EVALUATION SUMMARY
INVESTMENT EVALUATION

AFRICAN IMPROVED FOOD - RWANDA

FACTS

CLIENT
Africa Improved Foods (AIF)

COUNTRY
Rwanda

CONSULTANT
Orchard Finance
KIT Royal Tropical Institute

COUNTRY FACTS

- **Population 13.6 million**
- **GNI per capita USD 784**
- **Poverty headcount ratio 38.2%**
- **Malnutrition prevalence 33.1%**

INTRODUCTION

Chronic malnutrition early in a child's life or even during pregnancy can result in severe, irreversible mental and physical damage such as stunting and wasting. Malnourished children have been found to complete fewer years of schooling, are not as effective in learning and earn lower wages in adulthood. At household level, malnutrition is furthermore likely to lead to higher health care expenditures, potentially resulting in catastrophic expenditures and spiralling households into a poverty gap. While Rwanda has shown economic growth over recent years and a reduction in malnutrition, still 49 percent of children under age 5 are stunted.

Since 2015, FMO has co-invested in equity and debt in social venture Africa Improved Foods (AIF) through Building Prospects (BP). BP is a Dutch Government fund which seeks to strengthen local economies of low-income countries and create jobs and prospects for the poor through investments in the agribusiness value chain and the enabling infrastructure.

Total FMO exposure to AIF: USD 10m B-loan led by IFC (in Special Operations), USD 8m common shares and USD 1m preference shares.

AIF produces fortified foods for pregnant and lactating women and infants during the first 6-24 months as key to stunting prevention. Rwanda was identified as pilot country for the business model of AIF. AIF Rwanda was established in 2015 as Public Private Partnership (PPP) between DSM, FMO (through Building Prospects), IFC and the Government of Rwanda (GoR). British International Investment (formerly CDC) was also a AIF shareholder between 2015-2017.

THE STUDY

Given its innovative structure, FMO wanted to understand the development results achieved by the company. To concretize this, FMO retained a consortium of Orchard Finance / Carnegie Consult together with the Royal Tropical Institute (KIT) to conduct an impact evaluation of the investment over five years. Specific areas of attention were (1) relevance and additionality of the investment, (2) the PPP's alignment and performance, (3) employment effects, (4) impact on malnutrition, and (5) the impact of sourcing maize from farmers. In addition, a summary of simultaneously conducted tangent studies on AIF was made. Finally, an assessment was made on the business case and financial sustainability of AIF Rwanda. The study took place between 2016 - 2022.

AFRICA IMPROVED FOODS AND ITS UNIQUE SOURCING MODEL

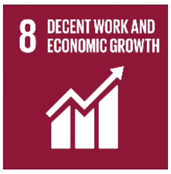
Since becoming operational in late 2016, AIF has been a leading manufacturer of high quality fortified blended foods (FBF) in the region, selling its products primarily through relief programs of World Food Programme (WFP) and GoR. AIF's business model is underpinned by sales through relief programs and consumer products in retail markets in the region. AIF also aims to create a sustainable sizable number of (permanent) local jobs under good labor conditions. As a unique feature, AIF has implemented a model to source raw materials locally where possible that allows smallholders farmers to sell their maize unshelled directly after harvest, which decreases harvest losses and improves overall quality. AIF business model cut across several SDGs as the findings below show.

FINDINGS

Relevance and additionality. BP's investment into AIF has a clear development relevance and is financially additional, as the investments were made at a greenfield stage of AIF or subsequently when AIF was floundering. At these times, no similar financing alternatives were available, thereby clearly demonstrating Building's Prospects additionality.

AIF's PPP's alignment and performance. A unique PPP construct has been implemented, in which private sector, development institutions and the Rwandan government have successfully joined forces, thereby contributing to SDG 17. This has been fostered by the aligned developmental goals of all stakeholders involved. Key strength of the model has been that the various actors have not only contributed financially, but also have provided significant value in operational expertise and in driving widespread coordination and advocacy efforts with farmers and foreign governments.

Wider development impact. The evaluation concluded that AIF has succeeded in its development ambition to produce affordable, high quality, *locally* sourced foods. Roughly 1.6 million people benefit daily from AIF products, which are distributed through WFP, GoR and consumer retail food channels. A study conducted by NORC at the University of Chicago, on behalf of IFC, estimated a total incremental value added at US$ 985m over 2016-2033 of which US$ 226.4 m result from direct and indirect effects to the Rwandan economy, largely attributed to employee income and incremental benefits to farmers and as such supporting Rwanda's economic growth (SDG 8). Additionally, NORC estimated US$ 532.1m in present value of costs-saving in the economy over 16 years as a result of the reduction in malnutrition in Rwanda. Other US$ 85 mln were estimated in net foreign exchange and US$ 143 mln in purchases from other African countries.



AIF impact on employee wellbeing and working conditions. AIF has succeeded in creating a reasonable number of decent jobs (164 permanent and 357 casual workers as of April 2022) and is seen as a frontrunner in terms of working conditions in the country (SDG 8). Satisfaction rates among permanent employees are high and strong attention is given to employee health and safety. The engagement survey in 2020 showed an engagement of response of 76%. The number of female employees (on the work floor as well as in management positions) increased each year, and AIF provides a supportive environment for female employees. However, because of systemic low wages in the country, some casual workers indicated working longer hours to make ends meet. AIF includes working conditions on the contract with service providers of casual workers and monitors their compliance with the agreements regularly. The agreements include payments to casual workers following national law on wage and employment (including pension and maternity contribution), training, working hours, etc and are among the country's best. AIF will continue monitoring closely working conditions for casual workers

Impact on malnutrition. Based on an impact evaluation conducted by Clinton Health Access Initiative (CHAI), children in the poorest and most vulnerable households in Rwanda (Ubudehe 1) with access to subsidized fortified foods produced by AIF showed a 40% reduction in the odds of being underweight (SDG 2). The prevalence of stunting among children 18-23 months declined 12 percentage points (from 47% in 2017 to 35% in 2021). Though these results can only partially be attributed to AIF's products as the effects are likely combined with other interventions from the GoR targeting the same households, it is clear AIF played a key role in decreasing malnutrition of the most vulnerable.

AIF impact on sustainable sourcing and farmers. After initial setbacks, AIF has been able to develop a sourcing model where maize is directly purchased unshelled from approximately 450,00 smallholders (SDG 10). By controlling the threshing, drying, and storage of maize, AIF achieves higher quality levels. For farmers, rejection rates decreased, while post-harvest losses and costs are reduced substantially. Nonetheless, liquidity constraints and market prices remain dominant decision-making factors for smallholders, which may result in AIF having to rely on (international) traders to fulfil raw material requirements. AIF strives to source maximum from Rwanda. In the last 5 years, AIF sourced between 40 and 80 % locally and intends in increase toward > 80 % in the coming years. AIF also started with buying local soya in 2022 and aims to source > 30 % locally in 2023.

AIF furthermore has had a notable impact on Rwanda's maize market. Given the higher prices that AIF offers, smallholders are incentivized to produce higher-quality maize. This has a positive impact on all maize produced in the country with potential spin-off effects on other industries (such as animal feed) or even other crops. This ascribes to the assumption that AIF has and will continue to have net incremental value on the Rwandan maize market.

