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**Federal Department of Foreign Affairs – Swiss Agency for Development and Cooperation SDC  
Global Programme Food Security**

# **Internal Evaluation of the “Postharvest Management in Sub-Saharan Africa” Project**

## ***Evaluation Report***



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### Currencies

CHF	Franc CFA (XOF)	Reference date	Source
1.00	599.500	September 2016	<a href="https://www.oanda.com/solutions-for-business/historical-rates/main.html">https://www.oanda.com/solutions-for-business/historical-rates/main.html</a>
CHF	Mew Metical (MZN)	Reference date	Source
1.00	76.856	September 2016	Idem
CHF	US Dollar (USD)	Reference date	Source
1.00	1.025	September 2016	Idem

### Abbreviations and acronyms

AFAAS	African Forum for Agricultural Advisory Services
Agridea	Swiss Centre for Agricultural Advisory and Extension Services.
ASS	Afrique Sub- Saharienne
CARDER	Centre d'Action Régional pour le développement Rural
ERAD	Études Recherches Appliquées pour le Développement Durable (ONG)
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization
FCFA	Franc CFA
FSC	Chaîne d'Approvisionnement Alimentaire
FUPRO	Federation of Farmer Unions in Benin
GPFS	Global Programme Food Security
HELEVETAS	HELVETAS Swiss Intercooperation
IMF	Institution de Microfinance
LDLD	Levier pour le Développement Local Durable (ONG)
M4P	Making Markets work for the Poor
ONG	Organisation Non-gouvernementale
OP	Organisation Paysanne
ONASA	Office Nationale pour la Sécurité Alimentaire
PHM	Post harvest Management
PICS	Purdue Improved Crop Storage (hermetic plastic bag)
PR	Post Récolte
PHL	Postharvest Losses
SDC	Agence Suisse pour le Développement et la Coopération
SSH	Sub-Saharan
UPC	Provincial Farmer Union, Mozambique

## Executive summary

- (i) This is the report of the internal evaluation of the “Postharvest Management in Sub-Saharan Africa” Project, hereinafter called PHM-SSA. The mission took place in Mozambique and Benin between 27 August and 11 September 2016. The authors are Dr Rachidatou Sikirou, Benin, Mr Abdul Cauio Sualehe, Mozambique, and Mr Ernst Schaltegger, INNOVABRIDGE Foundation, Switzerland, team leader.
- (ii) The overall objectives of the project are:
  - Improved handling and storage options within the grains and pulses value chains are benefitting smallholder farmers in the two pilot countries Benin and Mozambique.
  - Good practice options for reducing postharvest losses are compiled, disseminated and scaled up.
  - Appropriate regulatory frameworks on reducing post-harvest losses in food supply chains are introduced and implemented at national and regional levels and financing is secured.
- (iii) The project is commissioned and financed by SDC’s Global Project Food Security (GPFS) unit and implemented by a consortium composed of four partners: Helvetas Swiss Intercooperation (HELVETAS), the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), the African Forum for Agricultural Advisory Services (AFAAS) and Agridea, the Swiss Centre for Agricultural Advisory and Extension Services.
- (iv) The internal evaluation has reviewed basic national and regional data about areas, production, yields and price fluctuations for grains and pulses in the two countries. This review confirms that the choice of the two pilot countries was relevant. There is evidence of progressing food grain and pulses productivities, which may be a driver of PHM. Prevailing producer price fluctuations over the year infer that poor producers tend to be the losers because of urgent needs of cash at harvest, and due the ignorance of appropriate PHM techniques. The evaluation concludes that the project is relevant, in view of the observed PHL and of the seasonal price fluctuations that are not only a threat, but also an opportunity to invest in PHM of grains and pulses.
- (v) Thanks to systematic reporting against the indicators of the results framework, the project is fairly well on track regarding outputs, but lags behind in terms of outcomes, e.g. determining solid business models for the dissemination of PHM solutions (drying, threshing, improved traditional storage containers, hermetic plastic bags and metal silos). The anticipated number of direct PHM adopters by the end of the first phase (10,000) is still far from being attained.
- (vi) Given the enormous extent of annual PHL in SSA, of about USD 4 billion, the investment of PHM-SSA is comparatively modest, of CHF 2.82 million for the current phase. By the end of 2015, the entire project stood at 59% of expenses, i.e. largely within the budget. Regarding technology efficiencies, related benefit-cost analyses are still pending.
- (vii) The evaluation notes that the evaluation criteria of impact and sustainability cannot be precisely assessed at this stage of a pilot project. Assuming reasonable adoption rates, impact is likely to be substantial. The interest shown by men and women testing the various PHM solutions is lively and manifest. Factors of sustainability are also the determination of building business models based on market conditions and existing, or emerging, supply chains.
- (viii) Most insight generated so far can be attributed to PHM-SSA as it is available and accessible for a wide public. It significantly surpasses earlier PHM initiatives by other donors that were punctual. Especially the outcomes related to dissemination and upscaling, and of policy dialogue and regulations related to PHM, have never been addressed in such a systematic way before.

- (ix) The evaluation also provides fair evidence that PHM-SSA is considering women in an appropriate way. Documentation of gender-disaggregated data should still be given more attention, though.
- (x) The main conclusion is that PHM-SSA, while truly relevant in the face of the prevailing PHL, still is in a state of technical, and foremost business-model related, inconclusiveness. *This is indicative that the planned second phase should be rethought in terms of its ambitions and timeframe.*
- (xi) Consequently, the internal evaluation recommends the following generic measures:
- Instead of two years, *a second phase of three to four years should be envisaged*, e.g. from June 2017 to December 2020. This is not only commensurate with the present status of relative inconclusiveness of the present phase, but also with the proposed objective and content of the second phase.
  - Furthermore, it is recommended *to maintain, in principle, the consortium as it is now.*
- (xii) Within this framework, the internal evaluation recommends a *paradigm shift regarding PHM, focusing on the availability of credit at harvest*, while the reduction of avoidable physical PHL will obviously remain an indispensable element.
- (xiii) *The warrantage system is a good solution because it injects cash on credit basis against a collateral that is prone to increase in value up to 100% in a few months.* In secure warrantage centres, the collaterals are not only safe but an incredibly good short term investment. Thus, the second phase of PHM-SSA should not attempt *“to do more of the same”*, but *“to add a quantum leap to attain much more”*.
- (xiv) *It follows from the above, that the project should extend the cooperation with rural financial intermediaries in order to operate the mentioned paradigm shift.* PHM-SSA will have to make overdue convincing efforts directed to such financial intermediaries: warrantage loans are particularly low-risk. This will be a key strategy element to cause massive adoption of PHM solutions.
- (xv) Regarding compilation and upscaling of good practice in PHM (Outcome 2), the emphasis should be put much *more on the adoption of PHM solutions, foremost beyond the pilot countries, than the materials and methods generated and used.* This means that the number of tasks given to AFAAS and Agridea may become less at national scale, but more determined in terms of outcomes at continental scale.
- (xvi) Not unlike regarding Outcome2, the second phase should be more focused on *the effects of policy dialogue* (policies, strategies, norms) than on the mere instruments and modalities of such policy dialogue. Like this, *the significance of Outcome 3 will be measured by how pilot and other countries integrate PHM into mainstream policies.*
- (xvii) Regarding project architecture and role clarity, the missions given to FANRPAN and AFAAS (Agridea) would need to be more output and outcome-oriented than during the first phase where it was and is necessary to generate the necessary inputs (dissemination material, policy briefs....).
- (xviii) With a second phase enriched with an essential paradigm shift towards the avoidance of financial losses and of physical PHL, sufficient time of implementation *in the two pilot countries* is still required to create the necessary know-how assets. Thus, geographic extension should not be considered for the second phase.
- (xix) Until the end of the first phase in May 2017, the following measures are recommended:
- Review and finalize the ongoing PHL research in the sense that valid lessons can be learned about physical losses and preferences for the tested PHM solution, with gender-disaggregated results.

- On this basis, prospective exercises regarding benefit-cost analyses for the avoidance of physical and physical and financial losses, per pilot country.
  - For both a. and b. above, prepare comprehensive reports displaying the state-of-the-art generated by the first phase of PHM-SSA.
  - Carefully examine whether the recommended paradigm shift towards the inclusion of financial loss avoidance is relevant and feasible, at pilot country level and beyond, including by consulting secondary literature about the subject matter.
- (xx) The main conclusion for the medium-term strategic orientation of PHM-SSA is that, despite a certain delay in the generation of conclusive premises, the basis is sufficiently solid to envisage a robust second phase. Cutting short now, or adding an only diluted phase-out, would do justice, neither to the evidence generated in the pilot countries, nor the overarching PHM challenges at stake in SSA.
- (xxi) On this basis, there is only one recommendation for the medium strategic orientation: *to implement the mentioned paradigm shift towards a more comprehensive definition of PHM, explicitly including the dimension of also avoiding financial losses, by taking advantage of the price fluctuations, and to create robust opportunities for creating wealth in rural areas.*
- (xxii) The advantage of this shift would be to put the entire PHM discussion on a new footing. Only avoiding, with appropriate technologies, the physical PHL is necessary, but not sufficient. All smallholder producers need cash at harvest. Just to avail of appropriate technology is no solution. It would be consistent with the mandate of the GPFS to lead this paradigm shift.

**XXXXXXXXXXXX**

## 1. Introduction

1. This is the report of the internal evaluation of the “Postharvest Management in Sub-Saharan Africa” Project, hereinafter called PHM-SSA. It is one of the projects in the domain of post-harvest management in Africa of the Global Programme Food Security GPFS of the Swiss Agency for Development and Cooperation (SDC) in the Federal Department of Foreign Affairs (DFAE).
2. The authors wish to thank GPFS of SDC for the excellent preparation and coaching of the internal evaluation, including the Swiss Cooperation Offices in Cotonou and Maputo for the recruitment of the local consultants. HELVETAS Swiss Intercooperation (HELVETAS hereinafter), the leader of the project consortium, was most helpful in providing access to relevant documentation and in directing the mission leader to the other consortium members. The Food ,Agriculture and Natural Resources Policy Analysis Network (FANRPAN) in Pretoria, the African Forum for Agricultural Advisory Services (AFAAS) in Kampala and the Centre for Agricultural Advisory and Extension Services (Agridea) in Lindau, Switzerland, provided documentation and insight in face-to-face or conference call interviews.
3. This report reflects the opinion of the authors. It therefore does not commit the financier SDC or the leader and members of the project implementation consortium. The authors are Dr Rachidatou Sikirou, Benin, Mr Abdul Cauio Sualehe, Mozambique, and Ernst Schaltegger, INNOVABRIDGE Foundation, Switzerland (mission leader).

### 1.1 The project

4. The project has a regional pan-African focus. It includes piloting activities in Benin and Mozambique during the first phase (referring to the period between April 2013 and March 2017, now extended to May 2017). The overall objectives of the project are:
  - a. Improved handling and storage options within the grains and pulses value chains are benefitting smallholder farmers in pilot countries.
  - b. Good practice options for reducing postharvest losses are compiled, disseminated and scaled up.
  - c. Appropriate regulatory frameworks on reducing post-harvest losses in food supply chains are introduced and implemented at national and regional levels and financing is secured.
5. As per the terms of reference, the project has the following theory of change: increased awareness on PHL issues, the promotion of effective PHM practices and systems, combined with capacity building and facilitation of access to markets will lead to smallholders adopting improved PHM practices and systems. This will entail improved handling and storage of crops and reduced PHL at farm and community level, a higher flexibility to sell stored produce at a later stage at higher prices results in higher farm income, among others, contributes to increased food security of smallholder farmers. It is to be noted that only grains and pulses are considered in the project, excluding perishables.
6. The compilation and dissemination of successful PHM practices through effective knowledge sharing and learning mechanisms at national, regional (SSA) and global level, and the use of innovative methods (RAS) for wider dissemination of PHM practices and systems were assumed to contribute to attain scale and sustainability even before mentioned impacts reach the household and community level. The evidence gained from experience in pilot regions would contribute to advocacy and policy dialogue resulting in increased awareness and capacity of policy makers on PHM issues at local, national and regional level. This would contribute to the integration of PHM issues into regulatory frameworks (policies, standards, and norms), ultimately leading to a more conducive environment attracting more investments for PHM in envisaged food crops value chains.
7. In terms of gender and social equity, the intervention seeks to put an important focus on addressing bottlenecks of PHM and strengthen capacities in PHM of women and other marginalised groups. The scoping studies confirmed that women are disadvantaged in terms of land property, access to credits and access to other productive resources. Hence, the project puts particular attention on

appropriate PHM technologies that are accessible to women, considering aspects of workload and access to benefits from improved PHM. At least 15% of the direct beneficiary households would be woman-headed households. Experiences from Central America demonstrate benefits of improved PHM especially for women (workload, hygiene etc.). The intervention focuses on net-deficit and net-surplus grain agri-cultural producers, but not on the better off.

## **1.2 The internal evaluation<sup>1</sup>**

8. Designed for an implementation period of five to seven years over the entire project cycle, the project is close to mid-term in 2016. The rationale of the evaluation is to account for the achieved results so far and to contribute to strategic steering for the remaining period of the first phase. It will also set the base for the second administrative phase of two to three years (2017 – 2018/2019, to be determined) in view of an upscaling of the achieved results. Annex 1 is reproducing the relevant parts of the terms of reference.

## **1.3 Evaluation methods adopted**

9. The terms of reference imply a mix of evaluation methods. The mission analysed the abundant pool of documentation generated by the consortium and screened it according to the evaluation criteria given and the mandatory lead questions. The interviews, most face-to-face, were either individual or in groups. Where appropriate, especially in Benin, the mission interviewed women separately.

10. In each country, the mission members met with the AFAAS focal points and the representatives of the national FANRPAN nodes. They also sustained debriefing sessions with the local national HELVETAS offices and with the SDC programme officer in Mozambique. The purpose of these final interactions was to share emerging insights and conclusions at the end of the field visits.

## **1.4 The issues at stake – Post-harvest food losses in Africa**

11. The value of post-harvest food losses for cereals in Africa runs at more than 4 billion USD annually or almost 15% of the total production value (terms of reference). It is widely acknowledged that reduction of postharvest losses (PHL) along food chains can provide a cost-effective means of promoting food and nutrition security. This is particularly true in the context of Sub-Saharan Africa where estimates infer that up to 40% of food losses occur at post-harvest and processing stage. The initial scoping studies for the project conducted in 2012 in the two pilot countries of this project – Benin and Mozambique – confirmed the need for action, revealing a number of major constraints that impede effective postharvest management (PHM).

12. In order to understand the context of food grain post-harvest management based on factual evidence, this section presents research undertaken in Benin and Mozambique on physical post-harvest losses and available statistics on maize and beans. In both pilot countries, maize and beans are among the most important staple crops susceptible to be protected by relatively simple post-harvest techniques. These range from harvesting, drying, threshing and, most significantly, safe storage over many months. The project has been testing drying and threshing technologies in both countries and has shown that these post-harvest steps are very crucial for PHL reduction at the later storage stage. Although the testing of storage technologies is taking more time and is more complex in terms of costs/business models, it is obvious that good pre-storage practices – namely drying and threshing – need to form integral part of all further PHM-promotion of the project

13. For the storage stage and in both countries, the project is testing metal silos, based on the overwhelmingly positive track record in Central America<sup>2</sup>, and more recent technologies, such as

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<sup>1</sup> The term “internal” refers to the evaluation terminology of SDC. This means that the responsible SDC Unit for project implementation is commissioning the evaluation and that one or more independent external consultants carry it out.

