b. Weeding

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Conducted weeding	478	259	737	95%	97%	96%	0.381
Herbicide (high input n=478; low input n=259)	20	15	35	4%	6%	5%	0.425
Manual weeding (high input n=478; low input n=259)	476	257	733	100%	99%	99%	0.921

Note: Evaluators compared the proportions between high and low input farmers for weeding techniques.

Appendix table 8. Safety measures

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Safety measures	N=501	N=267	N=768				
Wearing gloves	467	246	713	93	92	93	0.685
Wearing boots	441	236	677	88	88	88	0.974
Others	181	90	271	36	34	35	0.556
No measures taken	16	9	25	3	3	3	1.000
Do you know best ways to protect pineapples from sun	287	161	448	77%	77%	77%	1.000
Did you protect pineapples from sun	130	58	188	26%	22%	24%	0.227
What did you use to protect your pineapple?	N=130	N=58	N=88				
Palm leaves	124	55	179	95%	95%	95%	1.000
Dried weeds	29	11	40	22%	19%	21%	0.746
Corn leaves	12	3	15	9%	5%	8%	0.511
Others	2	2	4	2%	3%	2%	0.771

Note: Evaluators compared the proportions between high and low input farmers for safety measures taken.

Appendix table 9a. Protection from sunlight, insects/pests, and diseases

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Total cost incurred (beside labor) to protect the pineapples against sun (high input n=130; low input n=58)	6,676.15 (11,033.25)	0-50,000	5,017.24 (9,958.23)	0-50,000	6,164.36 (10,714.16)	0-50,000	0.310
Number of days for male family workforce (high input n=63; low input n=32)	2.05 (2.64)	0-15	3.50 (9.29)	0-54	2.54 (5.79)	0-54	0.392
Number of days for female family workforce (high input n=47; low input n=21)	0.83 (1.52)	0-8	0.52 (0.81)	0-3	0.74 (1.35)	0-8	0.286
Number of days for temporary male labor (high input n=123; low input n=58)	2.93 (10.34)	0-100	2.38 (5.47)	0-30	2.75 (9.06)	0-100	0.642
Number of days for temporary female labor (high input n=125; low input n=56)	1.72 (13.41)	0-15	0.50 (1.18)	0-7	1.34 (11.17)	0-150	0.315
Cost incurred in managing crop and insect diseases (high input n=285; low input n=126)	2,210.58 (22,603.27)	0-350,000	2,107.24 (12,553.49)	0-84,000	2,179 (20,049)	0-350,000	0.953
Calcium carbide/chemical to induce flowering – GD (high input n=500; low input n=265)	1.22, 0.66	1-10	1.28, 0.74	7-339	1.24 (0.69)	1-10	0.274
Ethephon/chemical to change the skin color of the fruit -GF (high input n=53; low input n=17)	1.06, 0.23	1-2	1.00 (0.00)	1-1	1.04 (0.20)	1-2	0.083

Appendix table 9a. Protection from sunlight, insects/pests, and diseases (continued)

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Fungicide – GH (high input n=0; low input n=0)	NA	NA	NA	NA	NA	NA	NA
Nematicides – GI (high input n=0; low input n=0)	NA	NA	NA	NA	NA	NA	NA
Other Pesticides/Insecticides - GK (high input n=0; low input n=0)	NA	NA	NA	NA	NA	NA	NA
Months after culture chemicals such as calcium carbide used to encourage pineapple production -GL (high input n=500; low input n=265)	12.39 (2.62)	4-23	12.41 (2.53)	5-24	12.40 (2.59)	4-24	0.929
No. of times have chemicals such as calcium carbide used to induce flowering of chicks – GM (high input n=500; low input n=265)	1.23 (0.54)	1-5	1.23 (0.55)	1-4	1.23 (0.54)	1-5	0.886
Months after cropping chemicals such as ethephon used to change the color of pineapple -GN (high input n=53; low input n=17)	7.11 (5.58)	0-19	11.94 (6.17)	1-18	8.29 (6.05)	0-19	0.008
Total cost of using all chemicals, (not counting labor charges) for pineapple growing during the last season of pineapple production? – GT (low input n=265)	17,480.44 (21,387.41)	600-144000	16,563.68 (19,173.07)	800-120,000	17,163.28 (20,640.23)	600-144,000	0.546
pay per day for the temporary labor during the chemical spreading activities -HD	16,790.80 (29,431.60)	0-270000	19,287.81 (42,533.86)	0-549120 0-549,120	17,658.90 (34,547.25)	0-549,120	0.392

Note: Evaluators compared means between high and low input farmers for protection from sunlight, insects/pests, and diseases.