AIF's financial sustainability. From a financial perspective, AIF will continue building and strengthening its business model by increasing retail sales and expanding the business to other countries.

RECOMMENDATIONS

Recommendations for FMO and AIF focus on supporting the company in, together with other financial institutions, exploring opportunities to facilitate access to finance to smallholders.AIF works in a continuous improvement model to further enhance social and environmental impact and further strengthening economical sustainability. AIF will continue to collaborate with the GoR. FMO and AIF has agreed on specific actions to address these recommendations.

MAIN FINDINGS

- The Public Private Partnership construct has proven a valuable platform, with the shareholders sharing joint development alignment
- AIF succeeded in its ambition to produce large quantities of high quality food products while having implemented an effective innovative local sourcing strategy and creating modest employment opportunities under decent conditions
- Malnutrition has decreased in Rwanda. Children in the poorest and most vulnerable households in Rwanda with access to AIF's food showed 40% reduction in the odds of being underweight (SDG 2).
- The investment in AIF aligns to Building Prospect's development criteria, and is clearly deemed additional

Impact Evaluation Africa Improved Foods East Africa (AIF)

Endline report
Client: FMO

Maarssen, The Netherlands

Table of Contents

Acronyms & Initialisms

AIF	Africa Improved Foods
BII	British International Investment (formerly operating under the name CDC Group)
BP	Building Prospects
CDI	Clinton Development Initiative
CHAI	Clinton Health Access Initiative
CIP	Crop Intensification Programme
DFI	Development Finance Institution
DFID	Department for International Development, UK
DSM	Royal DSM N.V.
EAX	East Africa Exchange
ETG	Export Trading Group
FBF	Fortified blended foods
FMCG	Fast-Moving Consumer Goods
FMO	Financierings-Maatschappij voor Ontwikkelingslanden N.V (Dutch Development Finance Company)
GAFSP	Global Agriculture and Food Security Program
GoR	Government of Rwanda
HoldCo	Africa Improved Foods Holding B.V.
HR	Human Resources
IDF	Infrastructure Development Fund
IFC	International Finance Corporation
KCB	Kenya Commercial Bank
KIT	Royal Tropical Institute
NGO	Non-governmental organisation
MINAGRI	Ministry of Agriculture of Rwanda
MINECOFIN	Ministry of Finance and Economic Planning
MoFa	Dutch Ministry of Foreign Affairs
MT	Metric Tonnes
NCDA	National Child Development Agency
OpCo	Africa Improved Foods Rwanda Ltd.
PLW	Pregnant and lactating women
PPE	Personal Protective Equipment
RAB	Rwanda Agriculture and Animal Resources Development Board
RGCC	Rwanda Grains and Cereal Corporation
RWF	Rwandan Franc
SC+	Super Cereal Plus (AIF product)
SDG	Sustainable Development Goal
SHE	Safety, Health and Environment
US$	US Dollar
WFP	World Food Programme

1. Introduction

2.1 Context

The Netherlands Development Finance Company (FMO) commissioned a consortium of Orchard Finance and the Royal Tropical Institute to conduct an independent evaluation on Africa Improved Foods Limited (AIF)[1]. This report forms part of the Impact Evaluation of AIF by FMO originally commissioned over a period of 2016 – 2019 and subsequently amended in 2022.

Malnutrition has been a key public health concern in Rwanda and the wider Sub-Saharan region for many years[2], as malnutrition not only severely hinders a child's development but also a country's future productivity and growth. In this light, a public-private partnership (PPP) was established in 2014 under the name Africa Improved Foods Rwanda, with the objective to provide a scalable and sustainable solution to malnutrition via local production of highly nutritious foods. Since becoming operational late 2016, AIF has been a leading manufacturer of fortified blended foods (FBF) in the region, with distribution of its product primarily through relief programmes of World Food Programme (WFP) and Government of Rwanda (GoR).

FMO, through BP, joined the PPP in 2015 by providing loan capital and taking an initial equity investment. In subsequent years, additional equity capital has been provided to support AIF in its growth while the loan has been restructured to accommodate liquidity needs.

The objective of this evaluation is to assess the development results of AIF over a number of components, which simultaneously guide the structure of this report:

- The overall development relevance of AIF[3];
- The additionality, catalytic effects and demonstration effects of FMO's investment in AIF;
- The alignment and performance of AIF's public-private partnership design;
- The impact of AIF on its employee wellbeing and working conditions;
- AIF's sustainable sourcing and impact on farmers; and
- A current assessment of the commercial feasibility and sustainability of the business model of AIF.

These sections will be proceeded by a section providing additional background on AIF, its shareholder history and the partnership structure. The report will be closed off by providing learnings and recommendations for future investments.

2.2 Methodology and activities undertaken

The overall impact evaluation of AIF covers a wide variety of topics, conducted between 2016 and 2022. In total, four rounds of data collection took place, including data collected for this endline study[4]. As AIF has developed as a company, an important change was made in the sourcing strategy for maize (as will be highlighted in section 7) to improve the business model. This has had an impact on the impact pathway "the

[1] For purposes of this report, a distinction will be made between 'HoldCo' and 'OpCo' for any specific reference to the Africa Improved Foods Holding B.V. and Africa Improved Foods Rwanda Ltd., respectively. The more general abbreviation 'AIF' refers to the activities in Rwanda.
[2] Despite having made strong strides in this area, 33% of Rwanda's children under 5 years remain stunted (wasting or low weight-for-height) as of 2020, according to the Rwanda Demographic Health Survey 2019/2020 published by the National Institute of Statistics of Rwanda.
[3] This report also incorporates findings of a separate evaluation study authored by CHAI Rwanda which focuses on reducing malnutrition.
[4] Baseline report (2017), Mid-Term report (2018), Assessment of the cob model (2018).

improved livelihoods for farmers and their families”. Accordingly, the Theory of Change underlying AIF was adapted[5].

The methodology of the overall impact evaluation builds on a mixed methods research design, drawing on a variety of data sources. The activities undertaken have not been identical for the various stages in the evaluation of AIF. For the endline study, greater focus was placed on an assessment of the business model compared to the base and midterm studies. In addition, given the change in sourcing strategy, no additional research into the impact on farmers was conducted. Furthermore, a deliberate choice was made in consultation with FMO not to conduct a full employee survey, as no signals were received on any significant changes in working conditions since the previous employee survey. Finally, the endline incorporates findings of other evaluation studies conducted on AIF by other financiers. For details on the methodology and activities undertaken, please refer to the Appendix.

2.3 Clarifications and limitations

This endline assignment was conducted between February through June 2022, well after the base- and mid-term assessments. The longer-than anticipated throughput was caused by a mixture of the evolving business model of AIF over time, combined with COVID-19 related restrictions. Due to budgetary considerations, the endline evaluation has taken place remotely, resulting in challenges in scheduling and conducting interviews. Furthermore, as mentioned in the previous paragraph, the endline evaluation has not incorporated a statistically relevant employee survey, resultingly relying on qualitative analysis. If and where relevant, the impact of COVID-19 is incorporated throughout this report.