<sup>2</sup> SDC, Intercooperation, ETH, NITLAPAN. 5 Year Ex-Post Impact Study, POSTCOSECHA Programme Central America, Final Report March 2011.

hermetic plastic bags specially development for the storage of grains, among simpler and/or traditional other techniques. Moreover, the following paragraphs display facts and figures on seasonal producer price fluctuations on the two mentioned staple crops in both pilot countries.

14. The case of Benin. The University of Agricultural Sciences in Cotonou has initiated field research on post-harvest losses of maize in the two pilot provinces of Atacora and Collines. The research is in its second year comparing<sup>3</sup> traditional stores, conventional woven plastic bags with an insecticide, Actellic<sup>4</sup>, Zero Fly Bags, hermetic plastic bags (PICS) and silos made of galvanized steel sheets. As the research project is not concluded, the following comments only refer to the outlay and certain conditions of implantation.

15. First, all treatments also included a tandem with the addition of Actellic powder, and without. Air-tight techniques such as the metal silo and the PICS bag do normally not need an adhering and persistent insecticide such as Actellic. Second, the humidity of the maize used at the Savalou (Collines Province) trial site was too high when the trial started in year one (2015), consistently beyond 13% of water content and increasing partly over to 15% after 5 months. At the Atacora site, the initial humidity was around 12%, thus on the safe side, but it also increased as well to 14-15% at the end of the trial period of 5 months. In Year Two (2015), initial humidity rates were clearly below 13% but still with significant humidity increases on both trial sites, and for all techniques tested. This contrasts with the results of the corresponding trials in Mozambique where humidity on air-tight devices (Superbag and metal silo) only increased from about 10.5% to 11% after 20 months of storage<sup>5</sup>. In terms of physical postharvest losses, they were higher in Savalou and in 2015, and higher for all treatments without Actellic. What is concerning – and counter-intuitive – is the fact that samples in metal silos and PICS also display noticeable losses, between 3% and 11%, with or without Actellic. As the source used does not indicate the cause of physical loss, and considering the high humidity rate of the maize, especially at the Savalou site, it is very likely that the cause of loss was mould. Obviously, it does not make much sense to test various storage techniques when grain with humidity beyond the threshold value is used. The same research also evaluated the acceptance of the tested technologies with the producers at the two trial sites. The metal silo, the PICS and the Zero Fly Bag attained the highest scores, with some nuances regarding gender.

16. Annex 5 shows area, production and yield statistics of maize and beans over the past fifteen years in Benin. While area and production of maize increased by 70% and more than 100% respectively, the same parameters display a near-stagnation for beans, between 2000 and 2014. Yield growth in the same period for maize was 30%, but less than 10% for beans. Average maize productivity is now at 1,300 kg/ha, and that of beans at 800 kg/ha. Annex 6 displays harvested areas, production and yields of maize in the Provinces of Atacora and Collines, from 2000 to 2015. As maize production volume is tenfold of bean production volume, only this crop is displayed. The trend lines clearly indicate productivity progress of close to 60% in Atacora Province while production volume changes in Collines Province are closely related to changes in harvested area and not to productivity increases. Maize productivity in Atacora is performing significantly better also compared to the national average. Indeed, standing crops in Atacora convey an impression of consistent attention (Photo 1 in Annex 6).

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<sup>3</sup> Patrice Ygué ADEGBOLA, Evelyne SISSINTO, Pélagie M. HESSAVI & OHOUKO S. Kemi. Évaluation de l'efficacité et l'acceptabilité de structures de stockage du maïs dans les communes de Savalou et de Boukombé au Bénin, PowerPoint dated 8 September 2016.

<sup>4</sup> Actellic has a very good persistence on all inert surfaces (3 - 6 months), low mammalian toxicity; internationally established maximum residue levels (MRLs) for stored grain, and no withholding periods on stored grain and peanuts. <http://www.agnova.com.au/content/custom/products/downloads/Actellic-stored-grain-AgNote.pdf>

<sup>5</sup> Banú Belmiro Irénio, Julia Crisanto Lipinga, Talibo Abdala Perar. Relatório Preliminar dos resultados do ensaio de validação de técnicas de armazenamento do grão de milho na redução de perdas pós-colheita, Maio 2016.

17. The mission visited two self-help groups, predominantly constituted by women, in Atacora and Collines Provinces, running warrantage centres<sup>6</sup> for basic grains, mostly maize and paddy. In both cases, they buy maize in February at XOF 120/kg and sell it in June at XOF 200, i.e. with a gross margin of 67% over the purchase price. The implementing NGOs in charge (ERAD in Atacora and LDLD in Savalou) confirmed such seasonal price differences. Both groups take advantage of local rural finance institutions that lend the money for the payment of the warranted cereals at 8-10% annual interest rates, thus at very favourable conditions. The prices statistics obtained, based on monthly surveys in the market of Natitingou, the capital of Atacora Province, do however not sustain this pattern, probably stemming from faulty compilation and/or data processing<sup>7</sup>. Assuming that the warrantage centres and their users indeed make robust benefits, it is not unreasonable to perceive seasonal price fluctuations as additional drivers for the PHM-SSA, over and above the avoidance of physical PHL, despite the fact that official statistics do not support these assumptions.

18. The case of Mozambique. As in Benin, postharvest losses of maize were given a preliminary evaluation<sup>8</sup>. The research tested the metal silo, the Superbag, raffia bags with and without addition of 2% Actellic, and an improved traditional storage container. At the outset, the results look more familiar than the ones in Benin. Humidity, for instance was well kept well below the threshold value for maize. The trial recorded 10.5% at trial start and 11.2% after 20 weeks of storage for the Superbag and metal silo. The latter only suffered minimal insect attacks while the improved traditional storage container had up to 4% of grains infested by *Sitophilus zeamais* (maize weevil) and 1% by *Prostephanus truncatus* (big maize borer). The trials are well documented, and the results are meaningful because there was not interference with grain insufficiently dried. The physical losses attained 8% +/- 6% in the improved traditional storage structure, and were close to zero in the metal silo and the Superbag.

19. National maize and beans statistics are shown in Annex. 7. Over the past ten years, the national maize area decreased by 6% approximately, but thanks to a productivity progress of about 14%, overall production of maize grew over the period from 2005 to 2014. The combined area increase of 40% and an average of 100% yield growth for beans in the same period caused the national bean production to soar from 100,000 tons in 2005 to 250,000 tons in 2014. However, the productivity levels of these two crops in Mozambique are roughly only half of the ones in Benin between 2005 and 2014.

20. At the regional scale, only statistics of Mecuburi District in Nampula Province were available (Annex 8). This is considered representative also for Chiure District in Cabo Delgado Province, the second of the two pilot areas of PHM-SSA in Mozambique. The data for maize and beans display distinct production volume growth rates, well above the national trends. Mecuburi District has increased maize production six-fold, and bean production three-fold, in only ten years. In the case of maize, the linear correlation between yields and production volume is 0.9, and for beans 0.27. This means that maize production grew, over the last ten years, foremost driven by productivity increases while the progress in bean production volume is likely to have depended much more on area increases.

21. Like in in Benin, authorities, the implementing agencies and the producers frequently referred to substantial seasonal price fluctuations between typical harvest months and months of scarcity<sup>9</sup>. The weekly price surveys for Mecuburi and Chiure Districts were consolidated by the national consultant

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<sup>6</sup> Warrantage, a French word commonly used in West Africa, describes the inventory credit system (normally called the warehouse receipt system, or WRS, in English); <https://www.oxfam.org/en/research/smallholder-warrantage-burkina-faso>

<sup>7</sup> In Savalou Province, the climate is bimodal with two maize and bean harvests per year, thus resulting in a more even supply and less price fluctuations.

<sup>8</sup> Banú Belmiro Irénio, Julia Crisanto Lipinga, Talibo Abdala Perar. Relatório Preliminar dos resultados do ensaio de validação de técnicas de armazenamento do grão de milho na redução de perdas pós-colheita, Maio 2016.

<sup>9</sup> The District Permanent Secretary of Chiure District noted: “the fact that we have, every year, grain producer price differences ranging from the simple to the double, clearly indicates that we have a postharvest management problem”.

and plotted in graphics displaying monthly prices over the years 2009-2015 for maize and cowpeas. The graphics perfectly reflect the statements, inclusive the one in Footnote 8. They also infer that prices increased in absolute terms over the seven-year observation period, at harvest from about MZM 5.00/kg to MZM 12.00/kg and from MZM 15.00/kg to MZM 22.00/kg, for maize and cowpeas, respectively. These price differences become more pronounced between October and December, the typical lean months in the two pilot districts. Again, the existence of such price differences is an indicator of potential for the implementation of adequate PHM measures, i.e. the reversal of financial losses typical of poor rural households into opportunities to add margins due to higher prices. The warrantage centres in Benin are doing precisely this while this is an unknown feature in the pilot districts of Mozambique.

## 2. Retrospective part - Assessment of project performance and impacts

### 2.1 Relevance

22. PHM-SSA is the result of a careful and circumspect design process, which is evidenced by the significance of the principles and drivers built into the project. At the outset, it is fair to say that PHM-SSA is an ambitious undertaking. The project documents mentions as building blocks:

- a. *The "Making Markets Work for the Poor approach" (M4P)*, with an "Economic Empowerment Perspective (WEE)" lens. The PHM-SSA design committed to adhere to the recent attempts made by SDC, in collaboration with DFID and SIDA, to integrate into M4P projects.
- b. Under this general commitment, *PHM-SSA applies M4P at two levels*, i.e.:
  - *Looking at PHM as a market system.* Following the M4P logic, supply and demand of food grains constitute the main market system (food crops value chains) in which PHM is an important supporting function i.e. households and communities have access to improved storage options as important aspect for enhanced market integration.
  - *Pluralistic rural advisory services (RAS) in a systemic view.* The M4P is also used to analyse the functioning of existing RAS systems for PHM (RAS seen as service markets). RAS are provided to men and women clients, by public and/or private actors, they are formal and/or informal, embedded within transactions (e.g. input supply) with different financing models. Hence they are pluralistic.
- c. *Innovation in RAS.* Depending on the specific local institutional and market context and based on a thorough analysis of constraints in the existing RAS systems, the project aims to identify actors within the RAS market system who may take a key role in disseminating knowhow and successful methodologies of PHM to smallholders and communities.
- d. *Operative knowledge management and learning.* The creation and sharing of evidence-based knowledge is a core element of this project.
- e. *Capacity building.* Capacity development is needed at all levels, from farmer to farmer interaction to linking researchers and training institutions, from organisational development to political lobbying at national and international level.
- f. *Contribution to creation of conducive policy frameworks for PHM.* Inadequate policy and administrative frameworks commonly constitute the most difficult obstacles to overcome. Also, their implementation is not always successful. One strength of this initiative – through FANRPAN's network – is the proximity/direct access to politicians and policy makers at high level.
- g. *Addressing gender and social equity.* In terms of gender and social equity, the intervention will put an important focus on addressing bottlenecks of PHM and strengthen capacities in PHM of women and other disadvantaged groups.

22. Successful PHM projects tend to comply with a first set of conditions of relevance when:

- a. They are located in countries or zones with *substantial staple crops production volumes and an equally important consumption of such staples by the rural and urban population*,
- b. PHM makes sense in the face of a generally distinct staple crop *productivity increase* over time,
- c. PHM responds to *objectively high physical PHL*;
- d. Such physical losses are perceived, *by the concerned rural populations, as existentially impacting their lives*, and
- e. PHM has the additional potential to take advantage of *prevailing seasonal prices fluctuations between harvest and lean months*.

The case is made here that the facts and figures presented Paragraphs 11-20 meet the above conditions fairly well in Benin and Mozambique.

23. A sound and manageable logical framework is an indication of the design relevance of a project. The project architecture with three distinct outcomes of (i) benefits at rural household level, (ii) dissemination and upscaling and (iii) policies and norms, are deemed an adequate component mix, i.e. necessary and sufficient to set a basis for regional projection of PHM issues. The logical framework of PHM-SSA contains three indicators at overall goal level, eight regarding the three outcomes, and 21 linked to the nine outputs formulated. While the overall number of indicators can be justified, and their quality is acceptable because most, but not all, of them are SMART<sup>10</sup>, the acid test comes when the indicators must be measured and interpreted. Section 2.2 will revisit this issue.

#### **a. Outcome 1 - PHM benefits for smallholders**

24. In the Inception Report of the evaluation mission prepared by the team leader, the four following working hypotheses serve as additional guiding arguments for the assessment of relevance at the level of smallholders households:

25. *Despite the evident and plausible rationale of food losses at household and community level in Africa, it is necessary to verify with households and communities whether the postharvest losses are perceived as substantial and avoidable, and, consequently, whether PHM is considered a felt need.*

26. *The above enquiry may result in differentiated perceptions and determinations in relation with PHM in function of whether net-deficit and net-surplus grain agricultural producers, or men or women, are concerned, i.e. the declared target populations of the project.*

27. *The investment cost, shelf lives and benefit-cost ratios of specific technologies (e.g. traditional granaries, metal silos, or quick bags) are drivers for adoption. If this is correct, the potential customers, women and men, must be aware of these variables, in numbers that contribute to critical mass.*

28. *The introduction of the metal silo, a success in Central America, also relies on a pre-existing artisanal tradition of sheet metal processing (tinsmiths). If this hypothesis is correct, the internal evaluation has to check whether this tradition is a fact in the two pilot countries, regarding the availability of inputs (metal sheets, soldering tin, etc.), the presence of qualified tinsmiths and a general demand for artisanal products made by such tinsmiths.*

29. Perception of PHL. PHM-SSA has commissioned an extensive baseline studies in both countries. The one in Mozambique<sup>11</sup> confirms that the interviewed households, including women, perceive physical postharvest losses as a liability against food security. In months with scarcity of grains, the most common coping strategy is to reduce the number of daily meals. In Benin, the still ongoing

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<sup>10</sup> SMART: Simple, Measurable, Achievable, Relevant, Time-bound.

<sup>11</sup> MIRUKU COOP. Estudo de Base para o Projecto de Gestão Póscolheita nos Distritos de Ancuabe, Chiúre, Mecubúri e Mucate nas Províncias de Nampula d Cabo Delgado, Relatório final, Junho 2014.

research on the demand and acceptance of PHM solutions also infers that *PHM are perceived as real constraints*. The discussions in both countries, especially with women groups, confirm the above.

30. **Targeting.** The cited sources in Benin and Mozambique include data on farm sizes and number of household members. But in neither case is it possible to directly conclude whether PHM-SSA is consciously targeting *net-deficit and/or net-surplus grain producers*. The visits made infer, as an anecdotic first approximation, that the producers selected for testing the various PHM solutions may be predominantly net-surplus producers. *To be fair, such a choice is not unreasonable in a technology testing phase.*

31. **Cost-benefit analyses.** The project has so far done little to subject the available cost and price elements of the tested technologies to rigorous benefit–cost analyses. It may be better to do this when technical data are expected to firm up. What is disturbing is the fact that, in neither country, did HELVETAS nor the project implementing entities inform the smallholder farmers, men and women alike, about the terms and conditions of the PHM devices given for testing. Not surprisingly, they tend to assume that these have been given for free, and that they would be for free as well in the future. This is blurring the development of business models, which are based on the profitable sale of PHM solutions under market conditions, in principle. This omission is compromising project relevance because the observed evidence of felt PHM needs (Paragraph 29) is not backed up by precise indications of “willingness to pay”, an essential ingredient of the business models (Paragraph 29). Without this willingness on the part of the “customer”, demand will be sub-critical, with probable future fallouts on project effectiveness and sustainability.

32. In both countries, such business models have been visualized (Annex 9). The identification of material suppliers and distributors is more advanced in Mozambique than in Benin, where the model is still one of PHM promotion within NGO logics. The Federation of Producers’ Unions (FUPRO), representing 16 second tier unions in Benin and counting a total of 120,000 members, has so far not been put in the loop. It is true, however, that Benin has just left behind a government that monopolised agricultural input supply for all crops, as a consequence of the overall importance of cotton growing.