Appendix table 9b. Protection from sunlight, insects/pests, and diseases

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Did you protect pineapples from sun	130	58	188	26%	22%	24%	0.227
Do you know best ways to protect pineapples from sun	287	161	448	77%	77%	77%	1.000
Palm leaves	124	55	179	95%	95%	95%	1.000
Corn leaves	12	3	15	9%	5%	8%	0.511
Dried weeds	29	11	40	22%	19%	21%	0.746
Others	2	2	4	2%	3%	2%	0.771
Did damage occur due to diseases or insects during pineapple production	285	126	411	57%	47%	54%	0.013
Wilting	237	92	329	83%	73%	80%	<0.001
Other	48	34	82	17%	27%	20%	0.216
No products	0	2	2	0%	1%	0%	0.232
Calcium carbide/chemical to induce flowering	500	265	765	100%	99%	100%	0.579
Herbicides	19	13	32	4%	5%	4%	0.602
Ethephon/Chemical to change the skin color of the fruit	53	17	70	11%	6%	9%	0.072
Insecticide (e.g. Against cochineal insects)	2	0	2	0%	0%	0%	0.772
Fungicides	0	0	0	0%	0%	0%	NA
Nematicides	0	0	0	0%	0%	0%	NA
Other, specify (any pesticide, insecticide)	3	5	8	1%	2%	1%	0.200

Appendix table 9b. Protection from sunlight, insects/pests, and diseases (continued)

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Pineapple size (high input n=53; low input n=17)	30	13	43	57%	76%	61%	0.239
Delivery/date of sale (high input n=53; low input n=17)	21	2	23	40%	12%	33%	0.067
Other, specify (high input n=53; low input n=17)	50	13	63	94%	76%	90%	0.094
Others (high input n=53; low input n=17)	0	0	0	0%	0%	0%	NA
Male family workforce (high input n=249; low input n=135)	74	26	100	30%	19%	26%	0.035
Female family workforce (high input n=178; low input n=89)	14	4	18	8%	4%	7%	0.437
Permanent male labor (high input n=49; low input n=21)	30	9	39	61%	43%	56%	0.248
Permanent female workforce (high input n=4; low input n=2)	0	0	0	0%	0%	0%	NA
Temporary male labor (high input n=460; low input n=246)	106	49	155	23%	20%	22%	0.390
Temporary female labor (high input n=464; low input n=241)	48	16	64	10%	7%	9%	0.137

Note: Evaluators compared the proportions between high and low input farmers protection from sunlight, insects/pests, and diseases.

Appendix table 10a. Harvest

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Months between cropping and harvesting	18 (2)	10-29	18 (2)	10-30	18 (2)	10-30	0.75
# of days for male family workforce on harvesting (high input n=49; low input n=21)	4 (4)	1-15	2 (2)	1-8	3 (4)	1-15	0.02
# of days for female family workforce on harvesting (high input n=41; low input n=18)	3 (4)	1-21	3 (3)	1-12	3 (4)	1-21	0.96
# of days for male permanent workforce on harvesting (high input n=10; low input n=3)	6 (7)	1-24	6 (6)	2-12	6 (6)	1-24	0.57 ⁵¹
# of days for female permanent workforce on harvesting (high input n=3; low input n=1)	2 (1)	1-2	1 (NA)	1-1	2 (1)	1-2	0.47 ⁵²
# of days for male temporary workforce on harvesting (high input n=183; low input n=88)	7 (15)	1-120	5 (6)	1-30	6 (13)	1-120	0.15
# of days for female temporary workforce on harvesting (high input n=417; low input n=228)	9 (19)	1-180	10 (18)	1-150	9 (18)	1-180	0.52
Cost per day for harvesting (high input n=119; low input n=63)	2,787.18 (1,877.30)	200-9,000	2,987.25 (2,188.04)	312-8,000	2,856.44 (1,986.61)	200-9,000	0.54
Total cost for harvesting (high input n=119; low input n=63)	52,847.69 (176,895.24)	300-1,800,000	37,038.38 (41,348.74)	2,000-180,000	47,375.24 (145,061.34)	300-1,800,000	0.35

Note: Evaluators compared means between high and low input farmers for preparation for harvest labor.

⁵¹ Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

⁵² Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

Appendix table 11. Change in harvesting land

Variable	High dose # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Did not change	32	22	54	6%	41%	7%	0.083
Increased	411	215	626	88%	34%	82%	>0.001
Decreased	58	30	88	12%	34%	11%	>0.001

Note: Evaluators compared the proportions between high and low input farmers for changes to harvest labor.

Appendix table 12. Use

Variable	High Input # (n=501)	Low Input # (n=267)	Aggregate # (n=768)	High Input %	Low Input %	Aggregate %	p-value (difference between high vs low input)
Personally consumed pineapple	218	126	344	44%	47%	45%	0.368
Sold pineapple in farm	406	213	619	81%	80%	81%	0.745
Sold pineapple on local market	123	75	198	25%	28%	26%	0.327
Sold pineapple on urban market	33	28	61	7%	10%	8%	0.078
Sold pineapple on regional market	27	15	42	5%	6%	5%	1.000
Sold pineapple to food processor	36	20	56	7%	7%	7%	0.993
Sold pineapple for export	15	10	25	3%	4%	3%	0.730
Sold pineapple elsewhere	35	29	64	7%	11%	8%	0.087

Note: Evaluators compared the proportions between high and low input farmers for how they used pineapples.