Feedback on the submitted report was received in the period July – October 2022. Understandably, various developments have occurred since the original data collection and submission in June 2022. However, for consistency purposes, we only refer to the subsequent developments where significant impact is seen in the form of footnotes to the main text.

2.4 Acknowledgements

The evaluation report was finalized in January 2023 after feedback. We are grateful for the full support of Thelma Brenes Muñoz in her role as evaluation supervisor at FMO. The reflections of senior staff at AIF and of the evaluation panel were of great value to the final product - we deeply appreciate their willingness to free up their schedule and provide us with insights in AIF and market dynamics. Furthermore, other interviewees were very forthcoming in sharing thoughts and information. This report would not have been possible without their cooperation.

2. Africa Improved Foods

This section provides an overall introduction to AIF, including background to its history, shareholdings and governance structure.

3.1 Introduction to Africa Improved Foods

Abbreviated history of AIF

[5] Please refer to the Appendix for the original and revised Theory of Change.

AIF was developed on the initiative of the Clinton Health Access Initiative (CHAI), in cooperation with the GoR. CHAI is a global health organization committed to strengthening integrated health systems around the world and expanding access to care and treatment for HIV/AIDS, malaria and other illnesses. CHAI made malnutrition a programme priority for its activities in twenty African countries in 2012. Based on various market scoping activities, the organisation identified that fortified foods for pregnant and lactating women (PLW) and infants during the first 6-24 months are key to prevent stunting[6]. Against this background, CHAI developed a business model for the production of Super Cereal Plus (SC+), a type of FBF with higher nutritional content and which at the time was not produced locally. As first landing spot, Rwanda was selected to commence operations.

In 2014, AIF was formally established as a PPP. CHAI itself did not seek a role as shareholder, as it did not have any financial interests in the project. 2015 marked the year of the initial investments by Royal DSM N.V. (DSM), IFC/GAFSP, British International Investment (BII) and FMO as shareholders of AIF in partnership with GoR. Crucially, CHAI helped negotiating initial offtake agreements with WFP and GoR to fortify the business model of AIF. These contracts ensured an off-take equal to at least USD 6 million (ex VAT) for the first 5 years of operations. Subsequently, a greenfield 45,000 MT FBF processing plant was constructed and completed in Kigali's Special Economic Zone, with operations commencing in December 2016.

Offtake markets

The original business plan of AIF rested on three offtake markets for SC+ products for WFP relief programmes in the region, GoR for support to its lowest income groups[7], and commercial retail markets (urban and regional export). To date, WFP and GoR are still by far the main off-takers. To diversify its customer base, AIF is gradually tapping into other NGO and tender markets. In parallel, the proposition to the commercial market is being redeveloped.

Sourcing

On the supply side, AIF at originally sought to source maize and soybean locally in Rwanda through forward delivery contracts with cooperatives, facilitated by GoR and CHAI. Due to volatility in harvest volumes combined with fluctuating prices, contract breaches (side selling) and quality issues, AIF was forced to diversify its sourcing strategy. At present, AIF optimises its sourcing through a mix of local smallholder farmers and cooperatives by purchasing full maize cobs (though no longer through forward delivery contracts), as well as through traders (both local and regional).

3.2 AIF's PPP setup and FMO's investment

This section will briefly describe AIF's PPP setup, current funding structure and FMO's investment and rationale. A more detailed investment history and description of the active roles of DSM and GoR in the operations of AIF are incorporated in the Appendix.

---

[6] Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Stunting in early life has adverse functional consequences on the child, including poor cognition and educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood, an increased risk of nutrition-related chronic diseases in adult life.

[7] GoR distinguishes between 5 "Ubudehe" categories based on economic status. The lowest income groups ("Ubudede 1") live in extreme poverty and are affected by food insecurity. These categories receive various services and social interventions, aiming to ultimately "graduate" to higher categories. As such, these households benefit from full state social protection, accessing all interventions from the Vision 2020 programme, including subsidies for solar-based domestic electrical systems, community-based health Insurance, and FBF.

PPP setup

In the initial design considered in 2014, the holding company Africa Improved Foods Holding B.V. (HoldCo) was set up. From HoldCo, various local investments in Africa were intended, with Rwanda marking the first. In a true PPP structure, Africa Improved Foods Rwanda Ltd. (OpCo) was established, with HoldCo proposed to own 90% of the OpCo and GoR the remainder[8]. As none of the stakeholders had worked together previously, CHAI played the role of partnership facilitator and partnership builder. To support the operations of AIF, loans were provided by shareholders. As mentioned, contracts were closed with WFP and GoR to ensure offtake of AIF's product.

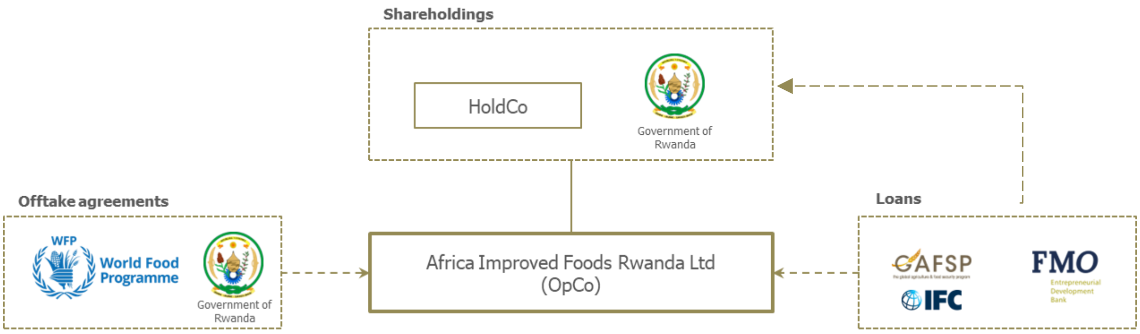


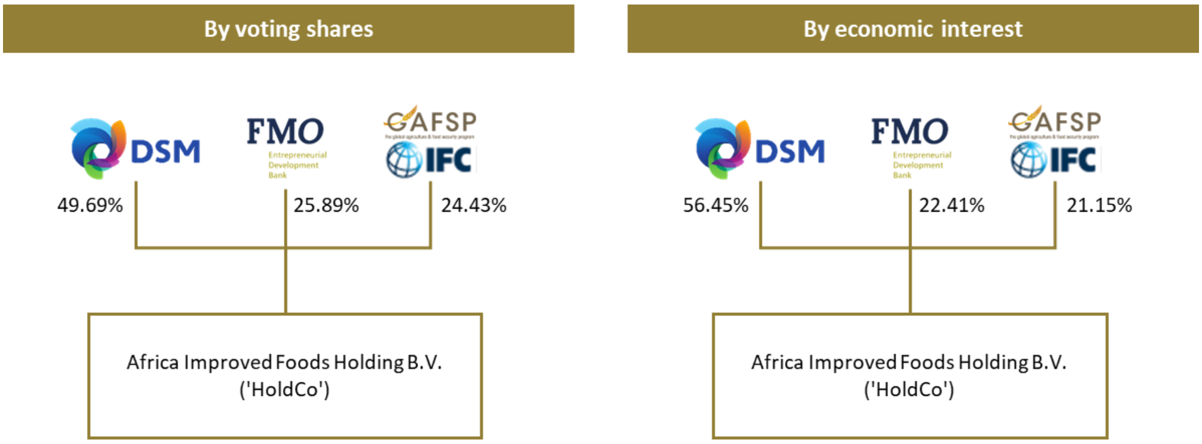
Figure 1. PPP structure

Equity funding of AIF

The initial equity capital invested in 2014 was US$ 22.5m. Since establishment, several equity transactions have taken place and additional capital has been injected to solidify AIF's balance sheet following operational losses incurred by AIF in its first years of operations and to fund exploration of expansion opportunities in Ethiopia. In total, the shareholders of AIF Holding B.V. have contributed US$ 43.2m in equity, of which US$ 4.2m are preference shares. The current shareholder structure of HoldCo as depicted below[9].