33. **Relevance of the metal silo.** Sheet metal working and tin soldering are not part of the artisanal tradition of either Benin or Mozambique. This makes the introduction of metal silos particularly difficult. The project was relatively astute by selecting candidates for artisanal training out of metal-processing professions. Thus, in the third project year, the quality of the silos inspected is acceptable, by and large. The shelf-life of the metal silo is such that it may become attractive for certain categories of users. On the other hand, a more vigorous emphasis on high quality plastic bag techniques may be a worthwhile coping strategy under such circumstances.

#### **b. Outcome 2 – compilation, dissemination and up-scaling**

34. Two working hypotheses are examined below for the assessment of relevance at the level of Outcome 2:

35. *The essence of Outcome 2 is more likely to be attained if PHM has entered into the mainstream pool of expertise of any kind of Rural Advisory Services (RAS), to an extent comparable with other key themes that emerged in the past decades, such as Integrated Crop Management (ICM), Sustainable Natural Resources Management (NRM) and Adaptation to Climate Change (ACC).*

36. *The same is also valid for agricultural training establishments at all levels, from informal to university modules.*

37. **PHM in the mainstream pool of expertise.** Under the criterion on relevance, the key question here is whether the mainstreaming of PHM issues has been given due attention at project design. The fact that the project contains the freestanding outcome 2 on compilation, dissemination and upscaling of good PHM practice is indicative that this important ingredient for success has been thought of. The inclusion of AFAAS does make sense. This is especially true when considering the underlying ambitions of a project under a global programme of SDC where replication and upscaling beyond the borders of pilot countries is important. It is also commendable that Agridea is associated as an advisory services

provider, and consistent with an SDC global programme: institutions with a clearly regional agenda such as AFAAs are advantageously brought together with providers of methodological insight into rural advisory services (RAS). The section of effectiveness in Section 2.2 will attempt an answer regarding the working hypothesis in Paragraph 32

38. PHM expertise in agricultural training institutions. The project document of PHM-SSA<sup>12</sup> does not explicitly mention agricultural training institutions as vehicles for dissemination PHM relevant expertise. Section 2.2 on effectiveness will annualize, whether, to which extent, and in which country, this has occurred.

### **c. Outcome 3 – policies and regulatory frameworks**

39. The Inception Report highlights 2 working hypotheses for Outcome 3, as shown below.

40. *While policy dialogue in terms of PHM is a must, it will only transcend into policies and regulations if policy decision makers and technology opinion leaders internalize the issue and give by themselves proof of the importance of the PHM theme, be it through related policies, official strategies, technical regulations, policy platforms and events or any other relevant documentation.*

41. *Among the latter, country specific food standard and norms related to PHM must be documented and accessible.*

42. Internalisation of PHM issues by policy makers and technology leaders. FANRPAN is a consortium member of PHM-SSA, which is indicative of the importance the project design attributes to the enrichment of agricultural and food security policies with PHM themes, in the pilot countries and beyond. Thus, the association of a regional organisation specialized in sector policy analysis is highly relevant. The section 2.2 on effectiveness will examine whether the necessary inputs are at hand and to what extent there is evidence that PHM themes have indeed been internalized in the two pilot countries, and possibly beyond.

43. Food standard and norms related to PHM. The state of food standards and norms, and the possible changes occurred, and/or the attribution of PHM-SSA, will be looked into in the Sections 2.2 and 2.5, respectively.

44. Summing up, it is correct to conclude that the project is relevant to the needs of the concerned rural population and beyond, due to the importance of the targeted staple crops and reported PHL. It is also aligned, in general terms, with government food security policies in both countries. PHM-SSA is conceptually very ambitious by building a comprehensive M4P logic into it (Paragraph 21), which however contrasts with the failure to communicate the business logic to the users testing the various PHM solutions. This does not mean that the M4P approach is not appropriate, on the contrary. In order to make markets work for the poor: The latter need to know from the start that the PHM solution will have a cost if they want to adopt it.

## **2.2. Effectiveness**

45. Effectiveness measures the extent to which the project has attained its outcome and outputs, as measured by the indicators in the logframe. The most important documentary source for this section is the project document and the annual report 2015<sup>13</sup>. The latter systematically compares the original indicator magnitudes with the ones achieved as by the end of 2015. Not surprisingly, no one on the three indicators at overall goal level was measurable by end 2015, because this would have required a massive adoption of PHM solutions, which was not the case after just three years of technology testing.

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<sup>12</sup> HELVETAS, FANRPAN, AFAAS, Agridea. Postharvest Management in South Saharan Africa, Project Document for Phase I 01.04.2013 to 31.03.2017, Zurich, 28.02.2013, Version 2.2.

<sup>13</sup> HELVETAS, FANRPAN, AFAAS, Agridea. Postharvest Management in South Saharan Africa, Annual Report 2015, Zurich, 2016.

### **a. Outcome 1 - PHM benefits for smallholders**

46. Against the indicator of 10,000 households directly reached, and 90,000 indirectly by awareness building and training, the end of 2015 figures are 245 and 2,560, respectively for Mozambique, and 515 and 2589 for Benin. This corresponds to less than 8% of the target of directly reached households, at over 80% of time elapsed in the first project phase. In both countries combined, close to 250 tons were stored in project-monitored storage structures, albeit without indication in which year and without pre-set magnitude to be attained<sup>14</sup>. The measurement of the indicator on household income is also problematic, for the same reason. The annual report also proceeds to a painstaking comparison of output indicators and the effectively achieved magnitudes, which are fairly in line with the anticipated magnitudes (Paragraph).

47. In terms of outputs under Outcome 1, the annual report 2015 is providing relevant information. It acknowledges preliminary data on physical losses in both countries, for which more solid data only emerged in 2016, especially in Mozambique. The narrative part of the annual report is dedicated to the building of business models. The report confirms that in 2015, the project managed to bring together local agro-entrepreneurs, suppliers of raw material, local MFI's and artisans, facilitating the joint *developing of business ideas* for the marketing of Triple Bags (Benin), Super Bags (Mozambique) and metal silos (both countries). Contractual arrangements between these actors were negotiated and first MoU's were signed, namely in Mozambique. The fact that FUPRO and emerging private input suppliers have not yet been consistently involved in Benin is signalled in Paragraph 31. This is due to the agricultural input supply policy in Benin under the past government until 2015, which was not conducive to the business model that PHM-SSA attempted to apply.

48. The annual report 2015, as well as the findings of a mission to Benin of the Co-head of GPFS of SDC in May 2016<sup>15</sup>, concur that distinct delays have occurred and that the results of the first project phase are as yet inconclusive. Both sources express a degree of reservation about the appropriateness of the metal silo as a solution to improve PHM.

### **b. Outcome 2 – compilation, dissemination and up-scaling**

49. At the level of Outcome 2, the new Five Year Plan (2015-2019) on Agriculture and Food Security in Mozambique highlights PHM as one priority with allocation of additional funding to PHM. Activities to promote improved storage facilities started in 2016 in the Provinces of Tete, Zambézia, Nampula, Cabo Delgado and Niassa. In Benin, a four-day retreat on the new Agricultural Sector Development Plan<sup>16</sup> with close to 100 participants from government, farmer organizations, civil society and development partners took place where PHM concerns were expected to be brought to the table (HELVETAS).

50. The project, with the collaboration with FANRPAN, AFAAS and Agridea, has developed a considerable number of PHM related fact sheets and manuals. In Benin, these include seven factsheets of 2 pages each, covering aspects of harvesting, drying, solar disinfection and storage of the maize and cowpeas. A comprehensive manual on PHM of maize and cowpeas is also available<sup>17</sup>, on which also the two implementing NGOs (ERAD in Atacora and LDLD in Collines Provinces) as well as IITA in Nigeria collaborated. A similar number and kind of disseminating documents are on record in Mozambique,

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<sup>14</sup> This is one of the indicators not corresponding to the SMART quality standard.

<sup>15</sup> SDC, GPFS, Simon Zbinden. Postharvest Management in South Saharan Africa, Mission Report, 16-25 May 2016.

<sup>16</sup> République du Bénin, Ministère de l'Agriculture, de l'Élevage et de la Pêche, Direction de la Programmation et de la Prospective. Retraite pour la Rédaction du nouveau Plan de Développement du Secteur Agricole, Termes De Reference, Cotonou, septembre 2016.

<sup>17</sup> SDC, HELVETAS, FANRPAN, AFAAS, Agridea, ERAD, LDLD, IITA. Manuel de formation participative sur les bonnes pratiques post-récolte du niébé au Bénin, Manuel du facilitateur, non-dated draft.

painstakingly reported in the annual report 2015. Paragraphs 49 and 50 suggest that valuable inputs have been generated for embedding PHM into pluralistic RAS.

51. Output indicators under Outcome 2 also report on the networks that take up PHM solutions developed and disseminated by PHM-SSA, that include in both countries agricultural research and extension organisations, as well as community of practices (CoP). The project in Benin also approached a considerable number of other development partners as well. The annual report 2015 displays a wealth of details on dissemination of PHM contents for various audiences. In Mozambique, related teaching material was also directed to farmer training institutions of which examples are not on record, though. The project did not reach out to agricultural training institutions in Benin, despite the fact that HIS is implementing project, on behalf of SDC, a big project directed at the recovery of youth excluded by the formal education system, which is already in its third phase<sup>18</sup>. The mission considers this as a missed opportunity to disseminate PHM knowledge further. On the other hand, the rural radios visited in Chiure (Mozambique) and Tchétti (Benin) are excellent and popular means of dissemination. They however require a renewed attention, foremost in the case of Chiure where broadcasts are not yet interactive with the audience (by using cell phones), and in Tchétti where the feedbacks received should be evaluated, annually at least.

52. AFAAS projected PHM relevant key results, experience and tools in at regional events (Ethiopia, Uganda) and virtually (AFAAS PHM platform, FANRPAN PHM website, internal newsletter)<sup>19</sup>. Linkages to other projects were further strengthened, namely to the other GPFS-funded PHM initiatives in Ethiopia, Uganda/Burkina Faso/DRC and Tanzania; through virtual linkages of the new AFAAS PHM platform; and during regional events (e.g. AFAAS extension week). Agridea enriched the PHM side event in 2015 by highlighting the role of the private sector in PHM<sup>20</sup>.

53. It is correct to say that HELVETAS, in a joint effort with AFAAS and Agridea, has produced a wealth of dissemination materials and conducted numerous events related to good practice in PHM. Not surprisingly, the annual report 2015 is not yet in a position to show overwhelming *“evidence of good practice options for reducing PHL being used by stakeholders not directly involved in the project implementation (policy makers, senior technical staff, rural advisors, NGOs, private sector, CSO)”*.

### **c. Outcome 3 – policies and regulatory frameworks**

54. According to the annual report 2015, a new national PHM strategy is being designed in Mozambique by a task force of MASA via the Centre for Promotion of Commercial Agriculture (CEPAAGRI), AFAAS and FANRPAN representatives are part the task force. For Benin, see Paragraph 49. The same source also affirms that awareness of PHM issues has increased.

55. A significant indicator under Outcome 3 is *“increased level of investments in PHM in pilot countries (by governments, donors, and the private sector)”*. The annual report 2015 relates that Global Agriculture and Food Security Program (GAFSP) funding seeks to improve food security through increased cereal and vegetable production, and reduced PHL, in Benin. A new multi-actor programme *“Multisectorial Support to Food and Nutrition Security in Atacora”* (AMSANA. Belgium/Benin) started implementation in 2016 to foster food security and nutrition, again in Benin. With the new PHM strategy in Mozambique (Paragraph 54), it is expected that new funding will be triggered in the near future.

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<sup>18</sup> Bureau de la Coopération Suisse au Bénin, HELVETAS, SOLIDAR. Programme d’Appui à l’Éducation et à la Formation d’Enfants exclus du système éducatif (PAEFE), Phase 2, 2016-2020, Cotonou, 2015.

<sup>19</sup> Jerry Egessa, AFAAS. Postharvest Management in Sub-Saharan Africa (PHM-SSA), Regional Project of the Global Programme Food Security (SDC), Introduction to the Project, Addis Ababa, 12 October 2015.

<sup>20</sup> Agridea, Simon Degelo. The role of private sector in delivery and servicing of equipment, and providing Rural Advisory Services (RAS) in Post-harvest Management (PHM) Results of the group work, Addis Ababa, 13 October 2015.

56. On the output level, FANRPAN published two PHM policy briefs in the two pilot countries in 2014<sup>21 22</sup>. Both are to be considered as valuable first approximation inputs for policy discussions but they were, inevitably, relatively generic at that time. In both cases, the role of private sector input suppliers in a working business model related to PHM, for instance, was a blind spot. Another noteworthy point to mention is that the Mozambique Policy Brief recommended a stand-alone national PHM policy. In hindsight, this may not be very realistic as the PHM task force mentioned in Paragraph 54 has not accessed a recognized status with the government, i.e. the Ministry of Agriculture and Food Security, which would be a relevant indicator of policy incidence. This being said, the PHM working group has been productive, with eight working sessions and awareness weeks organized in the two pilot districts in Cabo Delgado and Nampula Provinces since project inception. The excellent feedbacks produced<sup>23</sup> reveal that PHM relevant issues are indeed discussed with public sector representatives and farmer unions, but policy impacts of such (necessary) actions are so far not discernible.

57. In Benin, the FANRPAN stage of dialogue is the Civil Society Platform of Civil Society Actors (PASCiB). The presentation prepared for the evaluation mission<sup>24</sup> infers that FANRPAN has found an adequate sounding board, with PASCiB, to engage in and conduct policy dialogue related to PHM. It may indeed be an advantage to be embedded in a recognized civils society platform. On the other hand, it may be difficult to remain focused on PHM as PASCiB has a much broader agenda. Whether PHM can successfully be integrated into the future Agricultural Sector Policy of Benin remains to be seen.

58. FANRPAN has also published, for each pilot country, an evaluation on gender roles and PHM<sup>25 26</sup>. These documents are well researched, and recommend more gender-conscious research and extension, albeit in only generic terms. Another set of two studies is available, in both pilot countries, on food standards and norms related to PHM of staple grains<sup>27 28</sup>. Again, it may be observed that the contents are generic. Aluminium Phosphide or Phostoxin are not mentioned in either document despite the fact that this compound is used worldwide for the fumigation of grain stores. In the Mozambique study, the term “Maximum Residue Levels (MRL of pesticides)” is absent while being one of the key food safety parameters.

### 2.3 Efficiency

59. It is difficult to directly measure efficiency in a project testing business models under sophisticated conceptual premises. There are no comparable projects at hand. If the postharvest losses

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<sup>21</sup> FANRPAN. Scaling-up Promising Postharvest Technologies by Implementing Cost-effective Policy Action in the National Agricultural Policy Framework (PSRSA) in Benin, Cotonou, 2014.

<sup>22</sup> FANRPAN. Towards a Specific Post-harvest Loss Management Policy and Strategy for Mozambique, Maputo, September 2014.

<sup>23</sup> Seven feedbacks in English with lists of participants are on record.

<sup>24</sup> HIS, FANRPAN, AFAAS, Agridea, PASCiB, Aurélien C. ATIDEGLA, Président PASCiB et FANRPAN Node Coordinator. Présentation des actions et résultats de FANRPAN / PASCiB dans le cadre du Projet Gestion Post Récolte (GPR) en ASS, PowerPoint, September 2016.