Appendix table 13. Income

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Income from jumbo smooth Cayenne (high input n=84; low input n=54)	9,069,349.52 (46,114,792.20)	13,360-405,000,000	1,625,412.04 (4,504,492.53)	25,000-32,000,000	6,156,504.42 (36,187,106.64)	13,360-405,000,000	0.15
Income from large smooth Cayenne (high input n=88; low input n=55)	569,807.95 (2,312,973.73)	4,000-20,000,000	252,763.64 (633,902.45)	7,500-4,500,000	447,867.83 (1,858,626.24)	4,000-20,000,000	0.23
Income from medium smooth Cayenne (high input n=58; low input n=31)	140,025.86 (417,804.11)	4,000-2,500,000	70,801.61 (132,655.44)	1,500-560,000	115,914.04 (346,650.68)	1,500-2,500,000	0.25
Income from small smooth Cayenne (high input n=0; low input n=4)	NA	NA	34,250 (32,907.70)	2,000-70,000	271.29 (3,960.08)	0-70,000	0.13 ⁵³
Total income from smooth Cayenne (high input n=91; low input n=58)	9,011,977.58 (45,378,612.62)	12,000-413,250,000	1,793,208.62 (4,380,900.78)	32,500-32,100,000	6,201,986.98 (35,666,390.54)	12,000-413,250,000	0.14

⁵³ Conducted Mann-Whitney U due to small sample size, but technically we are not supposed to conduct a test with this small of a sample

Appendix table 13. Income (continued)

Variable (n)	High Input (n=501)		Low Input (n=267)		Aggregate (n=768)		p-value (difference between high vs low input)
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	
Income from jumbo Sugarloaf (high input n=288; low input n=131)	1,741,443.75 (4,577,222.45)	40,000-49,500,000	1,505,916.03 (3,378,294.02)	6,000-22,400,000	1,667,806.21 (4,236,319.16)	6,000-49,500,000	0.56
Income from large Sugarloaf (high input n=409; low input n=206)	602,668.45 (1,011,824.68)	1,375-8,930,000	703,768.04 (1,056,107.75)	1,700-7,920,000	636,532.70 (1,027,120.67)	1,375-8,930,000	0.26
Income from medium Sugarloaf (high input n=344; low input n=173)	227,172.05 (660,400.87)	600-7,020,000	308,461.85 (1,112,346.98)	600-12,800,000	254,373.47 (838,940.04)	600-12,800,000	0.38
Income from small Sugarloaf (high input n=124; low input n=72)	72,664.11 (98,085.34)	1,200-550,000	115,712.15 (247,785.40)	600-1,575,000	88,477.68 (169,871.63)	600-1,575,000	0.16
Total income from Sugarloaf (high input n=439; low input n=225)	1,902,470.91 (4,393,744.81)	22,000-55,025,000	1,795,317.29 (3,356,122.49)	6,000-23,950,000	1,866,161.33 (4,069,592.98)	6000-55,025,000	0.73

Note: Evaluators compared means between high and low input farmers for income.

Appendix table 14. Profitability....

Variable	N	Average (SD)	Range
Total Cost	672	715,563 (921,174)	21,500 to 13,042,300
Total Income	672	2,242,835 (6,202,018)	0 to 110,480,000
Total Profit	672	1,527,271 (6,058,248)	-3,769,675 to 109,241,900

*Note: Total cost includes costs from (1) equipment, (2) labor cost of land preparation, (3) cost of fertilizers, (4) labor cost of fertilizing, (5) cost of chemicals, (6) labor cost of using chemicals, (7) labor cost of weeding, (8) cost of protection from sun, (9) cost of insect diseases, (10) labor cost of harvesting, and (11) cost of transportation.

Appendix table 15a. Loan

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p- values)
Did you apply for the loan during the last pineapple cultivation season?	N=501	N=267	N=768				
Yes	187	96	283	37	36	37	0.690
No	314	171	485	63	64	63	0.690
Did you get the full, part or no loan?	N=187	N=96	N=283				
Yes, fully	105	50	155	56	52	55	0.600
Yes, partly	74	42	116	40	44	41	0.538
No, did not receive	8	4	12	4	4	4	1.000
Why did not you get loan for pineapple growing in the last season?	N=314	N=171	N=485				
Too risky	113	66	179	36	38	37	0.672
Interest rates	80	33	113	25	19	23	0.145
Complicated formalities	72	23	95	23	13	20	0.015
No need for credit	69	34	103	22	20	21	0.650
No credit institution in the locality	53	18	71	17	10	15	0.075
Little chance of being approved	44	20	64	14	12	13	0.546
No guarantee	38	13	51	12	8	10	0.159
Previous problems	35	11	46	11	6	9	0.121
Insufficient funds	11	8	19	4	5	4	0.704
Insufficient savings	11	6	17	4	3	3	1.000
Others	69	51	120	22	30	25	0.077