[8] GoR's contribution is based on its capital contributions, granted tax breaks and in-kind contributions in the form of land and other physical assets. However, as GoR did not initially inject its agreed cash contributions, its ownership was lower at start. The first mentioning of formal GoR shareholdings was in AIF's 2017 annual report, which states GoR's shareholding in OpCo at 5.41%. At present, GoR holds 6.98% of the shares of OpCo.

[9] Shareholdings are based on the latest KYC remediation performed in 2021 (220406 Change Request Africa Improved Foods_185278). Please note that this relates to HoldCo only and hence is exclusive of the US$ 3.0m contribution of GoR in OpCo.



Note: Updated numbers for 2022: By voting shares: DSM (49.54), FMO (26.47), IFC (23.99). By economic interest: DSM (60.05), FMO (20.95), IFC (19.00)

Figure 2. Shareholdings in HoldCo as of March 2021

HoldCo owns 93.02% of the shares in OpCo, with GoR holding the remaining shares (6.98%). The shares of GoR are formally held through the Agaciro Development Fund, Rwanda's sovereign wealth fund.

Furthermore, HoldCo holds 97.28% of the shares in Africa Improved Foods PLC, the operating company for the anticipated expansion into Ethiopia, with DSM holding the remainder of the shares directly.

Debt funding of AIF

At year-end 2021, a balance of US$ 50.9m in debt has been provided to AIF by shareholders and financial institutions as follows:

- At HoldCo, the balance of subordinated loans, deferred interest and guarantee fees provided by DSM amounts to US$ 11.0m.
- The balance of an IFC-led facility at year-end 2021 is US$ 18.7m[10]. FMO, through BP, participates in this facility as B-lender. The pro-rata outstanding of BP's investment is US$ 9.6m, including deferrals.
- OpCo has access to working capital facilities from Kenya Commercial Bank (KCB) amounting to US$ 19.2m per year-end 2021[11]. Of this amount, US$ 1.1m is the remaining outstanding of a temporary COVID-19 emergency facility and has been repaid in full early 2022.

Investment and rationale FMO

To BP, the project was considered an interesting business opportunity as the anticipated investment in Rwanda could be the first plant of several others that would produce affordable, nutritious and high-quality fortified foods locally in Africa. In addition, it involved a Dutch shareholder (DSM), and was expected to receive strong support from the GoR, WFP and CHAI. The development impact was perceived high, both on the supply side (private sector development, job creation and agricultural value chains) as well as on the demand side (malnutrition).

[10] The facility is split between HoldCo (US$ 3.9m) and OpCo (US$ 14.8m). As part of restructuring, interest payments and guarantee fees have partially been deferred, with year-end 2021 deferrals summing to US$ 1.9m. DSM has provided an unconditional and irrevocable completion guarantee capped at US$ 12m for all obligations of the borrowers. On top, there is a first-ranking pledge on fixed assets and cash & cash equivalents.

[11] Inventories and trade receivables of OpCo are pledged as security.

In summary, the original investment of US$ 13m was made via equity (US$3 m) as well as senior (US$ 8m) and subordinated loans (US$ 2m). FMO's investment in AIF, all made through BP, currently totals US$ 18.7m, consisting of:

- US$ 8.0m equity;
- US$ 1.1m preference shares;
- US$ 9.6m in senior and subordinated loans.

3.3 Partnership governance and management

The partnership is based on an extensive legal framework, which is critical to safeguard the substantive investments of each partner, but also necessary in view of the fact that none of the organisations has worked together previously in such a partnership context. The highest decision-making body of AIF is the Board of Directors of HoldCo, which is constituted by representatives from each of the shareholders. Day-to-day management is part of the responsibilities of OpCo. In OpCo, HoldCo has the right to appoint 4 directors, whereas GoR has the right to appoint one director. However, the GoR representative has no management capacity within OpCo, thereby relegating the GoR representative to having an "outsider role"[12].

Regular communication between the shareholders and with stakeholders takes place through different channels, including board meetings, formal reporting on financial and development results, informal exchanges, stakeholder meetings (regular visits to and by stakeholders e.g. MINAGRI, NCDA, MINECOFIN, WFP), and steering committee meetings with relevant stakeholders organized by the Ministry of Health (MOH).

3. Evaluation findings on relevance, additionality, catalytic effects and demonstration effects

This section details the evaluation findings of respectively the relevance of AIF, the financial additionality and catalytic effect of FMO's investment in AIF as well as the demonstration effects of AIF. Firstly, the main conclusions are summarized in Box 1 below, which will then be detailed in subsequent paragraphs.

[12] This is in line with IDF criteria.

AIF has significant development relevance as it seeks to address malnutrition and hunger by producing high-quality foods for vulnerable populations in Africa. Additional development is achieved through local job creation, improved incomes for farmers and higher quality food crops. There is a significant reduction in the prevalence of malnutrition for the most vulnerable compared to national data. However, the effects cannot be attributed to FBF products alone, as they are combined with GoR distribution efforts and other interventions targeting the same households.

AIF aligns well with BP's investment strategy, as the investment in AIF clearly overlaps with the target development criteria of BP.

AIF was at an early stage of the life cycle when BP was used to de-risk the investment through a minority shareholding and long-term loans when no alternatives were available, thereby confirming the financial additionality. Through its subsequent investments and flexibility offered, BP has been critical to the survival of AIF so far.

FMO is perceived as a relatively silent partner and financier in HoldCo by other stakeholders and therefore, in non-financial terms, it cannot be concluded that FMO makes significant proactive contributions to the (environmental, social and governance) strategy or the development focus of OpCo.

As FMO has been the last shareholder to enter the partnership, no catalytic effect is witnessed from equity perspective, despite that FMO has played a key role in subsequent equity raises. While DFIs being a shareholder and loan provider may have contributed to a positive view from local financial institutions, it can also not be concluded that BP's investment as such has led to an active catalytic effect from a debt perspective.

Finally, no significant demonstration effect can be attributed to AIF, as it has not been verified whether AIF's presence in the market has clearly driven a change in the overall value chain in the market or quality of maize production (AIF drives only a small portion of the Rwandan maize market). We do, however, observe a small demonstration effect in terms of sourcing, since the cob model has proven a success and is slowly being introduced by other actors besides AIF.