<sup>25</sup> FANRPAN, Pedro Tomo (first author), Editing author: Elizabeth Mnyandu. Evaluation of Gender Roles, Relationships, and Social Equity in Post-Harvest Management in Mozambique (Post-Harvest Management Project in Sub-Saharan Africa), not dated.

<sup>26</sup> FANRPAN, Dr Kouboura Alice A. DJINADOU IGUE (first author), Elizabeth Mnyandu (editing author). Benchmark Study on Gender and Social Equity in Managing Post-Harvest in Benin, not dated.

<sup>27</sup> FANRPAN, Dr Kouboura Alice A. DJINADOU IGUE (first authors), Elizabeth Mnyandu (editing author). Policy and Regulatory Frameworks for Food Standards/ Norms Related to Post-Harvest Management (PHM) of Staple Grains, and Pulses, An abridged report for the project done in Benin, West Africa, not dated.

<sup>28</sup> FANRPAN, Ivone Muocha (first author), Elizabeth Mnyandu (editing author). Policy and Regulatory Frameworks for Food Standards/ Norms Related to Post-Harvest Management (PHM) of Staple Grains, and Pulses, An abridged report for the project done in Mozambique, not dated.

are indeed USD 4 billion annually, as reported in Paragraph 11, an average annual investment into PHM-SSA of CHF 0.7 million (project document) is modest, even if such investments were to last more than the six years foreseen. Assuming that only 1% of the overall food losses can be reduced after eight years of PHM-SSA, and after a successful upscaling, the gross annual benefit would still be USD 40 million against an accumulated cost of about CHF 6 million. *These orders of magnitude appear to confirm the statement in Paragraph 11, i.e. that PMH is one of the most cost-effective means for enhancing food security.* The following paragraphs underline this general assessment with outcome-specific facts and figures.

#### **a. Outcome 1 - PHM benefits for smallholders**

60. At single household and then at project level, efficiency is normally assessed with benefit-cost analyses. They inform on whether an investment is profitable - or comparatively efficient - and thus justifiable. As the project has not yet made the required calculations the internal evaluation will present related recommendations in the respective sections. Another aspect related to efficiency is linked to the internal transaction costs. In both countries, the pilot activities in the selected districts are relatively remote from the headquarters of the implementing agencies (farmers' unions in Mozambique, NGOs in Benin), causing travel times of several hours each time a pilot site is visited. It is understood that HIS has selected the pilot areas because of own precursor projects in the area of seed production and food security. This is not unreasonable, and may even be relatively efficient. However, if should pilot areas art to be expanded in the future, transaction costs due to transport distances would need to be given more consideration. At the end of December 2015, the activities under Outcome 1 (administrated project funds) amounted to CHF 302,000 or 49% of the allotted budget.

#### **b. Outcome 2 - compilation, dissemination and up-scaling**

61. A brief analysis of the budget structure and the expense-budget balance of Outcome 2 suggests that the wealth of products generated was generated with a cost of CHF 140,000 or 45% of the original budget. It is correct, however, that the HIS offices in Benin and Mozambique began covering local AFAAS costs for the respective fora directly, starting in 2015. This enhanced implementation efficiency of Outcome 2 notably.

#### **c. Outcome 3 - policies and regulatory frameworks**

62. The budget and expenses related to Outcome 3 (FANRPAN) are in the same order of magnitude as for Outcome 2. FANRPAN has generated the numerous products and events mentioned in Paragraphs 54-58 at a cost of CHF 160,000 by end of 2015, equivalent of 50% of the budget.

### **2.4 Impact**

63. The results framework of PHM-SSA infers that three distinct impacts were expected at project design, i.e.: (i) the number of food-secure months in participating households, (ii) the number of communities indicating reduces vulnerability, and (iii) livelihood/gender improvements at household level: workload for women/men, housing conditions, farm production, family health and education of children. As mentioned in Paragraph 45, the related indicators have not been measured as this would only make sense with a more consistent adoption of PHM solutions, which is not the case at this stage of technology testing. This does not diminish the value of the chosen indicators, but they require carefully designed surveys, ideally at the end of the second phase of the project.

### **2.5 Attribution of results**

64. This evaluation criterion is not a freestanding DAC criterion, but interesting to explore because it focuses the view on the question whether the observed results are, or are not, due to the deployment of project activities. The following paragraphs detail the evaluators' assessments per outcome.

### **a. Outcome 1 - PHM benefits for smallholders**

65. According to HELVETAS, the Ministry of Agriculture and FAO in Mozambique implemented already activities related to PHM, including the promotion of other PHM technologies like the mud-plastered, woven, Gorongosa silo<sup>29</sup>. PHM-SSA is the first project that is systematically investigating and testing various PHM solutions in two environments of Benin, and two northern districts of Mozambique. The response of the PHM solution testing households, men and women alike, is one of vivid interest as PHM are perceived as an existential liability (Paragraph 29). PHM-SSA is the only project focusing on these issues exclusively. The research conducted in both countries, despite some technical reservations in the case of Benin (Paragraph 14), shows that the test persons would tend to adopt the promoted technologies.

### **b. Outcome 2 – compilation, dissemination and up-scaling**

66. In both pilot countries and at in the AFAAS platforms, the available dissemination material can only be attributed to PHM-SSA. The incipient outreach to other African countries and development organizations is another case to be made. The presence of PHM issues is increasingly clearly visible on the AFAAS PHM platform.

### **c. Outcome 3 – policies and regulatory frameworks**

67. Without the involvement of FANRPAN in PHM-SSA, PHM issues would be much less present in realms of policy analysis and dialogue, although FANRPAN has also publishes PHM relevant themes, funded by the European Union, FAO and a number of universities<sup>30</sup>.

## **2.7 Sustainability**

68. Not unlike as in the case of impact, it appears to be premature to assess sustainability based on project attributable evidence at this point of time. It is however possible to estimate the prospects of sustainability related to the three outcomes of PHM-SSA towards the end of its probable existence.

### **a. Outcome 1 - PHM benefits for smallholders**

69. A number of factors is favouring sustainability for smallholder farmers. Among them are worthwhile to mention:

- a. The probably growing importance of staple grains, the ensuing need to increase preharvest productivity and to reduce postharvest losses in a context of population growth and decreasing arable land.
- b. The growing awareness, also thanks to the project, of the physical losses and the options to reduce or avoid them.
- c. The emerging conscience that the seasonal prices fluctuations of grains may represent opportunities. At present, these fluctuation inflict bigger financial losses than the physical losses, to a big number of poor producer families under the obligation to sell grain at low prices, for the urgent need of cash.
- d. The observed propensity to form producer organizations, e.g. for the management of warrantage centres.

70. One factor clearly compromising sustainability is the approach to PHM testing with rural producer families without determining the conditions and prospects of test periods, which moreover must be limited in time. Even if it can be safely assumed, on the basis of research and anecdotic feedback, that the test subjects are interested in a given PHM solution, leaving them in the dark of the

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<sup>29</sup> Manfred Schug, Advisor for Agrarian Technologies, INGC, Mozambique. The granary for cereals, “Gorongosa Type”, not dated.

<sup>30</sup> FANRPAN, Trust Donga. Analysis of Existing Institutional Arrangements and Policy Environments for Managing Climate Related Risks to Smallholder Crop Production and Post-Harvest Handling in Malawi, 30 August 2014.

cost of such solutions is killing their willingness to pay. This approach is contradictory to the business model that the project is trying to develop.

#### **b. Outcome 2 – compilation, dissemination and up-scaling**

71. The products of Outcome 2 typically are emerging public goods. If they are designed and decisively disseminated by a variety of channels, including mobile and computer-based, the prospects of sustainability are good. The success will be measured by the growing demand of such products, on a continental scale.

#### **c. Outcome 3 – policies and regulatory frameworks**

72. It is still early to affirm that PHM has entered mainstream policies in SSA countries. But the choice of FANRPAN was a rational one to build an advocacy platform in order to reach lobbying groups related to PHM. The fact that physical PHL are technically avoidable, and that methods are at hand to reduce financial losses by the most vulnerable rural populations, by warrantage-like features, confers the potential of political leverage. Evidently, policy dialogue and advocacy must be permanent functions.

### **2.8 Gender equity**

#### **a. Outcome 1 - PHM benefits for smallholders**

73. The design of PHM-SSA went at some length to insist on the gender-sensitivity of PHM solutions to be tested (Paragraph 21). As the annual report 2015 notes, it is not so easy to overcome the gender indifference of typical extension methods and organizations, which tend to reproduce themselves also on PHM issues. On the positive side, the field research and surveys on PHL in Benin and Mozambique both present a fair amount of gender-disaggregated data, as well as the baseline survey in Mozambique (Paragraphs 14, 17 and 21). The baseline survey of Benin is not on record. In terms of the gender of PHM adopters, the annual report 2015 indicates that 4% of all adopters of the total were women in Mozambique, and 8% in Benin, thus below the target of 15% (Paragraph 7).

74. Another noteworthy feature of PHM-SSA at the level of the technology testing sites is that both women and men are involved in the assessment of the various PHM solution. It may be an emerging insight, as noted by the annual report 2015, that women tend to prefer PHM solutions that imply relative low costs (PICS, Superbag) and that women may tend to spread risks more by adopting various PHM solutions at the same time. When we interviewed Ms Rosa Manuel in Chiure District in Mozambique, asking her why she would prefer the metal silo over a traditional storage container, she simply replied: *“It is beautiful”*. Such replies can be eye-openers because they are infer that successful PHM business models must also appeal to emotions.

75. The two warrantage centre visited in Benin were led by women, in one case a group of 112 women and one man. This suggests that women may have much more potential than men to fully grasp the potential hidden in the distinct seasonal price fluctuations, which we assume to be real despite the obviously flawed official price statistics (Paragraph 16). In view of the above, the impression prevails that PHM-SSA is considering women in an appropriate way. Documentation of gender-disaggregated data should still be given more attention, though.

#### **b. Outcome 2 – compilation, dissemination and up-scaling**

76. A review of the available didactic and dissemination material suggests that men and women equally find access to the fact sheets and PHM manuals, in both countries (Paragraphs 49-53). In most pictorial representations, women appear as appropriate, consistent with their specific tasks in PHM, and concerning their role in the assurance of food security in general.

77. The mission commends what the annual report is noting: *“For more differentiated measuring of gender segregated results, the **indicators of the M&E system** were refined and completed. Work on surveying the benefits of PHM options was further continued in 2016 and shall provide a clearer picture of the suitability of PHM innovations as a basis for the dissemination of most successful options”*.

### **c. Outcome 3 – policies and regulatory frameworks**

78. It speaks for the project that the two FANRPAN studies on gender roles in PHM policies conclude that related policies, not only regarding PHM, tend to be gender-blind, albeit with only generic references (Paragraph 58). The outstanding challenge for the project, and FANRPAN, during the second phase will be to bring not only PHM into the food security policy mainstream, but to endow it with the required gender sensitivity. It is reasonable to assume that this will still require a concerted effort among all consortium members.

### **2.9 Summary and conclusions**

79. As stated in Paragraph 21, PHM-SSA is an ambitious project as it attempts to include and implement key principles such as M4P and its practical implications related to PHM in a transparent manner. The annual reports do reflect achievements as well as difficulties to reach them, both in their narrative parts and in detailed comparisons between stipulated outcome and output indicators and the effectively attained magnitudes.

80. PHM-SSA is not only ambitious, it also has a complex architecture due to a consortium composed of two main partners (HIS and FANRPAN) and two subsidiary members (AFAAS and Agridea). Taking into account both the ambitions and the complexity, PHM-SSA kept the road fairly well. But it is not surprising that the implementation delays result in a state of technical, and foremost business-model related, inconclusiveness. This is indicative that the planned second phase should be rethought in terms of its ambitions and timeframe.

### **3. Prospective part – Looking to the second project phase**

81. As originally designed, the second phase would last about two additional years. In view of the summary conclusions above, the internal evaluation recommends the following generic measures before entering into the matter of Sections 3.1 to 3.8.

82. Instead of two years, a second phase of three to four years should be envisaged, e.g. from June 2017 to December 2020. This is not only commensurate with the present status of relative inconclusiveness of the present phase, but also with the proposed objective and content of the second phase.

83. Without pre-empting what follows in the sections below, it is recommended to maintain, in principle, the consortium as it is constituted now.

84. The most fundamental change from the first to the second phase is one of *underlying assumptions*. As in most PHM undertakings, the physical PHL are at the centre stage of attention, plus the available technical solutions to reduce or completely avoid such physical losses. This internal evaluation recommends a *paradigm shift regarding PHM*. Obviously, the reduction of avoidable physical PHL will remain an indispensable element. However, much more attention needs to be directed to another phenomenon, the substantial seasonal price fluctuations between harvest and lean periods that typically display six-monthly curves (Annex 9). The project document, and to a lesser degree, the annual report 2015, do refer to such seasonal price fluctuations, correctly assuming that the use of appropriate PHM technologies would indeed allow to sell higher quantities of grains and pulses in periods of higher prices. However, as it is stated below, this is not enough to prompt producers to store grains and pulses instead of selling at harvest. The *recommended paradigm shift therefore focuses on the availability of credit at harvest*, a condition that seems to locally exist in Benin, at least with the two women groups visited. As HELVETAS remarks, there may be socio-cultural inhibitors among poor households to store grains (pulses, because of their smaller volumes, tend to be stored at home) in a warrantage centre, such as mistrust and aversion to openly display assets. The visits to the two groups in Benin did not reveal such limitations.

85. The pattern shown in Annex 9 is a persistent poverty trap: most poor household urgently need cash at harvest when prices are low. If they happen to be net-deficit producers, they have to buy grain again when prices are higher. "Selling for buying is losing twice". Even for net-surplus producers, this poverty trap is real. Their cash need is as urgent as for net-deficit producers. They sell part of their

harvest at a low price, even if they had the technology to avoid physical PHL. This is one of the reasons why areas with rural grain producers persistently remain in poverty.

86. *The warrantage system is a good solution because it injects cash on credit basis against a collateral that is prone to increase in value up to 100% in a few months.* In secure warrantage centres, the collaterals are not only safe but an incredibly good short term investment. Thus, the second phase of PHM-SSA should not attempt “to do more of the same”, but “to add a quantum leap to attain much more”. Admittedly, this is a bold recommendation, but the system does not need to be invented but only to be replicated and scaled up. Annex 12 includes two separate spreadsheet-based tools to conduct simple financial analysis for two cases: (i) avoidance of only physical losses, and (ii) avoidance of physical losses plus additional revenue by warrantage-like mechanisms.

### **3.1 Viability of the business models adopted (Outcome 1)**

87. At this stage, close to the end of the first phase of the project, it is impossible to confirm or infirm the viability of the business models based on solid evidence. What can be said with a certain degree of confidence is that there are no fundamental alternatives to a market-based model with private sector logic and with little lasting distortions. In Mozambique, the business models shown in Annex 10 displays market actors that are real and that have, albeit modestly, demonstrated that they have the interest and capacity to supply the requires items. In Benin, the supply chains of PICS bags and material for the production of metal silos still need to give proof of their business clout, profitability and sustainability.

88. Paragraph 48 mentions that the metal silo is perceived as a PHM solution with less chances than other, more affordable, items such as the PICS and Superbag. *The significance of the silo might be enhanced if a number of warrantage centres were to be equipped with silos, given their easy handling and long shelf live.* The authors of this evaluation concur with HELVETAS that farmers may be ready first to invest in cheaper hermetic bags, but once convinced that it works, and prepared to store bigger quantities, they may then shift to metal silos. For the solidity of the actors in the supply chains of the business model in Mozambique, the metal silo may have better chances than in Benin.

89. Again assuming the inclusion of warrantage schemes, it may also be indicated to seriously consider the use of Aluminium Phosphides (Phostoxin) under controlled conditions and at a certain scale, and the training of the operators. At present, Phostoxin is not officially admitted in neither country, but freely available even in small villages. The use of Actellic in hermetic containers should not be promoted.