Appendix table 15a. Loan (continued)

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Reasons for taking a loan during the last pineapple cultivation season	N=179	N=91	N=270				
Purchase of fertilizers and other inputs	165	82	247	92	90	91	0.730
Manpower	142	78	220	79	86	81	0.267
Purchase of seeds	98	48	146	55	53	54	0.855
Investment of agricultural investment	79	35	114	44	38	42	0.446
Personal expenses	32	11	43	18	12	16	0.292
Transport	31	9	40	17	10	15	0.149
Non-agricultural investment	20	11	31	11	12	11	0.983
Others	7	4	11	4	4	4	1.000
Sources of loan for pineapple production	N=179	N=91	N=270				
Buyers/traders	93	45	138	52	49	51	0.795
Microfinance	44	19	63	25	21	23	0.598
CLCAM	23	14	37	13	15	14	0.700
Lender	11	0	11	6	0	4	0.037
Family, friends, neighbors	4	2	6	2	2	2	1.000
Producer organization	3	2	5	2	2	2	1.000
Formal sector banks	1	0	1	1	0	0	1.000
Carder/ATDA	1	1	2	1	1	1	1.000
Others	42	20	62	23	22	23	0.903
New financial products for pineapple production	N=8	N=1	N=9				
Business or agricultural loans	6	1	7	75	100	78	1.000
Microfinance loans	3	0	3	38	1	33	1.000
Insurance (floods, droughts, crops)	0	0	0	0	0	0	
Others	0	0	0	0	0	0	

Note: Evaluators compared the proportions between high and low input farmers for loan information.

Appendix table 15b. Loans application by size of farmers' landholding

Farmers' size	Applied for loans	p-value (proportion's test)
Small farmers (N=97)	29%	0.158 (Small vs Medium farmers)
Medium farmers (N=602)	37%	0.159 (Medium vs Large farmers)
Large farmers (N=69)	46%	0.032 (Small vs Large farmers)

Note: Evaluators compared the proportions between high and low input farmers for loan applications by size of landholding.

Appendix table 15c. Loans approval by size of farmers' landholding

Farmers' size	Received full loans	Received partial loans	p-value (proportion's test)
Small Farmers (N=28)	55%	45%	0.342 (Small vs Medium farmers)
Medium farmers (N=211)	56%	44%	1.000 (Medium vs Large farmers)
Large farmers (N=31)	68%	32%	0.449 (Small vs large farmers)

Note: Evaluators compared the proportions between high and low input farmers for loans approved by their size of landholding.

Appendix table 16. Buyers – farmers relationships

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Pineapples transport	N=501	N=267	N=768				
Buyers come to you	494	263	757	99	99	99	1.000
You go to sell your products	14	10	24	3	4	3	0.615
Choice of buyers	N=501	N=267	N=768				
Best price offered	316	169	485	63	63	63	1.000
Buyers who pays deposit before harvest	195	106	301	39	40	39	0.894
Buyers who offers the best price for a good quality	153	71	224	31	27	29	0.288
Buyers who provides input for credit	101	44	145	20	16	19	0.253
Buyer who is reliable	82	39	121	16	15	16	0.544
Close to the point of sale	66	34	100	13	13	13	0.952
Monopoly of the sector	19	8	27	4	3	4	0.715
Others	20	9	29	4	3	4	0.817
Pineapple attributes sought by the buyers	N=501	N=267	N=768				
Size	440	237	677	88	89	88	0.79
Maturity	423	210	633	84	79	82	0.057
Solidity	339	172	511	68	64	67	0.408
Variety	230	117	347	46	44	45	0.633
Level of rot/mildew	145	95	240	29	36	31	0.071
Others	19	16	35	4	6	5	0.226
Arrangement with buyers	N=501	N=267	N=768				
No prior arrangement	224	112	336	45	42	44	0.51
Verbal Agreement	219	125	344	44	47	45	0.455
Written Agreement	67	35	102	13	13	13	1.000
Others	0	1	1	0	0	0	0.749
Support services received from buyers	N=210	N=122	N=332				
Prepayment given before harvest	162	100	262	77	82	79	0.368
Inputs offered on credit	74	36	110	35	30	33	0.343
Transportation services	25	8	33	12	7	10	0.168
Training/capacity building/technical	14	6	20	7	5	6	0.685
Advice on management of crops	9	5	14	4	4	4	1.000
Others	10	4	14	5	3	4	0.715

Note: Evaluators compared the proportions between high and low input farmers for farmers' relationships.