Box 1: main conclusions on relevance, additionality, catalytic effects and demonstration effects

4.1 Development relevance of AIF

Following, OECD evaluation criteria, development relevance is defined as "*the extent to which the intervention objectives and design respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change*"[13]. In the case of AIF, its mission is to help combat hunger and improve the health for vulnerable people by producing affordable, high quality, locally sourced foods. As such, AIF addresses the food challenges (SDG 2) facing the African continent. Vulnerable communities, including refugees, are supported in Rwanda, Kenya, Uganda and South Sudan

[13] https://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm#relevance-block.

(through WFP) and the most vulnerable mothers and children (through GoR). As AIF enters into its 6th year of full operations in 2022, its reach is 1.6 million consumers and beneficiaries per annum[14].The fact that relief food is now sourced from the region is positive. AIF's impact on health and food security will be further elaborated on in section 7.3.

As secondary development goals, AIF:

- aims to create a sustainable sizable number of (permanent) local jobs (SDG 8, SDG 10) under improved labour conditions (wages, health and safety standards). The long-term goal is to fill key management positions with local talent and to achieve a gender balance (SDG 5).
- sources locally where possible with a supply chain aimed at lowering post-harvest losses, resulting in improved incomes for farmers and higher quality food crops.

4.2 Fit of AIF with BP's investment strategy

FMO's investment in AIF is made through BP, which was formerly known as Infrastructure Development Fund (IDF)[15]. The Theory of Change of AIF at baseline (please refer to the Appendix) summarises the development objectives and the intended impact pathways of the intervention as reconstructed from documents and stakeholder interviews. The investment in AIF clearly overlaps with the target development criteria of BP, based on the following:

- BP and AIF seek to develop local agricultural value chains.
- AIF has a clear fit with BP's criteria by driving private sector development, job creation (SDG 8) and reducing inequalities (SDG 10). AIF furthermore supports the private sector by procuring services and non-food inputs (such as packaging materials) locally when cost effective.
- AIF furthermore works with gender quota for its employees, thereby contributing to SDG 5.

Though not explicit BP targets, the following is worth noting:

- AIF's focuses on food and nutrition security for consumers (particularly infants and PLW), contributing to SDG 2. Indirectly, this also will benefit the achievement of job creation and reducing gender inequalities.
- In its original set-up, AIF was to source all soybeans and maize through forward delivery contracts with Rwandan cooperatives, thereby offering approximately 9,000 farmers a stable, sustainable income for a proportion of their harvest and with it, allow for access to finance. As this sourcing approach did not meet expectations due to insufficient high-quality maize being delivered to AIF (please also refer to section 7), AIF diversified its sourcing strategy to include traders in 2017 (please refer to section 7 for an elaboration). As a result, AIF's relevance on the livelihoods of smallholder farmers became less than originally intended. This change was tolerated by BP and other shareholders, implying that the financial viability of AIF and the development relevance related to nutrition weighed heavier to BP than impact related to improving the livelihood of smallholder farmers.
- As a final reflection, the original investment is relevant in particular to IDF, namely to provide support to the Dutch private sector (with DSM headquarters being domiciled in the Netherlands at the time of investment).

[14] https://africaimprovedfoods.com/.

[15] Please refer to the Appendix for the development criteria of IDF and BP. Even though the mandates of IDF and BP are not identical, only reference will be made to BP for purposes of consistency.

4.3 Development additionality

The 1998 agreement between FMO and the Dutch Government requires FMO to only provide financial services that are not, or insufficiently, or on unreasonable terms, provided by the market. These additionality criteria are also made explicit for BP. Next to this 'financial additionality', public stakeholders can bring about changes to the company beyond the pure financial contribution, for example by influencing the operational or ESG standards.

Financial additionality

To assess the financial additionality of the investments of BP it is vital to have a good understanding of the financial requirements of the project and the availability of equity and debt financing from commercial sources at the time of original and follow-up investments.

Equity. When the Export Trading Company (ETG) dropped out of the project in 2015[16], there was significant risk of the project falling apart with few alternatives available. AIF was at an early stage of the life cycle and BP was found willing to take on a high-risk minority shareholding when no alternatives were available. The ability of BP to swiftly cover the remaining equity gap allowed the project to commence in a public-private partnership structure with an independent private project sponsor. FMO easily integrated into the original structure, despite AIF being one of FMO's few direct equity investments in agribusiness at the time. On two occasions afterwards, FMO played a key role by together with other shareholders injecting additional capital in the loss-making greenfield operation, thereby knowingly taking on additional risks.

Debt. The financial sector in Rwanda has been growing in recent years, and its stability, structure and efficiency improved due to stricter enforcement regulations by the central bank. For many years, local commercial banks have by far been the most important source of financing in Rwanda[17]. Insurance companies and pension funds are growing in number and size, though their balance sheets are relatively modest. A local stock exchange exists, which trades 10 local stocks (four of which are financial institutions) and has limited liquidity.

Funding of local commercial banks consists mainly of short-term deposits, which limit their investment opportunities. Though deposits have a degree of 'stickiness', they remain short term in nature and hence are governed as such by the Bank of Rwanda. As a result, long-term financing in Rwandan Franc ('RWF') to support long-term investments is often not readily available or reserved for the most highly rated or established companies only, certainly not for greenfield operations that run negative cash flows. Financing in US$ is even more difficult to come by, as not all commercial institutions have sufficient access to US$ funding. Loan tenors are typically maxed at 5 – 7 years. These can only be accessed by applicants backed by strong shareholders, strong cash flow projections and high collaterals.

In 2014, average lending rates in Rwanda amounted to 16-18% in RWF and 8-10% in US$. Due to the maturing sector, lending rates in local currency have since gradually dropped. Average lending rates in Rwanda to established companies currently range between 11% upwards in RWF, though this is exclusive of

[16] Please refer to the Appendix for an elaboration on the investment history of AIF.
[17] Please refer to the Appendix for a brief overview of the current Rwandan financial sector.

any fees. Commercial lending rates for US$ loans remain similarly priced and start at 8% as before, again exclusive of fees.

As has been described in the investment history (please refer to the Appendix), FMO was found willing to join the IFC-led loan on terms[18] that were unavailable in the market in terms of size, ranking, currency, grace period, tenor and interest rate. Also, the subsequent flexibility offered by FMO to support the loan restructuring can also be seen as clearly additional[19]. It should be noted that although IFC conducted the negotiations on behalf of the consortium, BP's consent was prerequisite for agreeing to the restructuring.

On a side note, BP's combined equity and debt investment however exceeds internally set single client exposure limits[20], though has received explicit support from MoFa and FMO's investment team in doing so. Furthermore, the investment has yet to meet return targets (100% revolvability), with partial impairments having been made by BP on both the equity and the subordinated loans.

Non-financial additionality

FMO is entitled to nominate a representative on the board of HoldCo, which amongst others monitors AIF compliance with the risk management policies and procedures, and reviews the adequacy of the risk management framework in relation to the risks faced. At HoldCo level, FMO provides assistance on financial matters in the AIF Finance Committee and supports on the Ethiopian expansion plans (both funding of studies and review of these plans). Furthermore, FMO has funded additional impact studies into the cob model and improving the commercial market strategy. From FMO's vantage point, FMO has contributed significantly despite not having the role of lead shareholder, but being an equity co-investor [21]. However, this viewpoint is not shared by other stakeholders including AIF, WFP and GoR, who view FMO as a silent equity partner and financier in OpCo. From a debt perspective, FMO has no formal position vis à vis AIF, as IFC is the sole lender of record (and FMO "merely" participant in the B-loan).