90. The above paragraphs infer that the promotion of warrantage centres would respond to the perceived PHM problems (not only physical PHL, but financial losses because of widespread sales at low prices; Paragraphs 84-86). In reality, if credit were available at good conditions for individual users of PHM solutions addressing physical PHL, warrantage centres would not be a must. But it is probable that banks and rural financial intermediaries will prefer lending to formal groups and cooperatives, for the sake of security and lower transaction cost. *It follows from the above, that the project should extend the cooperation with such financial intermediaries (Paragraph 91).*

### **3.2 Strategies for massive adoption (Outcome 1)**

91. In both countries, promotion agencies have been associated to the project, the provincial delegations of the respective ministries of agriculture and, as frontline agencies, Provincial and District Farmer Unions in Mozambique, and two ONGs in Benin. The need for an extension of alliances in Benin is obvious, by FUPRO for example, that represents 120,000 producers in the country. If the promotion of warrantage schemes is retained, their installation would cause a substantial demand pull for appropriate storage technologies (Paragraph 88) and, in concomitance, be a driver for the adoption of PHM because this would be associated with an injection of cash at critical moments of harvest. Obviously, and as the case of Benin shows, banks or rural financial institutions must be involved from the start. In this happens, *PHM-SSA will have to make overdue convincing efforts for such financial intermediaries: warrantage loans are particularly low-risk (Paragraph 86).*

### **3.3 Approaches and effectiveness of dissemination modes (Outcome 2)**

92. Considering the quantity of dissemination material produced, and the variety and numbers of events and vehicles organized and used, including rural radios and e-fora (AFAAS), it is clear that this material and channels are appropriate. In a second phase, the emphasis should be put much *more on the adoption of PHM solutions, foremost beyond the pilot countries, than the materials and methods generated and used*. This means that the number of tasks given to AFAAS and Agridea may become less at national scale, but more determined in terms of outcomes at continental scale. This indeed corresponds to the competitive advantage of the AFAAS/Agridea tandem.

### **3.4 Approaches for policy dialogue and awareness raising (Outcome 3)**

93. Not unlike regarding Outcome 2, the second phase should be more focused on *the effects of policy dialogue* (policies, strategies, norms) than on the mere instruments and modalities of such policy dialogue. Like in the case of Outcome 2, *the significance of Outcome 3 will be measured by how pilot and other countries integrate PHM into mainstream policies*.

### **3.5 Project architecture and role clarity (Outcome 3)**

94. In principle, the project architecture is adequate as it assigns roles to organizations with distinct competitive advantages that are consistent with the characteristics of a global programme of SDC. They clearly require a project outlook able to project good practice on a continental scale. The choice of FANRPAN and AFAAS, coached by Agridea, is coherent with the logic of a global programme. Consistent with the Sections 3.3 and 3.4 above, the missions given to FANRPAN and AFAAS (Agridea) would need to be more output and outcome-oriented than during the first phase where it is necessary to generate the necessary inputs (dissemination material, policy briefs...).

### **3.6 Geographic extension (Outcome 3)**

95. Geographic extension makes sense as soon as there is a critical mass of conclusive products that can be scaled up beyond the borders of the pilot countries. By May 2017, will not be the case. With a second phase enriched with an essential paradigm shift towards the avoidance of financial losses and of physical PHL, sufficient time of implementation *in the two pilot countries* is required to create the necessary know-how assets.

### **3.7 Conclusions and recommendations for the short-term strategic orientation**

96. PHM-SSA is alive and able to produce tangible asset by the end of the first phase. On the short term, PHM-SSA should use the remaining time of the first phase until May 2017 in the following areas:

- a. Review and finalize the ongoing PHL research in the sense that valid lessons can be learned about physical losses and preferences for the tested PHM solution, with gender-disaggregated results.
- b. On this basis, prospective exercises regarding benefit-cost analyses for the avoidance of physical and financial losses, per pilot country.
- c. For both a. and b. above, prepare comprehensive reports displaying the state-of-the-art generated by the first phase of PHM-SSA.
- d. Carefully examine whether the recommended paradigm shift towards the inclusion of financial PHL is relevant and feasible, at pilot country level and beyond, including by consulting secondary literature about the subject matter.

### **3.8 Conclusions and recommendations for the medium-term strategic orientation**

97. The main conclusion for the medium-term strategic orientation of PHM-SSA is that, despite a certain delay in the generation of conclusive premises, the basis is sufficiently solid to envisage a robust second phase. Cutting short now, or adding an only diluted phase-out, would do justice, neither to the evidence generated in the pilot countries, nor the overarching PHM challenges at stake in SSA.

98. On this basis, there is only one recommendation for the medium strategic orientation: *to implement the mentioned paradigm shift towards a more comprehensive definition of PHM, explicitly including the dimension of also avoiding financial losses, by taking advantage of the price fluctuation and to create robust opportunities for creating wealth in rural areas.*

99. The advantage of this shift would be to put the entire PHM discussion on a new footing. Only avoiding, with appropriate technologies, the physical PHL is necessary, but not sufficient. All smallholder producers need cash at harvest. Just to avail of appropriate technology is no solution. It would be consistent with the mandate of the GPFS to lead this paradigm shift.

**XXXXXXXXXXXX**

### Terms of reference of the internal evaluation (excerpt)

The overall objective of the evaluation is twofold:

- a) Review and assessment of the achieved vs expect results (retrospective, approx.)
- b) Based on the review under a) and the policy environment in the two countries and the sub-regions, elaborate and draw conclusions and make recommendations for the rest of the current administrative phase and the subsequent administrative phase of two to three years (prospective)

The evaluation under a) follows in principal the standard DAC criteria for evaluation of development assistance and the definition of key terms such as effectiveness, relevance, efficiency and sustainability.

For a):

Based on these criteria, the evaluation throws light to the following interlinked aspects (retrospective part):

1. Effectiveness and relevance: a) assess and evaluate the degree by which the agreed outcomes of the project have been achieved and b) evaluate the relevance of the project (results, technological solution, approach and strategy) against technical, agro-climatological, economical and socio-cultural needs and suitability, and against national and regional policy and decision makers.
2. Attribution of results: Assess the contribution of the project to the degree by which out-comes were achieved as a direct result of the efforts of the project (attribution), including by relating and comparing it to the contribution of other drivers and factors of the out-come.
3. Efficiency: Evaluate the performance and efficiency of the project in relation to the costs (outputs vs. inputs).
4. Impact: Draw conclusions on the overall impact of the project.
5. Sustainability: Assess the sustainability of the initiated results (sustainability in terms of technical solutions identified and stipulated, but also in terms continued promotion, promulgation and/or provision of services).

In addition to these five standard DAC criteria, the evaluation is expected to analyse transversally gender equity aspects. In terms of gender and social equity, the M&E framework is supposed to:

- provide gender disaggregated data for all person-related quantitative data,
- include qualitative data relevant to gender equality (such as changing roles or access to credit or extension services for men and women,
- capture women's and as well as men's perspectives (i.e. separate female and male respondents) in a way that reflects their role in the PHM

Key questions are:

- Does the project reach men and women equally in terms of delivery of solutions and in terms of benefits induced by the project?
- Do the promoted technical post-harvest loss reduction solutions favour equally men and women?
- Supposing that one sex tends to favour less from introduced technical innovations, what change in the technical solution, intervention strategy, and the approach would be needed?
- What are the policy implications of the gender analysis?

Any other relevant information regarding the effects of the project on both sexes, wanted or un-wanted, positive or negative, are to be detected and analysed.

For b):

For the prospective part, the evaluation intends to throw light particularly on the following aspects:

Regarding Outcome 1:

- Does the project propose a viable business model for PHM businesses that ultimately leads to the dissemination of PHM technologies at large scale (metal silos, triple bags / super bags)?
- Does the project have an efficient and effective strategy and/or approach to make this business model be massively adopted?

Regarding Outcome 2:

- Does the project have the right approaches for the dissemination of the knowledge of PHM technologies and practices (outreach, viability, effective mobilization of private and public actors, quality of training tools and products used)? Are they effective?

Regarding Outcome 3:

- Does the project have the right approaches for an effective policy dialogue and general awareness raising (effective placement of PHM into national sector agendas, quality and effectiveness of publications and studies used, sensitization of broad public in the intervention areas, use of regional networks to bring in PHM into policies of the Sub-Saharan region and share knowledge)?

Regarding project set-up:

- Functioning of the consortium: Is the institutional architecture of the project and sharing of roles (multi-partner, multi-country consortium) the most suitable and efficient to achieve results defined? How can it be improved?
- Geographical extension: Is an out-scaling to further countries the two regions logic, viable? What geographical focus should the project have in phase 2, considering results achieved so far, available resources and other existing PHM initiatives in the region?

This analysis together with the key findings under a) will be the basis for the following three types of conclusions:

1. Regarding the retrospective part:

- Summary and conclusions on the overall performance of the project (summary of findings under a)).

2. Regarding the prospective part:

- Conclusions *and recommendations* for the short term strategic and operational orientation (rest of current administrative phase)
- Conclusions *and recommendations* for the medium term strategic and operational orientation (next and last administrative phase of 2017 to 2018/2019)

## Mission itinerary, participants

Dates	Places	Activities	Participants*
26 August 2016	Caslano-Maputo	Travel	ES
27 August 2016	Maputo	Document review	ES
28 August 2016	Maputo-Pemba	Travel, document review, inception report	ES
29 August 2016	Pemba-Chiure	HIS office Pemba, Provincial Department of Agriculture, Provincial Farmers' Federation Cabo Delgado, travel to Chiure	ES, MN
30 August 2016	Chiure-Nampula	District authorities, COOPSEN, project partners, technology users	ES, ACS, MN
31 August 2016	Nampula-Mecuburi-Nampula	District authorities, project partners, technology users	ES, ACS, MN
01 September 2016	Nampula-Maputo	Provincial Farmers' Federation Nampula, travel, preparation of debriefing	ES, ACS, MN
02 September 2016	Maputo	Meeting with Ministry of Agriculture and Food Security, ASAAF Focus, FANRPAN Node, HIS, debriefing with SDC	ES, ACS, MN
03 September 2016	Maputo-Lisbon	Travel	ES
04 September 2016	Lisbon-Paris-Cotonou	Travel	ES
05 September 2016	Cotonou-Natitingou	Travel, meeting with	ES, RS, EvS
06 September 2016	Natitingou-Pira	District authorities, project partners, technology users	ES, RS, EvS
07 September 2016	Pira-Dassa	Meeting with, visit of ...	ES, RS, EvS
08 September 2016	Dassa-Cotonou	Travel, HIS office, meeting with ASAAF Focus, FANRPAN Node, Agricultural Research Institute	ES, RS, EvS
09 September 2016	Cotonou	Debriefing with HIS, analysis of agricultural statistics	ES, RS;EvS
10 September 2016	Cotonou-	Report layout, travel	ES
11 September 2016	Paris-Caslano	Travel	RS

\*RS: Dr Rachidatou Sikirou ACS : Abdul Cauio Sualehe ES: Ernst Schaltegger  
 MN: Mauricio Negas, HELVETAS EvS: Evelyne Sissinto, HELVETAS

## List of persons met

Persons	Institutions and functions
<b>Switzerland</b>	
Simon Zbinden	Co-Head, Global Programme Food Security, SDC
Raphael Dischl	Programme officer, PHM-SSA, HELVETAS
Simon Degelo	Programme officer, Agridea
<b>Mozambique</b>	
Mauricio Negas	HELVETAS PHM Coordinator Mozambique
Alfane Momade	Director, District Agriculture Services (SDAE), Chiure
Jatila Raul and Constancio Mario Pitau	Coordinator and chief of programs, Community Radio, Chiure
Abdul Chafi Picones	District Permanent Secretary, District Government, Chiure
Guilherme Messai and artisans Xavier Pedro, Manuel Martins, Eliseu Romoliua	Master trainer and artisans, Mahipa
Ibraimo Pepeya	Mahipa trader
Eusebio Manuel and Telmina Manuel	Pilot Adopting Farmer and wife, Mahipa
Marieta Viera (President) and members (Joaquina Moripa, Moises Daniel, Margarida Tuaya, Ermelinda Filiquero, Rosalina, Luis Daniel, Assanadine Cohane, Crescente Monteiro, Antonio Americo, Fernando Mahala	District Farmer Union of Chiure
Jose Anselmo) and Florencio Geraldo (Attendant)	Shop manager, attendant, COOSEN inputs shop, Mecuburi
Maria Airone and District Administrator	SDAE Director, District Government, Mecuburi
Luis Acacio, Maurito Araujo, Rosa Manuel, Mario Cuatieque	President and farmers, Association of farmers in Minhuene
Delcio Mbota	Provincial coordinator, UPC (Provincial Farmers Union)
Artur Baltazar (General Manager) and Alirio Benjamim (Agribusiness Manager)	General and agribusiness manager, COOSEN (Cooperative of Services and Business)
Joao Mutondo	National Nodal Point, UEM/FANRPAN
Licinia Cossa	AFAAS/MASA (Ministry of Agriculture)
Horacio Morgado	SDC programme officer
<b>Benin</b>	
Evelyne Sissinto	HELVETAS PHM Coordinator Benin
Bruno Poitevin	HELVETAS Country Director Benin
Pontikamou Eric	ERAD, Directeur exécutif
Orou Benjamin	ERAD, Responsable du projet post- récolte dans l'Atakora (Boukombé)
Sanoussi Feisal	ERAD, Suivi du projet post-récolte dans l'Atakora (Boukombé)
Natta Constance	Groupement Koukongou, Responsable du groupement
Ogounniyi Gabriel Oladjiré	LDLD, Directeur exécutif
Gongo Sylvestre Tchamé	LDLD, Responsable du projet post- récolte dans les Collines (Dassa)
Gbaguidi Thomas	Mairie de Savalou

<b>Persons</b>	<b>Institutions and functions</b>
Guezodje Lionel	Fédération des Unions de Producteurs du Bénin (FUPRO), Président
Godjo Rufin	FUPRO, Directeur Exécutif
Professeur Simplicite Vodouhè	Sciences Agronomiques de l'Université Nationale du Bénin (UAC), AFAAS Point Focal
Adegbola Patrice Ygué	Sciences Agronomiques de l'Université Nationale du Bénin (UAC)
Hessavi Pélagie M.	UAC
Ohouko S. Kemi	UAC
Atidegla Aurélien C.	Président du PASCiB et FANRPAN Node Coordinator
<b>Conference call interviews</b>	
Mr Talentus Mthunzi	FANRPAN, Programme Officer, PHM-SSA
Mr. Jerry Egessa	AFAAS, Programme Officer, PHM-SSA
Mr. Max Olupot	AFAAS, former Programme Officer, PHM-SSA