Appendix table 17. Training received by farmers

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Types of training received	N=501	N=267	N=768				
Agricultural practices/methods	466	249	715	93	93	93	1.000
Farm management	386	210	596	77	79	78	0.676
Agricultural financial management	369	205	574	74	77	75	0.389
Marketing	317	169	486	63	63	63	1.000
Other	7	5	12	1	2	2	0.841
No training	28	12	40	6	4	5	0.632
Types of agricultural practices/ methods training received	N=466	N=249	N=715				
Plant material to be used for production	436	225	661	94	90	92	0.163
Application of fertilizers (including schedule of applications)	434	228	662	93	92	93	0.541
Plant density and spacing	431	235	666	92	94	93	0.426
Induction of flowering (including calendar)	399	215	614	85	86	86	0.879
Manual weeding techniques	370	196	566	79	79	79	0.906
Management of crop diseases	351	185	536	75	74	75	0.833
Prune and protect the fruits	339	179	518	73	72	72	0.875
Others	10	4	14	2	2	2	0.832
Types of agricultural financial management training received	N=369	N=205	N=574				
Planning of the agricultural calendar	353	192	545	96	94	95	0.394
Input supply	342	187	529	93	91	92	0.643
Cash management	295	154	449	80	75	78	0.216
Loan reimbursement planning	278	154	432	75	75	75	1.000
Bookkeeping, expenditure, and revenue management	267	147	414	72	72	72	0.945
Support to the application of a micro-credit	265	151	416	72	74	72	0.707
Distribution planning	253	152	405	69	74	71	0.190
Other	5	1	6	1	0	1	0.582

Note: Evaluators compared the proportions between high and low input farmers for training received.

Appendix table 18. Member of group supporting pineapple production

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Member of group supporting pineapple production	N=501	N=267	N=768				
Farmers ' Association	172	80	252	34	30	33	0.251
Cooperative	122	66	188	24	25	24	0.980
Cultural or religious group	39	17	56	8	6	7	0.566
Structured Credit Group	35	14	49	7	5	6	0.432
Unstructured Credit Group	15	3	18	3	1	2	0.167
Extension Club	11	0	11	2	0	1	0.034
Other	52	28	80	10	10	10	1.000
Not a member of any group	187	106	293	37	40	38	0.501
Benefits obtained from pineapple supporting groups/Associations	N=314	N=161	N=475				
Knowledge of cultural practices and market information	266	137	403	85	85	85	1.000
Credit	71	37	108	23	23	23	1.000
Agricultural Equipment	41	20	61	13	12	13	0.959
Inputs (fertilizers)	61	26	87	19	16	18	0.454
Groupings sell support services, including transport	24	5	29	8	3	6	0.080
Other	29	13	42	9	8	9	0.802

Note: Evaluators compared the proportions between high and low input farmers for members of the group supporting pineapple production.

Appendix table 19. Management practices for pineapple production

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Farm/business management practices for pineapple production	N=501	N=267	N=768				
Input planning	434	230	664	87	86	86	0.939
Agricultural calendar planning	423	218	641	84	82	83	0.375
Distribution planning	302	177	479	60	66	62	0.119
Cash Management	283	154	437	56	58	57	0.810
Bookkeeping, expenses and revenues	266	143	409	53	54	53	0.963
Loan repayment planning	226	113	339	45	42	44	0.506
Support for the application of a microcredit	208	114	322	42	43	42	0.811
Other	3	2	5	1	1	1	1.000
No	13	10	23	3	4	3	0.504

Note: Evaluators compared the proportions between high and low input farmers for management practices for pineapple production.

Appendix table 20. PINEX contribution

Variables	High dose producer #	Low dose producer #	Total #	High dose producer %	Low dose producer %	Total %	Difference in HI - LI % (proportion test p-values)
Types of interactions with PfD - PINEX-							
	N=500	N=262	N=762				
Received training	497	260	757	99	99	99	1.000
Put in contact with suppliers	167	78	245	33	30	32	0.349
Become a member of pineapple association	159	102	261	32	39	34	0.059
Put in contact with buyers and exporters	127	57	184	25	22	24	0.304
Received inputs directly	60	26	86	12	10	11	0.459
Received training on use of storage stores	47	24	71	9	9	9	1.000
Received inputs for storage facility	30	15	45	6	6	6	1.000
Others	11	3	14	2	1	2	0.456

Note: Evaluators compared the proportions between high and low input farmers for their PINEX contribution.