In joint collaboration with IFC, FMO has supported the implementation of the Environmental and Social Action Plan (ESAP) and has been supporting DSM's lead in the health and safety programs for employees. Although FMO does, however, monitor E&S conditions on a regular basis[22], this is over time perceived to have become more reactive in nature than proactive. Therefore, in non-financial terms, it can be concluded that FMO currently provides only limited proactive contributions to the (environmental, social and governance) strategy or the development focus of OpCo.

4.4 Catalysing role

Catalysing effects refer to the way in which the investment of FMO has contributed to commercial investors starting to invest in AIF and/or this sector in the region.

---

[18] FMO's B-loan amounted to US$10m and took a subordinated position. The tenor of the whole facility was 8 years with a 3-year grace period and priced at a variable interest rate of 6 months libor + 550 basis points (bps).

[19] This flexibility was offered on two occasions. In 2019, FMO agreed to an extension of the tenor by 18 months, incorporating an additional period and deferring part of the interest. Furthermore, in 2021 the consortium agreed to temporarily forego part of the guarantee DSM provides on the loans in order to allow AIF to secure additional working capital funding from KCB.

[20] In principle, BP seeks de-risking investments at early stages through minority stakes and long term loans up to €10 million, whilst catalysing commercial and institutional investors at later stages (blending).

[21] This is in line with FMO's (direct equity) investment approach – as a co-investor, FMO follows the lead investor (in this case being DSM).

[22] A number of higher-level E&S risks (for example risks on occupational health and safety, risk management, supply chain working conditions and resource efficiency) were identified at the start of the program. These risks have been monitored annually through E&S tracking reports and were generally found to be well-managed.

Equity
Since inception, several equity rounds have taken place at HoldCo level, in which FMO participated. Nevertheless, no new shareholders have been onboarded, with FMO being the final shareholder to enter the partnership. Therefore, no catalysing effects with respect to new equity participants have resulted to date, although discussions have been held in the past with potential new equity participants (most notably being Norfund, who was also approached to acquire BII's shares in 2021). This has not come to fruition, with the existing high debt levels being one of the dominant factors for hesitancy of new participants. It is expected that any new investor would require lower debt levels and/or a further debt restructuring as prerequisite before committing equity. In the coming period, catalysing effects may be achieved with regard to other investors participating in AIF, though most likely this will be focused on the Ethiopian expansion (Africa Improved Foods Plc). In that regard, talks are being held with possible investors from the commercial and input sides.

Debt
FMO joined the IFC-initiated debt consortium and has furthermore restructured its loans to allow AIF more breathing room. As mentioned, FMO does not have a direct relationship with AIF from a debt perspective and therefore FMO's participation in the debt facility has no catalysing effect. The commercial financiers of AIF are KCB (since 2016) and very recently Bank of Kigali (2022), who both provide working capital. Both financial institutions were approached directly by OpCo, and both confirming that having DSM and DFIs[23] as shareholders has been helpful in securing this financing. Furthermore, the fact that AIF has been able to access debt from IFC is considered as a stamp of approval by local institutions, as IFC is renowned for its very strict application and approval procedures.

4.5 Demonstration effects
AIF was expected to lead to adopted behaviour of various stakeholders in the market, for example, by the implementation or raising of local (production) social standards by adaptation of similar production technologies. Other examples of demonstration effects are companies copying the business model of or being crowded into the value chain of AIF. This effect may also take place on a lower level; for example, by farmers not involved in an outgrower scheme copying agronomic practices of those selling to AIF.

A small demonstration effect is observed in terms of sourcing. The cob-model, which was introduced by AIF, has proven a success (for further elaboration on the model, see Section 7.1). Based on interviews with the company, a small number of traders has developed a similar sourcing model to AIF, whereby maize cobs are purchased from smallholders or aggregators. Furthermore, note has been made that overall maize quality is improving in Rwanda, possibly as result of AIF's necessitated high quality standards. Next to that, AIF is a frontrunner in terms of employee health and safety and diversity in management, which provides an example for other actors within, or even outside, the industry.

[23] For purposes of this report, IFC, FMO and BII are all labelled as DFIs.

4. PPP alignment and performance

This section reviews the developmental and financial alignment of the shareholders. Firstly, the main conclusions are summarized in Box 2 below, which will then be detailed in subsequent paragraphs. The section will be concluded with an assessment of the partnership's performance.

> The development objectives of the respective shareholders in both HoldCo and OpCo have remained aligned since inception. To date, all partners have reiterated their commitment to AIF. For the foreseeable future, it is unlikely that any of the shareholders in HoldCo or Opco would retract from the investment, given the alignment of AIF has with the impact targets of shareholders.
>
> The financial risk-return profile of shareholders is however not identical: In HoldCo, IFC holds a preferential equity position. Also, over time, shareholders have not equally provided equity or loan capital to HoldCo. At OpCo level, potential dividend distributions are skewed towards GoR.
>
> The key strengths of the partnership are the efforts of DSM to support OpCo operations, the efforts of GoR at OpCo level (to commit to off-take contracts and to support the sourcing of inputs at various levels), and the commitment of shareholders in HoldCo to provide additional capital when needed.
>
> At the same time, these strengths simultaneously reflect the fragile dependencies of the partnership – should any of the above-mentioned commitments fade, the PPP's success would likely be jeopardized. Furthermore, AIF also stands to benefit by attracting a shareholder with a background in retail markets. More clearly defined roles will help alignment between shareholders and would be preferential for AIF's expansion into new countries.

Box 2: main conclusions on PPP alignment and performance

5.1 Partnership alignment

Developmental

The partnership objectives have remained aligned with the objectives of all shareholders since inception. For DSM, AIF fits into its efforts to develop and pilot nutritious food solutions by working in partnership with different organisations. AIF is particularly interesting as it holds the potential for scaling up and replicating similar models in other low-income countries. The objectives and activities of AIF meet FMO's goals and requirements of specialised funding mechanisms that help businesses make development impact interventions that these businesses would otherwise not make[24]. At IFC, AIF falls within the private sector window of GAFSP, aimed at improving incomes and food nutrition security in low-income countries, and within the general strategy of the World Bank Group for Rwanda aimed at improving agricultural value chains. For GoR, AIF is the showcase for its national policy to develop PPPs with the private sector to for commercialisation and transformation of its agricultural sector. From a malnutrition perspective, AIF allows GoR to support its lowest income groups with nutritious foods at attractive prices. Furthermore, AIF aligns with MINAGRI's PSTA4[25] goals of increasing yields and output (amongst others for maize and soy), and to foster market linkages for smallholder farmers.

[24] This was also the case for DFID's Impact Accelerator facility, from which BII's investment in AIF was made.
[25] Strategic Plan for Agriculture Transformation 2018-24.