## Bibliography

- SDC, Intercooperation, ETH, NITLAPAN. 5 Year Ex-Post Impact Study, POSTCOSECHA Programme Central America, Final Report March 2011.
- Patrice Ygué ADEGBOLA, Evelyne SISSINTO, Pélagie M. HESSAVI & OHOUKO S. Kemi. Évaluation de l'efficacité et l'acceptabilité de structures de stockage du maïs dans les communes de Savalou et de Boukombé au Bénin, PowerPoint dated 8 September 2016.
- Banú Belmiro Irénio, Julia Crisanto Lipinga, Talibo Abdala Perar. Relatório Preliminar dos resultados do ensaio de validação de técnicas de armazenamento do grão de milho na redução de perdas pós-colheita, Maio 2016.
- MIRUKU COOP. Estudo de Base para o Projecto de Gestão Póscolheita nos Distritos de Ancuabe, Chiúre, Mecubúri e Muecate nas Províncias de Nampula d Cabo Delgado, Relatório final, Junho 2014.
- HELVETAS, FANRPAN, AFAAS, Agridea. Postharvest Management in South Saharan Africa, Project Document for Phase I 01.04.2013 to 31.03.2017, Zurich, 28.02.2013, Version 2.2.
- HELVETAS, FANRPAN, AFAAS, Agridea. Postharvest Management in South Saharan Africa, Annual Report 2015, Zurich, 2016.
- SDC, GPFS, Simon Zbinden. Postharvest Management in South Saharan Africa, Mission Report, 16-25 May 2016.
- République du Bénin, Ministère de l'Agriculture, de l'Élevage et de la Pêche, Direction de la Programmation et de la Prospective. Retraite pour la Rédaction du nouveau Plan de Développement du Secteur Agricole, Termes De Reference, Cotonou, septembre 2016.
- SDC, HELVETAS, FANRPAN, AFAAS, Agridea, ERAD, LDLD, IITA. Manuel de formation participative sur les bonnes pratiques post-récolte du niébé au Bénin, Manuel du facilitateur, non-dated draft.
- Bureau de la Coopération Suisse au Bénin, HELVETAS, SOLIDAR. Programme d'Appui à l'Éducation et à la Formation d'Enfants exclus du système éducatif (PAEFE), Phase 2, 2016-2020, Cotonou, 2015.
- Jerry Egessa, AFAAS. Postharvest Management in Sub-Saharan Africa (PHM-SSA), Regional Project of the Global Programme Food Security (SDC), Introduction to the Project, Addis Ababa, 12 October 2015.
- Agridea, Simon Degelo. The role of private sector in delivery and servicing of equipment, and providing Rural Advisory Services (RAS) in Post-harvest Management (PHM) Results of the group work, Addis Ababa, 13 October 2015.
- FANRPAN. Scaling-up Promising Postharvest Technologies by Implementing Cost-effective Policy Action in the National Agricultural Policy Framework (PSRSA) in Benin, Cotonou, 2014.
- FANRPAN. Towards a Specific Post-harvest Loss Management Policy and Strategy for Mozambique, Maputo, September 2014.
- HELVETAS, FANRPAN, AFAAS, Agridea, PASCiB, Aurélien C. ATIDEGLA, Président PASCiB et FANRPAN Node Coordinator. Présentation des actions et résultats de FANRPAN / PASCiB dans le cadre du Projet Gestion Post Récolte (GPR) en ASS, PowerPoint, September 2016.
- FANRPAN, Pedro Tomo (first author), Editing author: Elizabeth Mnyandu. Evaluation of Gender Roles, Relationships, and Social Equity in Post-Harvest Management in Mozambique (Post-Harvest Management Project in Sub-Saharan Africa), not dated.
- FANRPAN, Dr Kouboura Alice A. DJINADOU IGUE (first author), Elizabeth Mnyandu (editing author). Benchmark Study on Gender and Social Equity in Managing Post-Harvest in Benin, not dated.

FANRPAN, Dr Kouboura Alice A. DJINADOU IGUE (first authors), Elizabeth Mnyandu (editing author). Policy and Regulatory Frameworks for Food Standards/ Norms Related to Post-Harvest Management (PHM) of Staple Grains, and Pulses, An abridged report for the project done in Benin, West Africa, not dated.

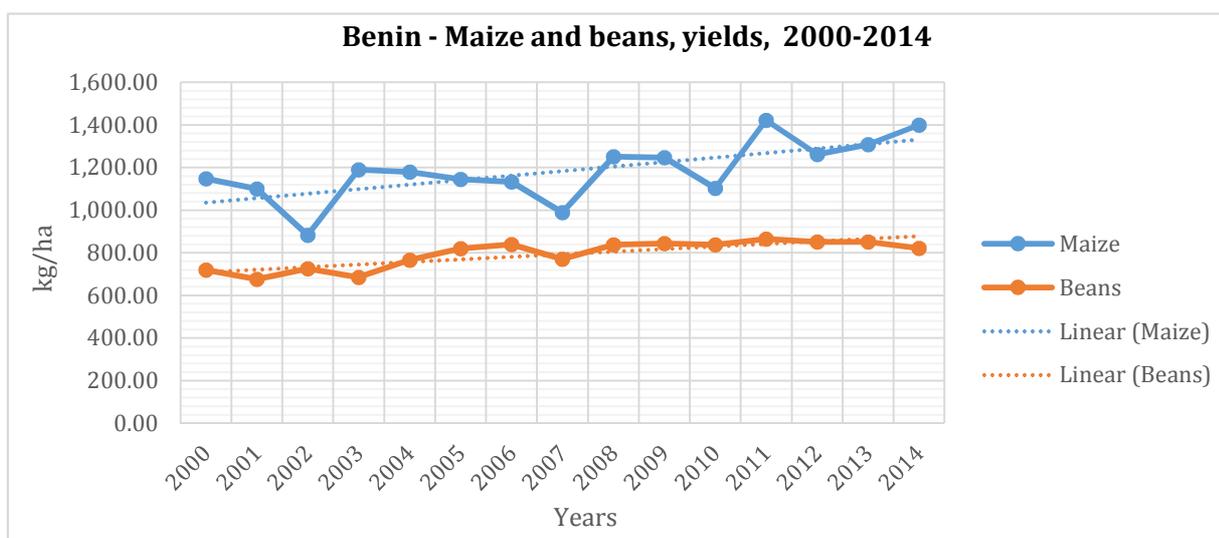
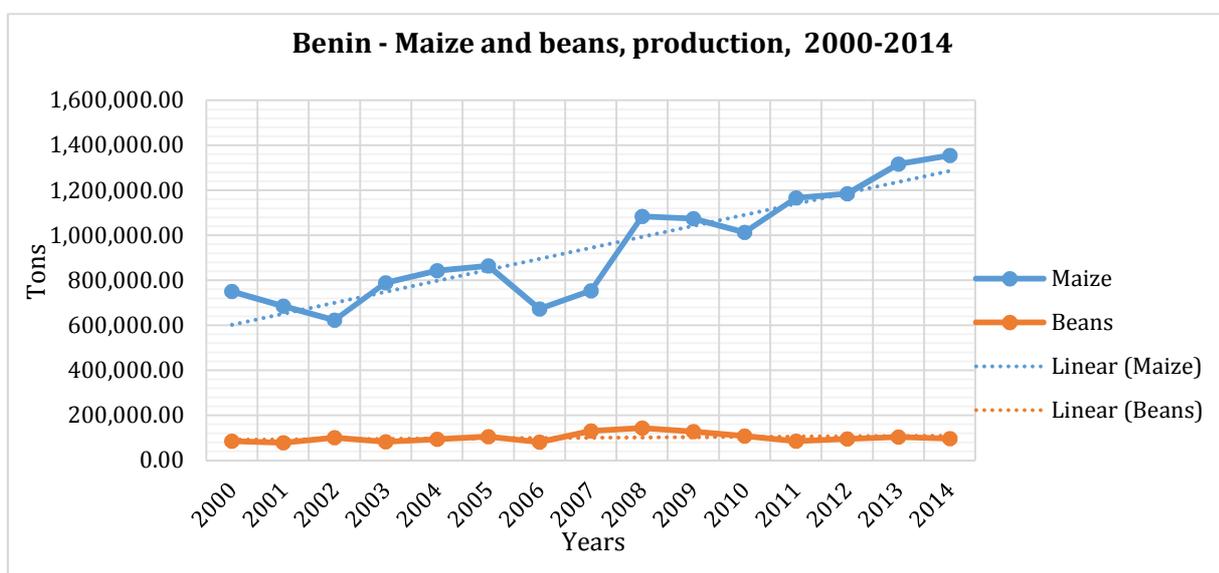
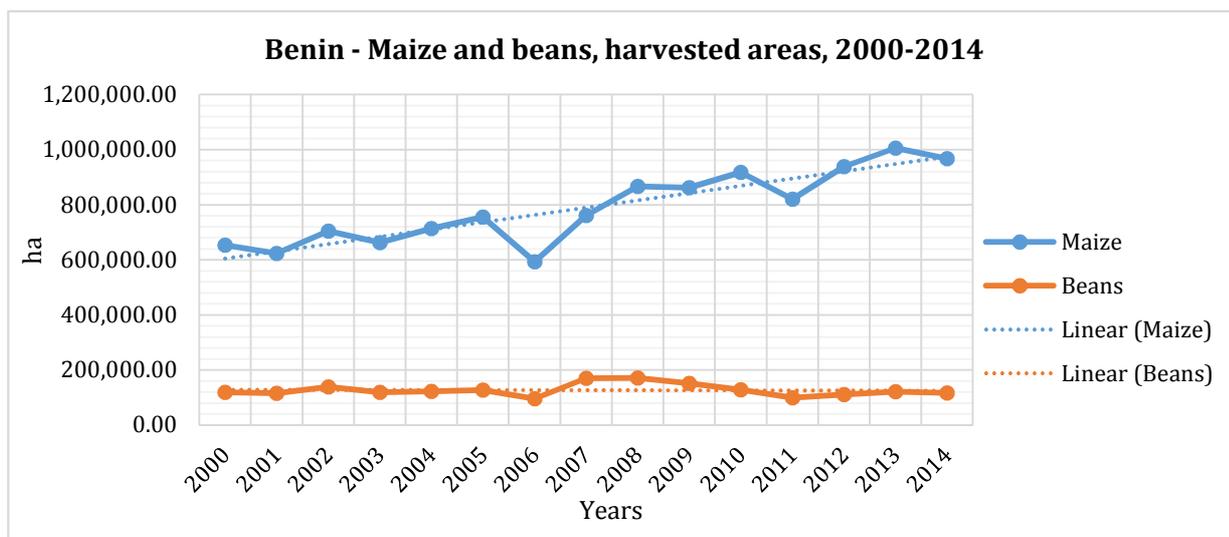
FANRPAN, Ivone Muocha (first author), Elizabeth Mnyandu (editing author). Policy and Regulatory Frameworks for Food Standards/ Norms Related to Post-Harvest Management (PHM) of Staple Grains, and Pulses, An abridged report for the project done in Mozambique, not dated.

Manfred Schug, Advisor for Agrarian Technologies, INGC, Mozambique. The granary for cereals, "Gorongosa Type", not dated.

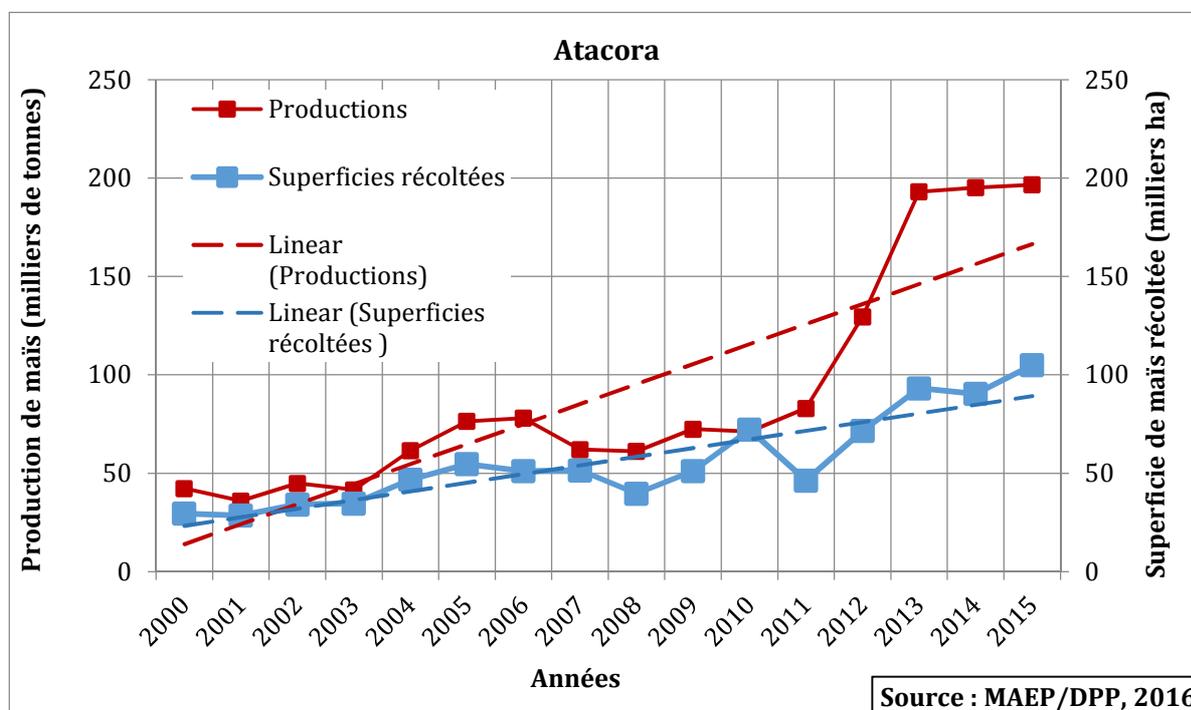
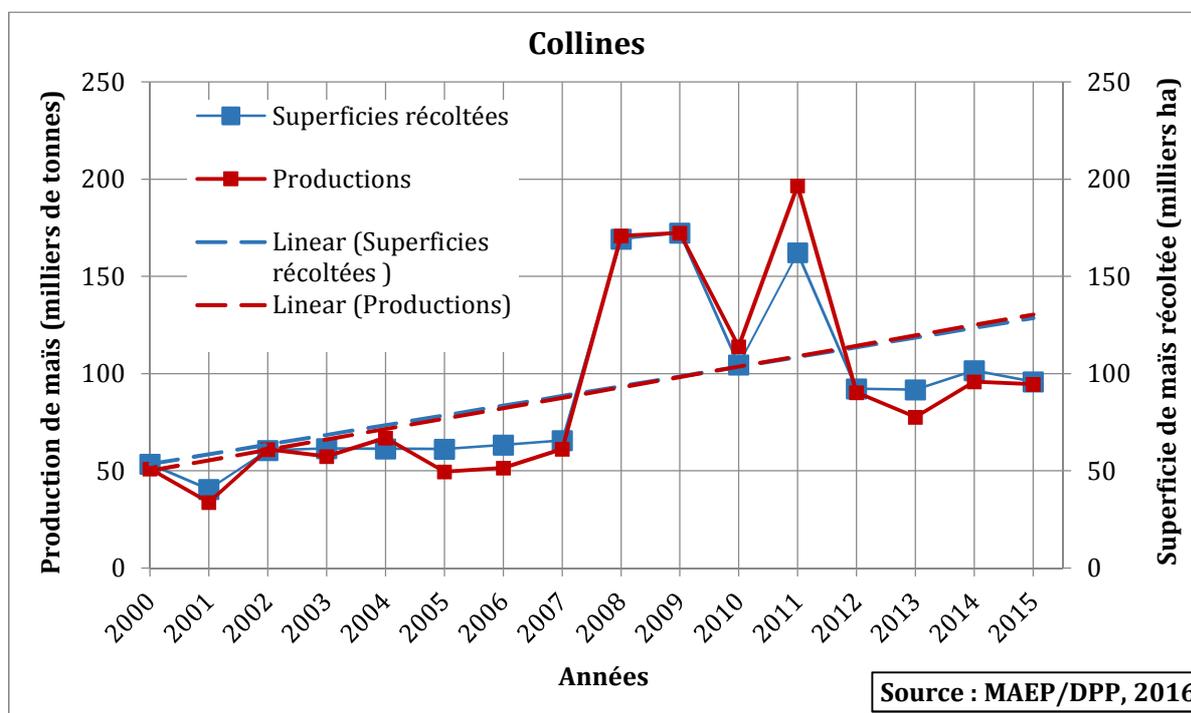
FANRPAN, Trust Donga. Analysis of Existing Institutional Arrangements and Policy Environments for Managing Climate Related Risks to Smallholder Crop Production and Post-Harvest Handling in Malawi, 30 August 2014.