Appendix XIX: Performance Progress Indicators

PINEX Performance Results Summary

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
Increased Agricultural Productivity	Total number of individuals benefiting directly as a result of USDA assistance	0	20 120	0	3 052	11 650	14 702	73%	
	Total number of individuals benefiting directly as a result of USDA assistance (female)	0	3 131	0	364	3 395	3 759	120%	Achieved
	Total number of individuals benefiting directly as a result of USDA assistance (male)	0	16 989	0	2 688	8 255	10 943	64%	
	Total number of individuals benefiting indirectly as a result of USDA assistance	0	80 480	0	37 338	50 500	87 838	109%	Achieved
	Value of sales by project beneficiaries	\$19 229 976	\$70 310 872	\$0	\$25 077 404	\$43 869 583	\$68 946 987	98%	
	Value of sales by project beneficiaries (fresh pineapple sold by producers)	\$5 324 375	\$17 472 000	\$0	\$15 830 000	\$26 838 748	\$42 668 748	244%	Achieved
	Volume of commodities (metric tons) sold by project beneficiaries	141 885	481 297	0	142 565	248 097	390 662	81%	
	Volume of commodities (metric tons) sold by project beneficiaries (fresh pineapple sold by producers)	127 785	416 000	0	135 016	234 016	369 032	89%	
Increased Leverage of Private-Sector Resources	Value of new public and private sector investment leveraged as result of USDA assistance	\$0	\$8 175 000	\$0	\$319 078	\$999 258	\$1 318 336	16%	
	Value of new public and private sector investment leveraged as result of USDA assistance (private)	\$0	\$8 175 000	\$0	\$269 929	\$936 483	\$1 206 412	15%	

⁵⁴ For the Cumulative Results Progress Level the progress level of the indicator compared to the end of project target is denoted by the following symbols: not on track (●), in progress (●), on track (●). If an end of project target has been achieved, it is noted as such.

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Value of new public and private sector investment leveraged as result of USDA assistance (public)	\$0	\$0	\$0	\$49 149	\$62 775	\$111 924	-	Achieved
	Number of public-private partnerships formed as a result of USDA assistance	0	13	0	13	1	14	108%	Achieved
	Number of public-private partnerships formed as a result of USDA assistance (agricultural production)	0	1	0	2	0	2	200%	Achieved
	Number of public-private partnerships formed as a result of USDA assistance (multi-focus)	0	2	0	2	1	3	150%	Achieved
	Number of public-private partnerships formed as a result of USDA assistance (other)	0	2	0	5	0	5	250%	Achieved
Increased Capacity of Government Institutions	Number of individuals who have applied improved farm management practices (i.e. governance, administration, or financial management) as a result of USDA assistance (people in government)	0	10	0	10	0	10	100%	Achieved
Increased Access to Improved Market Information	Number of individuals accessing pineapple market information as a result of USDA assistance	0	5 275	0	123	1 105	1 228	23%	
Improved Capacity of Key Groups in the Agriculture Production Sector (Coops and Small	Number of individuals who have received short-term agricultural sector productivity or food security training as a result of USDA assistance (people in civil society)	0	16	0	34	47	81	506%	Achieved