Financial

From a financial perspective, a full alignment between investing partners is achieved if all parties embrace an identical risk-reward profile. In contrast to the development objectives, investing partners are not fully aligned financially, as several items stand out:

- IFC has downside protection at HoldCo level, as it holds a put option to sell the own balance sheet funded portion of its shares[26] to DSM.
- Not all original shareholders in HoldCo participated in subsequent capital rounds on a pro rata basis, with BII first diluting and ultimately exiting[27]. This has changed the ownership structure over time and has led to a discrepancy between economic interest and voting rights[28]. As a further consequence, FMO has been squeezed into a more prominent shareholder position than originally intended, which may increase expectation of further future commitments and entail potential reputational risks due to its higher visibility[29].
- Discrepancies persist in relative shareholdings and participation in loans[30].
- At OpCo level, dividend distributions are not fully aligned, with HoldCo to be at a disadvantage to GoR should specific financial targets be exceeded[31]. Given the poor financial performance to date, no such target has been reached, and therefore any potential friction is hypothetical.

Since the exit of BII, none of the parties have indicated any frictions caused by the mismatch. However, the previous misalignment signals that better alignment of shareholders is preferable to drive future success of this project and any expansion to Ethiopia or elsewhere.

To date, all current partners have reiterated their commitment to AIF. For the foreseeable future, it is unlikely that any of the shareholders in HoldCo or Opco would retract from the investment, given the alignment of AIF has with the impact targets of shareholders. Although IFC holds a put option, it has never signalled its intention to put its equity to DSM. Furthermore, pulling back from AIF would pose a reputational risk for any of the current shareholders. However, it cannot be assured that any of the partners would be willing to commit to additional capital or guarantees until a stronger financial track record has been displayed.

5.2 Partnership performance

At HoldCo level, the commitment and ability of shareholders to solve the Rwandan operation's liquidity issues has been a strong display of cooperation. Though not all shareholders participated in subsequent capital rounds or debt restructuring, the determination of shareholders to provide financial solutions has provided the room needed for AIF to remain afloat. The development goals between the current

---

[26] Around 33% of IFC's equity investment to date can be put to DSM at cost. Other shareholders do not hold this right.

[27] Prime reasons for BII to exit were an unsatisfying (subordinated) structure, the poor financial return, a limitation in the Impact Accelerator facility's holding period (6 years), an overall size discrepancy (BII targets larger markets/businesses), and the fact that AIF had already achieved impact goals (and could continue to do so without BII's support).

[28] Due to this structure, DSM is able to maintain a minority stake in HoldCo and thus is not required to consolidate AIF on its balance sheet.

[29] For this reason, a convertible subordinated loan (preference shares) was issued by shareholders in May 2019 rather than an additional equity commitment.

[30] BII was invested in the equity of HoldCo only, which by definition results in a degree of misalignment. Also, FMO has provided disproportionally large loans in comparison to its shareholdings.

[31] The dividend policy is skewed in favour of GoR. First, both shareholders (Holdco and GoR) will receive 9% return. Of any returns above the 9% threshold, 2/3 will go to GoR, which will spend it on malnutrition programs (at least 75% purchased from Opco). This will ensure that 50% of all profits above the hurdle rate flow back to OpCo. The remaining 1/3 of profits will go to HoldCo. In case Malnutrition Prevalence in Rwanda will decrease to less than 10%, 2/3 will go to Holdco and 1/3 to GoR.

participating DFIs are clearly aligned. It should also be noted however that the cooperation between shareholders took some learnings at HoldCo level, in particular regarding throughput times needed for making financial decisions and the vision on doing business in developing markets. This should be attributed to the nature of the shareholders (corporate versus DFI as pure financial shareholder).

During the first years of operations, OpCo has faced numerous challenges, several of which were outside the influence of the partners. Regardless, the partners all have contributed to overcoming these challenges using their respective tools and expertise, providing a clear display of alignment of interests. A crucial achievement has been to amend the WFP contract in 2019, which has enabled AIF to support its operational cash flows. Furthermore, GoR has reiterated its commitment to AIF and has supported the business at various levels. Despite delays in its payment obligations, GoR has ultimately fulfilled its commitments on both offtake obligations and capital injections at OpCo level.

However, it to date the partnership has lacked shareholder expertise in its dealings with consumer retail markets (and, to a lesser extent, to agro-commodities trading). A more balanced shareholder structure may well have been able to tap into specific knowledge and have avoided costly operational issues during the first years of operations of AIF.

As a final remark, it should be noted that a disparity exists at OpCo governance. The OpCo board is predominantly populated by OpCo management, with only the GoR representative being an “outsider”. From governance perspective, there should be more accountability from management to a more independent board. Governance could be strengthened from either empowering the board more[32] or have less board members who simultaneously hold management positions in the company.

5. Employee wellbeing and working conditions

This section digs deeper into employment generation by AIF. The section starts with a caption on the main conclusions on employee wellbeing and working conditions, followed by an outline of the number of jobs that are directly created by AIF and an assessment of the conditions of employment. Specific attention will be paid to gender equality at the work floor and the impact of the COVID-19 epidemic on employees.

> AIF attributes high importance to the working conditions. Our results show high satisfaction rates among permanent employees. Those employees are generally content with their salaries, other employment benefits (such as paid leave and sick leave), career opportunities and their job security. Permanent employees are loyal to AIF and indicate to be proud to work for the company.
> An outstanding point within AIFs policies is the attention to employee health and safety. Employees in all parts of the organisation (including management, plant operators and casual workers) indicate that SHE is taken very seriously, ensuring a safe working environment for all. Some casual workers indicated working longer hours to make ends meet.

Box 3: main conclusions on employee wellbeing and working conditions

[32] For instance, the OpCo board itself currently has no budget and must rely on management of OpCo, which from a governance perspective is a mismatch.

6.1 Employment creation

AIF creates employment for "permanent employees" – those directly employed and paid by AIF, after probation for an unspecified period of time – and "casual workers" – those contracted through external agencies. Permanent employees are typically higher qualified individuals for vital company positions, including administration and finances, human resources, management, IT, sourcing, marketing, food quality and safety, and machine operations. Casual workers, by contrast, are hired for unqualified labour, including cleaning and casual management services, security services, and handling of loading and offloading. AIF currently works with three external agencies (two at the baseline), which are required to comply with national labour laws.

Figure 3 below shows that employment numbers have increased at AIF, especially for casual workers (from 79 to 357) and in the initial two years also for permanent staff (from 129 to 165). The large increase in the number of casual workers can be explained by two factors. On the one hand, due to the plant becoming (more) operational, there are more casual jobs, such as cleaning and loading/offloading available compared to previous years. On the other hand, the pool of casual workers which can be hired by AIF has increased.[33]

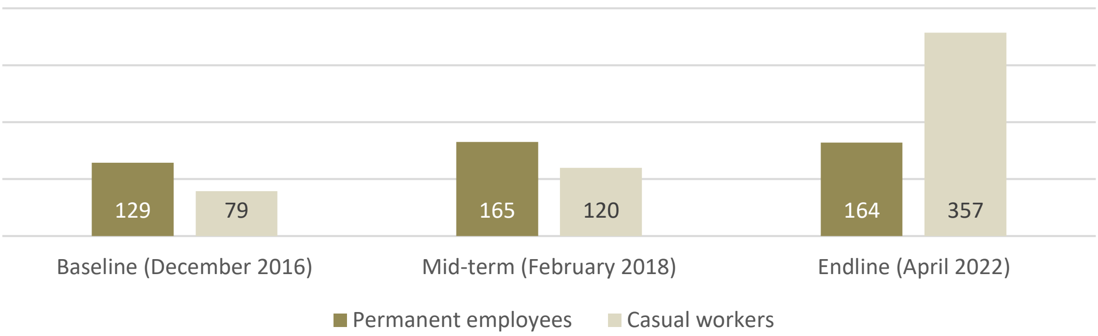


Figure 3. Employment numbers at AIF

AIF values personal development of their staff, and there have been examples of casual workers moving into permanent positions – doing work than they did as casual worker. Many casual workers have the ambition to move into a permanent position at AIF. However, they also indicate that this is only possible for a small number of people. To our knowledge, there are no examples of permanent jobs being replaced by casual workers.