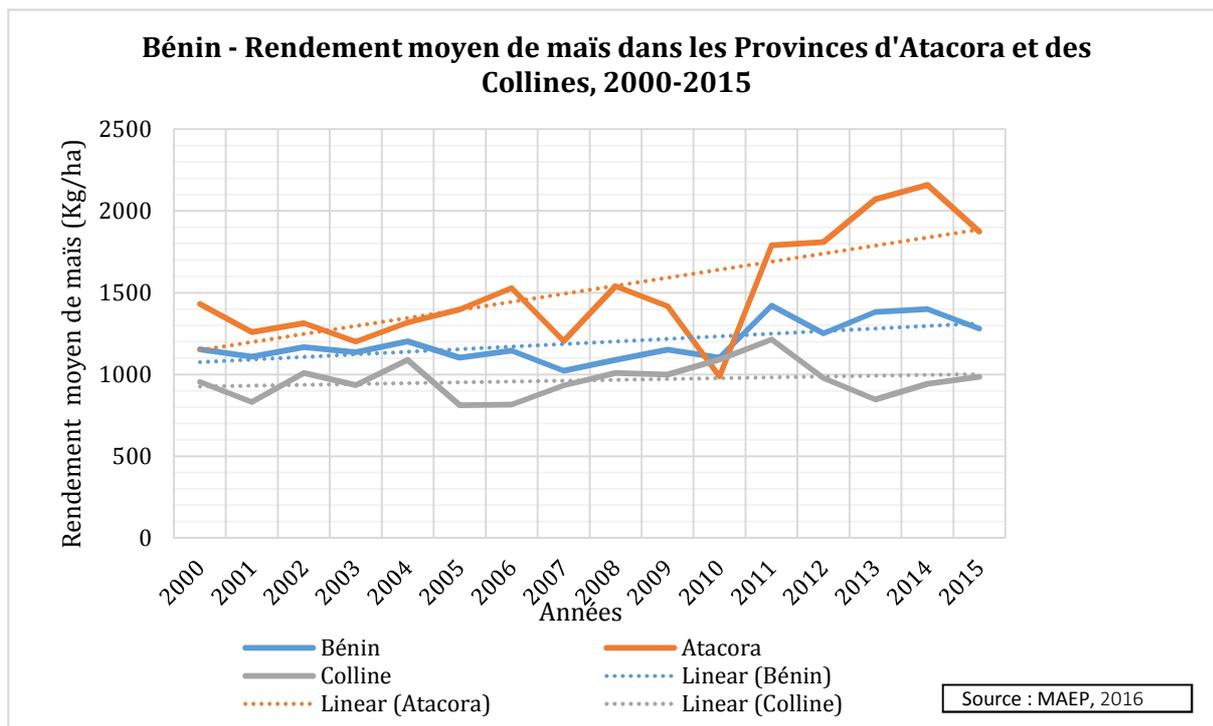
Instituto Nacional de Normalização e Qualidade INNOQ. Catálogo de Normas Moçambicanas -2015, Maputo, 2015.

## Benin - Selected national agricultural statistics (FAOSTAT)



Benin - Selected regional agricultural statistics (compiled by R. Sikirou)  
Comparaison de la production et de la surface récoltée du maïs

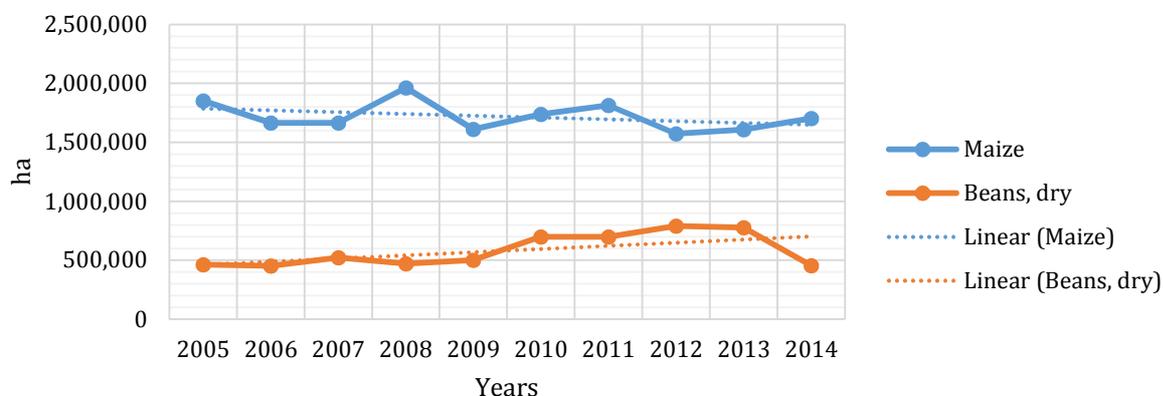




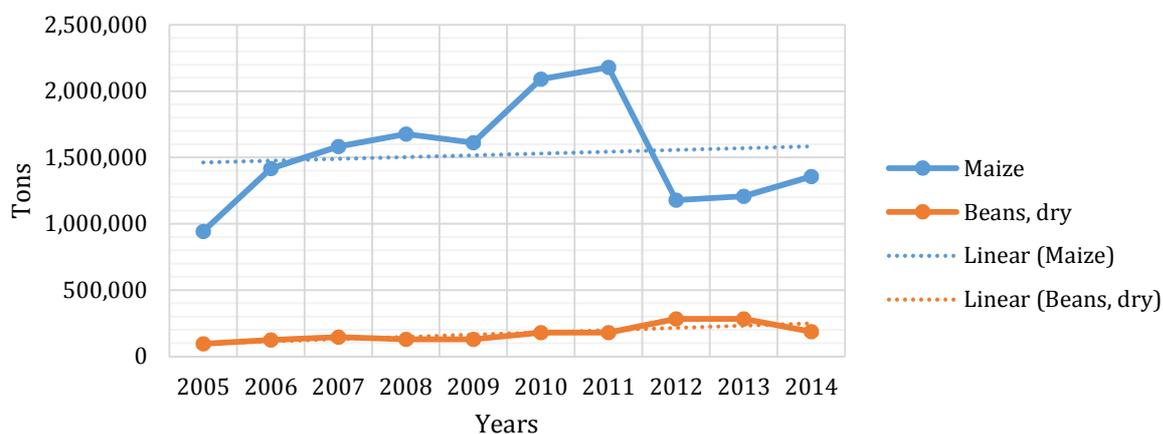
**Photograph 1: Maize field near Boukombé, Atacora Province**

## Mozambique – Selected national agricultural statistics (FAOSTAT)

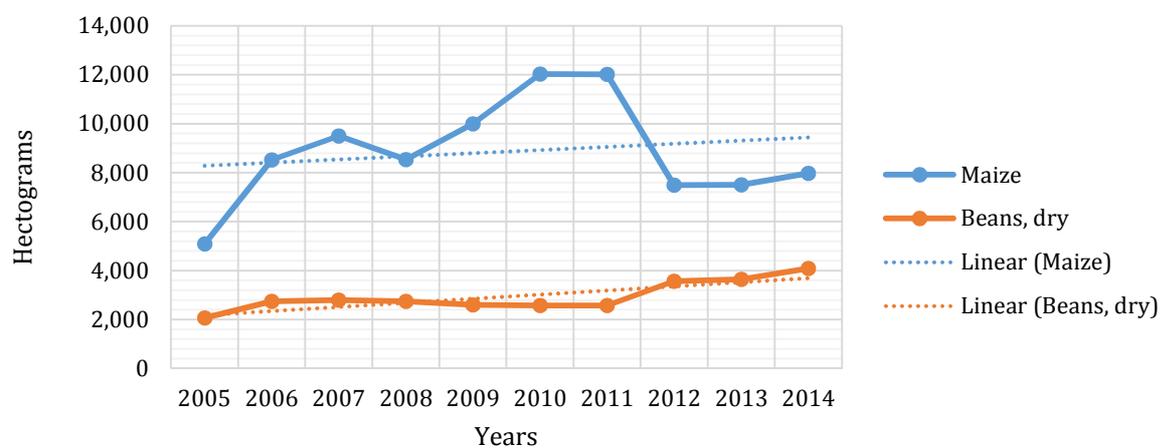
Mozambique - Harvested areas for selected rainfed crops, 2005-2014



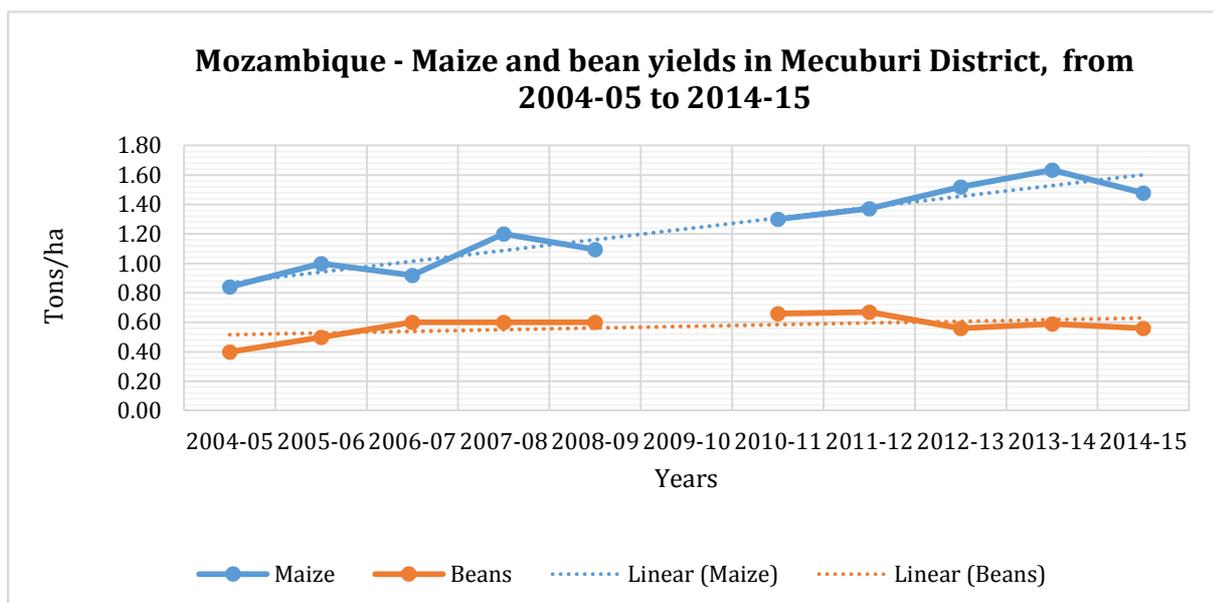
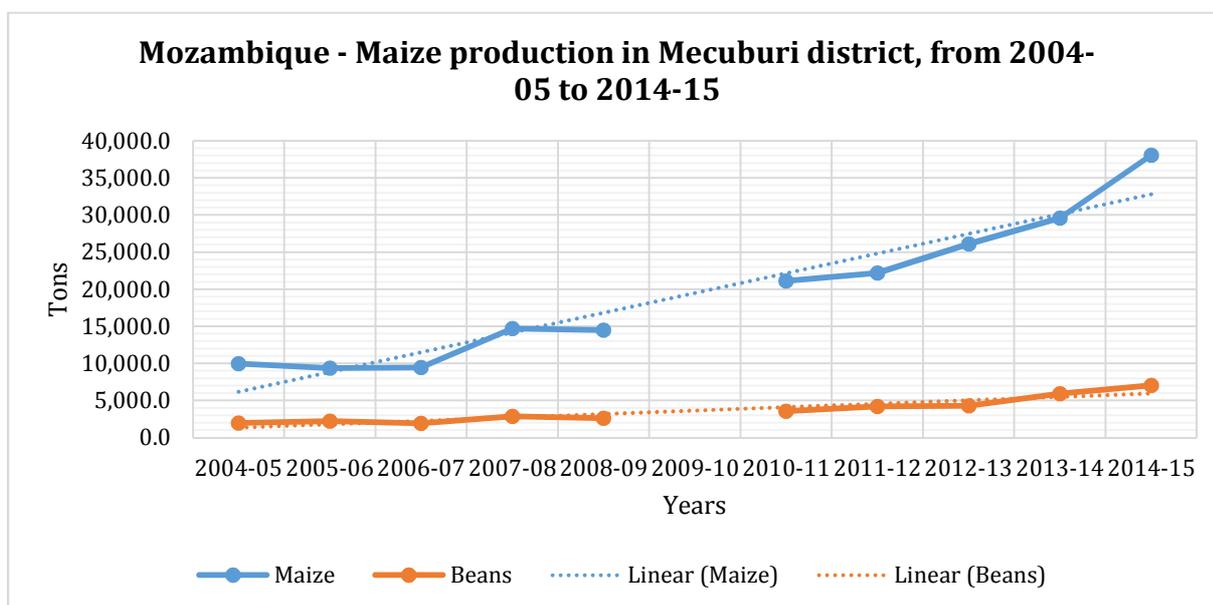
Mozambique - Production of selected rainfed crops, 2005-2014



Mozambique - Yields of selected rainfed crops, 2005-2014



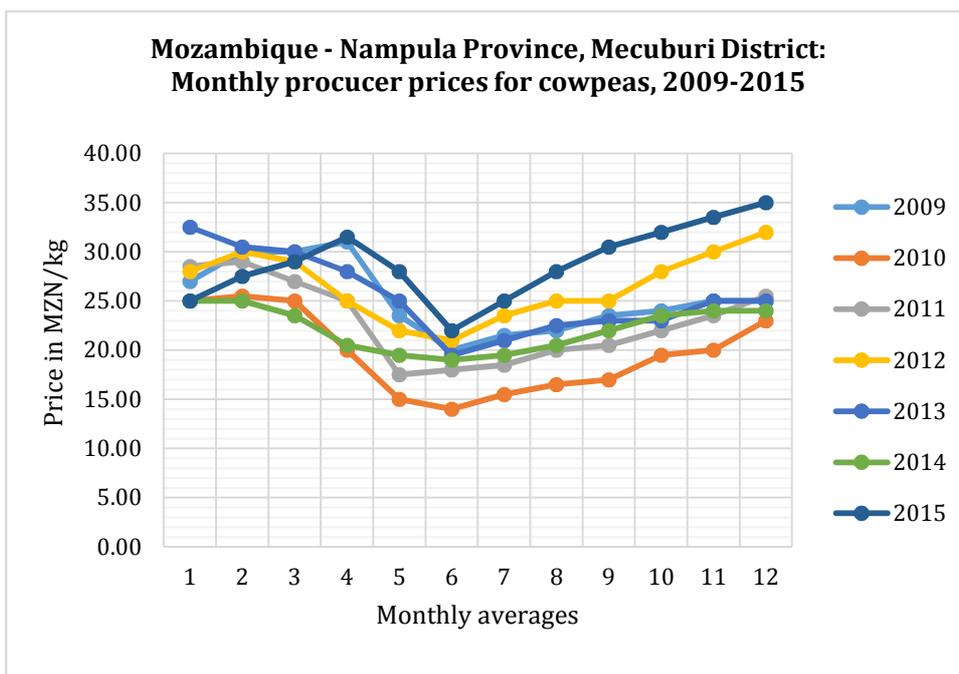
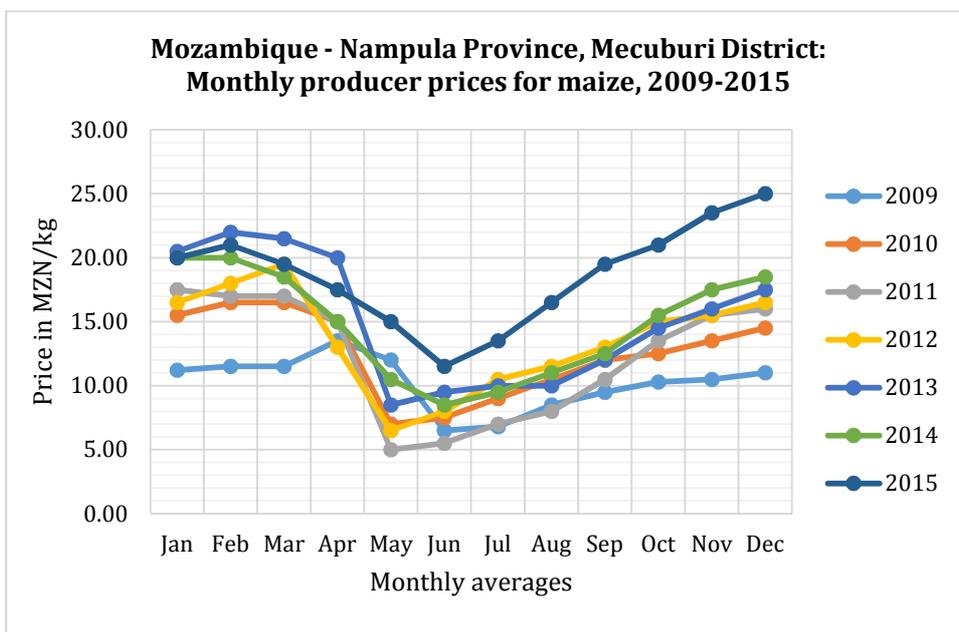
Mozambique – Selected regional agricultural statistics (compiled by A. Cauio Sualehe)