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
Shareholder Farmers)	Number of Pineapple Producer Network of Benin (PPNB) staff trained in pineapple production, business management and member services as a result of USDA assistance.	0	12	0	9	18	27	225%	Achieved
	Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied improved techniques and technologies as result of USDA assistance (producer organization)	0	1	0	1	2	3	300%	Achieved
Increased Use of Improved Agricultural Techniques and Technologies	Number of hectares under improved techniques or technologies as a result of USDA assistance	0	5 200	0	4 008	5 165	5 165	99%	
	Number of hectares under improved techniques or technologies as a result of USDA assistance (crop genetics)	0	5 200	0	4 008	5 165	5 165	99%	
	Number of hectares under improved techniques or technologies as a result of USDA assistance (disease management)	0	5 200	0	4 008	5 165	5 165	99%	
	Number of hectares under improved techniques or technologies as a result of USDA assistance (irrigation)	0	10	0	0	0	0	0%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (pest management)	0	5 200	0	1 564	3 814	3 814	73%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (soil-related fertility and conservation)	0	5 200	0	1 564	3 814	3 814	73%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (total w/one or more improved techniques or technologies)	0	5 200	0	1 564	3 814	3 814	73%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance	0	5 200	0	1 564	3 814	3 814	73%	
	Number of hectares under improved techniques or technologies as a result of USDA assistance (crop genetics)	0	5 200	0	4 004	5 165	5 165	99%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (disease management)	0	5 200	0	0	1 252	1 252	24%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (female)	0	520	0	143	387	387	74%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (irrigation)	0	10	0	0	0	0	0%	
	Number of individuals who have applied new techniques or technologies as result of USDA assistance (male)	0	4 680	0	1 421	3 427	3 427	73%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of hectares under improved techniques or technologies as a result of USDA assistance (pest management)	0	5 200	0	4 008	5 165	5 165	99%	
	Number of hectares under improved techniques or technologies as a result of USDA assistance (total w/one or more improved techniques or technologies)	0	5200	0	4 008	5 165	5 165	99%	
Increased Availability of Improved Inputs	Number of individual pineapple producers procuring improved fertilizer as a result of USDA assistance	0	2 880	0	307	1 044	1 351	47%	
	Volume of improved fertilizer (metric tons) procured by project beneficiaries as a result of USDA assistance	0	7 500	0	356	1 312	1 668	22%	
Increased Use of Financial Services	Number of individuals receiving financial services as a result of USDA assistance	0	3 580	0	159	4 118	4 277	119%	Achieved
	Number of individuals receiving financial services as a result of USDA assistance (female)	0	708	0	20	484	504	71%	
	Number of individuals receiving financial services as a result of USDA assistance (male)	0	2 872	0	139	3 634	3 773	131%	Achieved
	Number of individuals receiving financial services as a result of USDA assistance (processors)	0	700	0	33	39	72	10%	
	Number of individuals receiving financial services as a result of USDA assistance (producers)	0	2 880	0	135	4 079	4 214	146%	Achieved
	Number of loans disbursed as a result of USDA assistance	0	2 892	0	138	780	918	32%	
	Number of loans disbursed as a result of USDA assistance (processors)	0	12	0	3	3	6	50%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of loans disbursed as a result of USDA assistance (producers)	0	2 880	0	135	777	912	32%	
	Value of loans provided as a result of USDA assistance (female)	0	\$320 000	\$0	\$20 428	\$96 249	\$116 677	36%	
	Value of loans provided as a result of USDA assistance (male)	0	\$2 880 000	\$0	\$191 056	\$712 530	\$903 586	31%	
	Value of loans provided as a result of USDA assistance (processors)	0	\$320 000	\$0	\$18 255	\$13 043	\$31 298	10%	
	Value of loans provided as a result of USDA assistance (producers)	0	\$2 880 000	\$0	\$193 229	\$795 735	\$988 964	34%	
	Value of loans provided as a result of USDA assistance.	0	\$3 200 000	\$0	\$211 484	\$808 778	\$1 020 262	32%	
Increased Knowledge by Farmers of Improved Agricultural Techniques and Technologies	Number of individuals who have received short term agricultural sector productivity or food security training as a result of USDA assistance	0	5 942	0	3 216	4 682	4 682	79%	
	Number of individuals who have received short term agricultural sector productivity or food security training as a result of USDA assistance (agricultural producers)	0	5 200	0	3 064	4 159	4 159	80%	
	Number of individuals who have received short term agricultural sector productivity or food security training as a result of USDA assistance (continuing)	0	5 942	0	0	3 204	3 204	54%	
	Number of individuals who have received short term agricultural sector productivity or food security training as a result of USDA assistance (female)	0	963	0	345	914	914	95%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of individuals who have received short term agricultural sector productivity or food security training as a result of USDA assistance (male)	0	4 979	0	2 859	3 768	3 768	76%	
	Number of individuals who have received short term agricultural sector productivity or food security training as a result of USDA assistance (new)	0	5 942	0	3 204	1 478	1 478	25%	
Improved Farm Management (Operations, Financial)	Number of individuals who have applied improved farm management practices (i.e. governance, administration, or financial management) as a result of USDA assistance	0	5 200	0	1 037	3 814	3 814	73%	
	Number of individuals who have applied improved farm management practices (i.e. governance, administration, or financial management) as a result of USDA assistance (agricultural producers)	0	5 200	0	1 037	3 814	3 814	73%	
	Number of individuals who have applied improved farm management practices (i.e. governance, administration, or financial management) as a result of USDA assistance (female)	0	520	0	31	387	387	74%	
	Number of individuals who have applied improved farm management practices (i.e. governance, administration, or financial management) as a result of USDA assistance (male)	0	4 680	0	1 006	3 427	3 427	73%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
Improved Knowledge Regarding Farm Management	Number of pineapple producers who have received short-term farm management training as a result of USDA assistance	0	5 200	0	1 396	3 814	5 210	100%	Achieved
Expanded Trade of Agricultural Products (Domestic, Regional and International)	Number of jobs attributed to USDA assistance	0	13 768	0	1 293	3 680	4 973	36%	
	Number of jobs attributed to USDA assistance (female)	0	1 784	0	666	2 217	2 883	162%	Achieved
	Number of jobs attributed to USDA assistance (male)	0	11 984	0	627	1 463	2 090	17%	
	Value of sales by project beneficiaries (dried pineapple sold by processors)	\$15 441	\$363 047	\$0	\$151 293	\$364 366	\$515 659	142%	Achieved
	Value of sales by project beneficiaries (fresh pineapple sold by exporters)	\$8 411 005	\$17 472 000	\$0	\$2 739 716	\$5 319 288	\$8 059 004	46%	
	Value of sales by project beneficiaries (pineapple juice sold by processors)	\$5 479 155	\$41 607 333	\$0	\$6 356 395	\$11 347 181	\$17 703 576	43%	
	Volume of commodities (metric tons) sold by project beneficiaries (dried pineapple sold by processors)	386	2 002	0	460	483	943	47%	
	Volume of commodities (metric tons) sold by project beneficiaries (fresh pineapple sold by exporters)	6 911	9 000	0	2 279	3 345	5 624	62%	
	Volume of commodities (metric tons) sold by project beneficiaries (pineapple juice sold by processors)	7 150	54 295	0	5 224	10 459	15 683	29%	
Improved Policy and Regulatory Framework	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance	0	14	0	4	3	7	50%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance (stage 1)	0	4	0	1	2	3	75%	
	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance (stage 2)	0	4	0	1	0	1	25%	
	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance (stage 3)	0	2	0	0	0	0	0%	
	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance (stage 4)	0	2	0	0	1	1	50%	
	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance (stage 5)	0	2	0	2	0	2	100%	Achieved
Improved Capacity of Key Organizations in the Trade Sector (Processing)	Number of individuals who have received short-term agricultural sector productivity or food security training as a result of USDA assistance (people in firms)	0	720	0	103	609	712	99%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
Organizations and Trade Associations)	Number of public-private partnerships formed as a result of USDA assistance (agricultural post-harvest transformation)	0	8	0	4	0	4	50%	
	Number of the National Association of Pineapple Producing Companies of Benin (NAPPCB) staff trained in pineapple processing, business management and member services as a result of USDA assistance.	0	4	0	4	4	8	200%	Achieved
Increased Value Added to Post Production Agricultural Products	Number of small processors that have had needs assessments and have expanded production as a result of USDA assistance		10	0	5	23	28	280%	Achieved
Improved Quality of Post- Production Agricultural Products	Number of agricultural products certified as meeting international standards with USDA assistance.		3	0	0	1	1	33%	
Increased Adoption of Established Standards by Industry	Number of individual Global GAP-certified pineapple producers correctly applying Global GAP standards as a result of USDA assistance	0	600	0	20	144	164	27%	
	Number of individual Global GAP-certified pineapple producers correctly applying Global GAP standards as a result of USDA assistance (female)	0	60	0	0	0	0	0%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of individual Global GAP-certified pineapple producers correctly applying Global GAP standards as a result of USDA assistance (male)	0	540	0	0	0	0	0%	
	Number of individual HACCP-certified pineapple processors correctly applying HACCP standards as a result of USDA assistance	0	6	0	3	0	3	50%	
	Number of individual ISO22000-certified pineapple processors correctly applying ISO22000 standards as a result of USDA assistance	0	2	0	0	0	0	0%	
Increased Efficiency of Post- Production Processes	Number of training sessions in processing methods conducted for processors as a result of USDA assistance		26	0	4	9	13	50%	
Increased Use of Improved Post- Production Processing and Handling Practices	Number of processors benefiting from postproduction processing and handling training as a result of USDA assistance.		65	0	58	35	93	143%	Achieved
Improved Post-Harvest Infrastructure	Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance	0	9 000	0	0	1 075	1 075	12%	
	Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance (cold)	0	10	0	0	0	0	0%	
	Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance (dry)	0	4 000	0	123	1 105	1 228	31%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance (new)	0	13 000	0	0	1 075	1 075	8%	
	Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance (refurbished)	0	5 000	0	0	0	0	0%	
Improved Marketing of Agricultural Products	Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied improved techniques and technologies as result of USDA assistance	0	68	0	73	74	147	216%	Achieved
	Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied improved techniques and technologies as result of USDA assistance (private enterprise)	0	65	0	70	70	140	215%	Achieved
	Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied improved techniques and technologies as result of USDA assistance (trade and business association)	0	2	0	3	4	7	350%	Achieved

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
Increased Access to Markets to Sell Agricultural Products: Improved Linkages Between Buyers and Sellers	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance	0	44	0	7	10	17	39%	
	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance (international)	0	6	0	1	3	4	67%	
	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance (market forums)	0	7	0	1	1	2	29%	
	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance (market research tours)	0	11	0	4	3	7	64%	
	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance (national)	0	9	0	1	2	3	33%	
	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance (regional)	0	29	0	5	5	10	34%	

Result	Indicator	Baseline (2015)	End of Project Target	FY_16	FY_17	FY_18	FY17 & FY18	% of achievement	Progress level ⁵⁴
	Number of national, regional and international trade fairs, market research tours and market forums attended by project beneficiaries as a result of USDA assistance (trade fairs)	0	26	0	2	6	8	31%	
Improved Market and Trade Infrastructure	Number of market stalls built as result of USDA assistance	0	4	0	0	0	0	0%	
	Number meeting and storage centers built as result of USDA assistance	0	4	0	0	2	2	50%	
	Number of Pineapple stakeholder Council meetings as result of USDA assistance	0	14	0	5	6	11	79%	
Improved Transaction Efficiency	Number of pineapple market linkages as result of USDA assistance	0	5 275	0	826	1 228	2 054	39%	