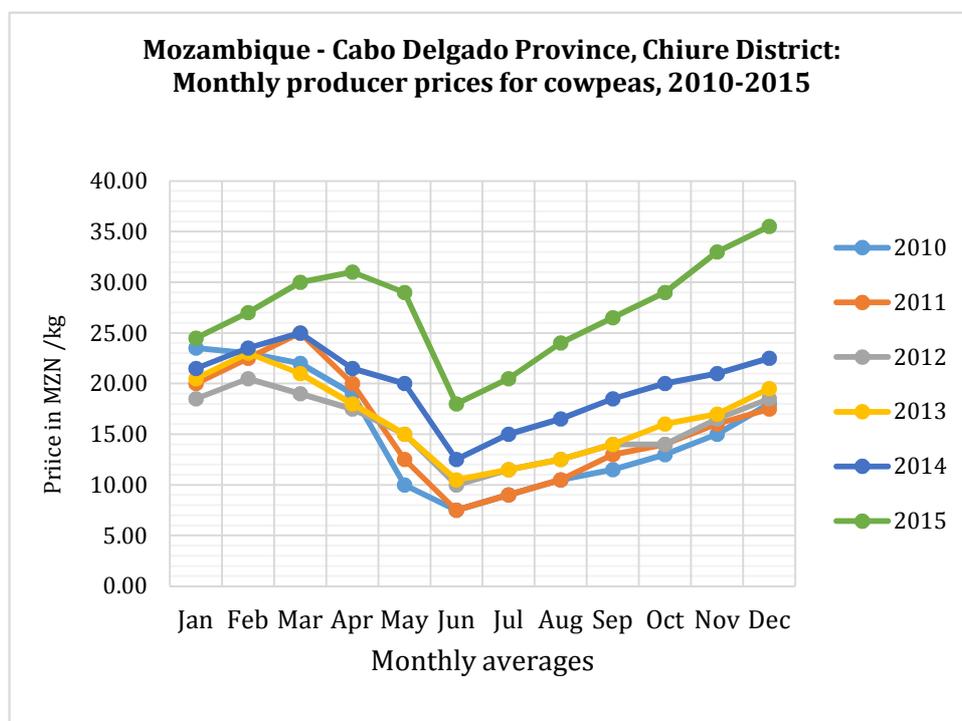
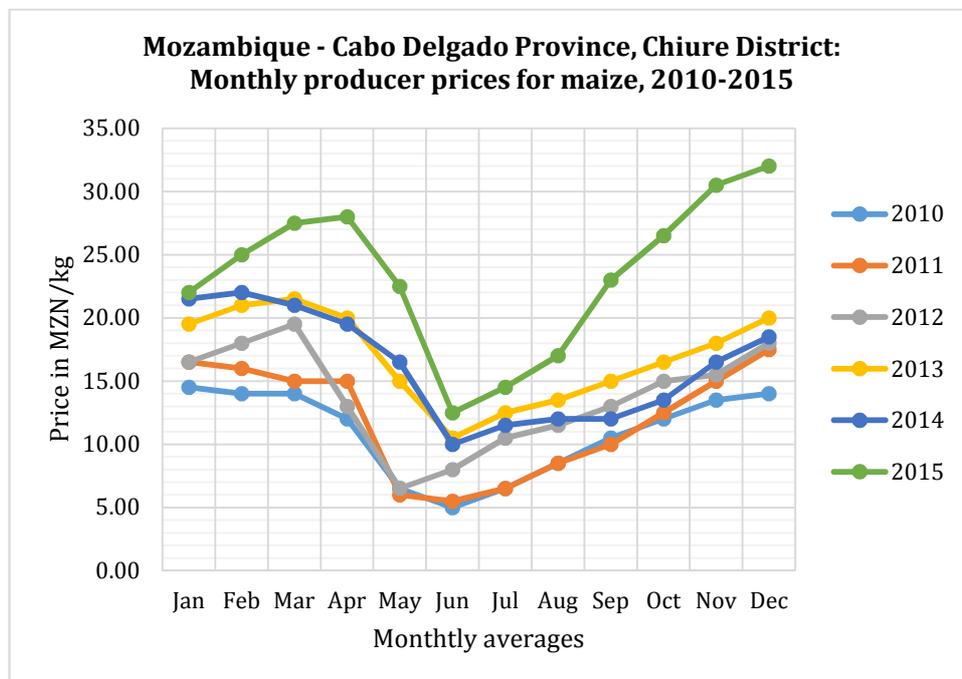
Linear correlation between yields and production volume – maize: **0.90**

Linear correlation between yields and production volume – beans: **0.27**

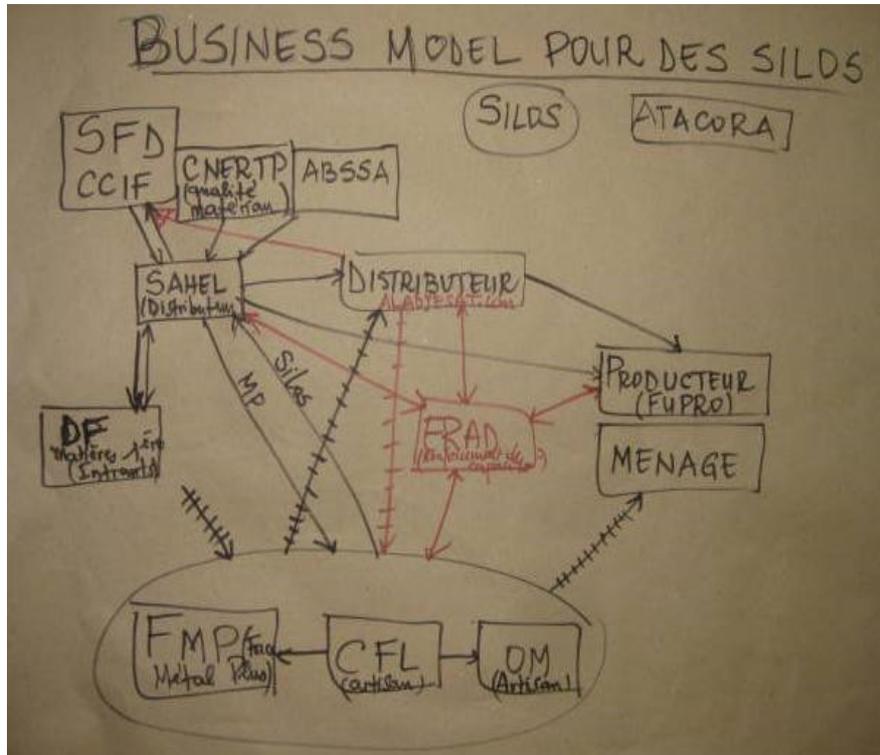
Mozambique – Monthly producer price fluctuations for maize and cowpeas



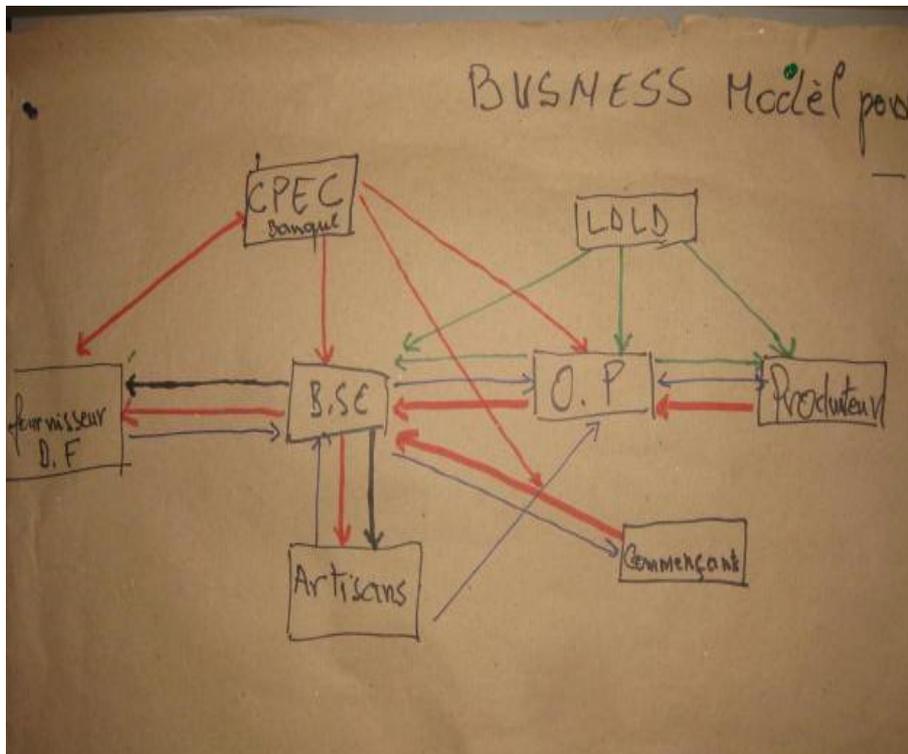
Mozambique – Monthly producer price fluctuations for maize and cowpeas



Visualized PHM business model, metal silo - Benin

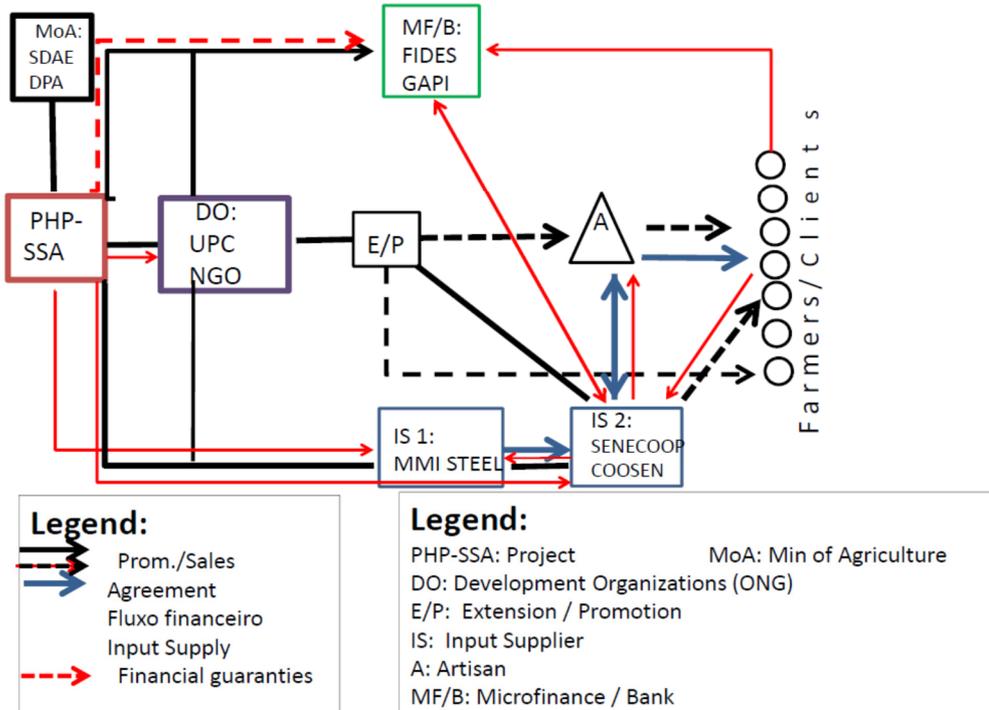


Visualized PHM business model, PICS (?) - Benin

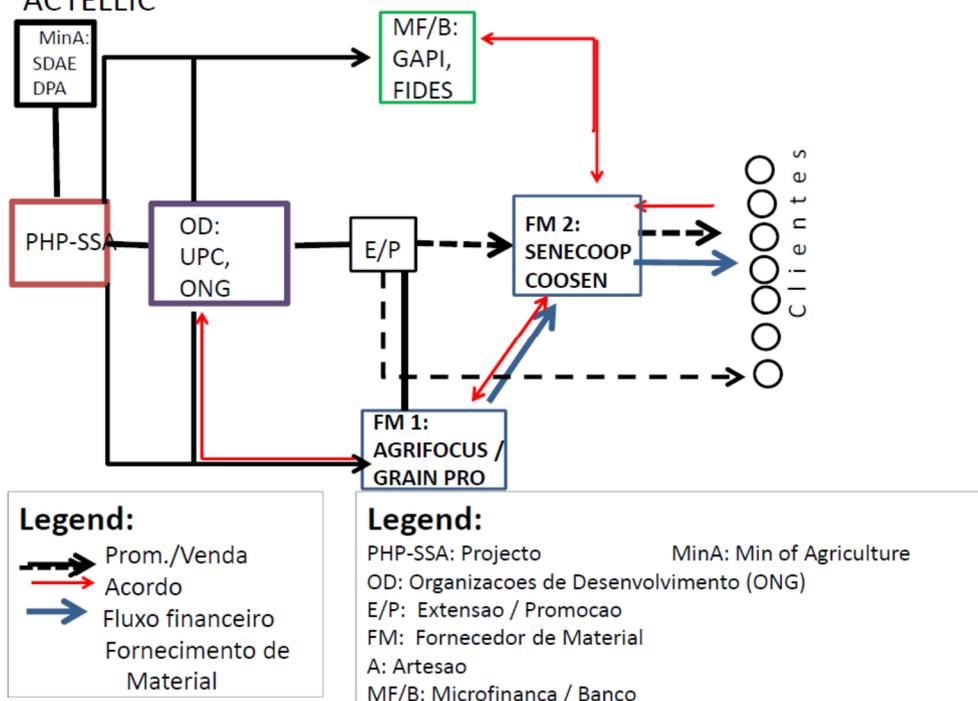


Visualized PHM business model - Mozambique

Business Model 1 : Privat – Public cooperation METAL SILO



Business Model 1 : Privat – Public cooperation SUPERBAG and ACTELLIC



**1. Benefit-cost calculator for the avoidance of physical PHL**

**2. Benefit-cost calculator for the avoidance of physical PHL and financial losses**