At endline, out of 164 permanent staff, 44 were female (27%) and 120 were male (73%). Out of 357 casual workers, 57 were female (16%) and 300 were male (84%). Despite the majority of staff being male, many employees praise the inclusive culture towards female employees. At present, two members of the executive committee are female, and the majority of management positions are fulfilled by female employees. As

[33] In the absence of data on FTEs, the number of jobs is used. It is therefore not possible to draw any conclusions on the number of FTEs worked by casual workers. Given the ad-hoc nature of their work, it is possible that a number of casual workers work part-time or go through periods without working at AIF. The casual workers interviewed as part of this study, however, all indicated to experience relative job security.

comparison, country-wide data shows that men are three times more likely to be (formally) employed in the private sector than women (ESTA & RWFO, 2014). This means that AIF is above the country average in terms of permanent workers. The share of female casual workers is below the country average. This can be explained by the type of work performed by casual workers, which is often work that is typically conducted by men in Rwanda (such as loading and offloading and other work requiring heavy lifting).

Most of the current employees (92% of the permanent employees and 65% of the casual workers) indicated having had a job before AIF. About half of the people who had a job before AIF (mostly the current permanent employees) occupied this position on a permanent basis. However, the other half, mostly casual workers, indicated to have worked jobs on a temporary basis, mostly without a contract. Whilst permanent employees enjoyed a number of employment benefits in their previous job, such as health insurance (72%), paid leave (59%) and pension rights (70%), this was not the case for casual workers. These reported no health insurance (80%), no paid leave (93%) and no pension rights (85%). This shows that permanent workers had better job security and bargaining position even before joining AIF, as well as other job opportunities under good conditions, while casual workers do not have such alternatives.

Overall, employment conditions at AIF are good. Satisfaction with working conditions and health and safety is high amongst employees and casual workers. The baseline survey from 2016 revealed a high rate of satisfaction with employment conditions, including physical working conditions, health care and sanitation. The employee satisfaction surveys conducted on an annual basis also indicate high rates of approval with AIF's working conditions (the last survey, conducted in 2020, showed a satisfaction rate of 76%). Though some workers indicate room for improvement, the working conditions at AIF are especially reported to be good in comparison to other companies in Rwanda. Many respondents stated that the employment conditions at AIF were better than those at their previous employer.

In general, employees feel proud to work at AIF. In interviews, employees have stated that AIF is a place where they were able to grow mentally, work towards goals and under the same values. Some employees also mention the possibility for (personal and professional) growth and promotion a motivating and encouraging factor in their job.

It needs to be noted, however, that working conditions, as well as employee satisfaction are considered less positive by casual workers. Since casual workers are not (all) included in employee surveys, their views are not always reflected in satisfaction figures. Further differences in conditions between casual and permanent employees will be elaborated on in the paragraphs below.

Contracts, working hours and job security

AIF is a stable employer. All employees are given contracts before starting the work, and wages are always paid in time. Both permanent and casual workers consider their work at AIF to be a stable source of income. Although casual workers are only paid for days worked and therefore have limited job security, they indicate that they are generally able to work their desired number of shifts per week. They also indicate that they are able to get back to the job in case of temporary absence, as long as their shift leaders are informed beforehand.

Regular working hours are 45 hours per week (in case of full-time employment). This is in line with the national law. The company determines working days that are divided in shifts of 45 hours per week. Evening work (Monday to Sunday from 18.00 to 23.00 and 23.00 to 06.00) does not entitle the employee to a bonus. Shifts last eight hours per day. Should it occur, overtime is compensated with time off within the calendar year. However, due to the nature of working in shifts, overtime is not common.

Some casual workers indicated working longer hours to make ends meet. AIF includes working conditions on the contract with service providers of casual workers and monitors their compliance with the agreements regularly and there is different view on this.

Compensation

Permanent employees. At baseline, permanent employees reported monthly salaries within the range from RWF 240,000 to RWF 4,150,000 per month, with a mean salary of RWF 585,483 (median salary: RWF 304,000) [34]. This translated into a daily salary of RWF 22,517. The wages for permanent employees are far above the Anker living income reference value of RWF 147,111 per month (Global living wage coalition, 2020) and the national poverty line benchmark of 118,000 RWF per month (African Development Bank, 2018). During the mid-term survey, the surveyed permanent staff members received a monthly salary in the range of RWF 250,000-600,000. At end-line, no overall wage assessments were done due to unavailability of the required data. However, the permanent employees interviewed as part of this study, showed satisfaction with their wage level, and all felt they were paid fairly. The wage, in combination with the secondary employment benefits, made that permanent employees are satisfied with the compensation received from AIF. AIF indicates to benchmark wages on a regular basis.

The mid-term survey revealed that permanent employees live in better accommodation than the casual workers, with singles renting their own private apartment and families living in single family houses. The single permanent employees and those in households with multiple incomes are relatively better off than the permanent employees who have young families with the AIF salary as main income source.

During the same survey, the permanent staff members indicated to often be dissatisfied with their perceived financial wellbeing, as they have larger households to support, higher expenditures and higher outstanding loans (e.g. for university studies) compared to casual workers. The expenditure patterns of permanent employees seem to imply that they pursue a middle-class lifestyle, which their incomes do not allow, in particular in the case of young families with single income sources. As this survey has not been repeated at end line, it is difficult to draw general conclusions about the current satisfaction with living standards and livelihoods. However, interviews with permanent workers suggest that the satisfaction on wages increased.

Casual workers. The situation for casual workers is, however, different. At the time of the baseline, as well as the midline assessments, daily wages were RWF 2,500 per day. AIF indicated that they require outsourcing companies to comply with national labour laws to ensure that casual workers receive at least a minimum

[34] At an exchange rate of RWF / USD 1,015 per year-end 2021, the salary range corresponds to US$ 236 – 4,088. The mean salary amounts to US$ 577 per month and the median US$ 300.

wage of RWF 50,000 per month. Their mean monthly income was RWF 80,000 (median salary: RWF 75,000). At the mid-term survey, only 11 casual workers were surveyed, who received a monthly average salary of RWF 62,500 per month. Although this salary lies above the minimum wage, it represents 72% of the estimated living income which at the time was RWF 86,500 per month.

Employment benefits

In addition to their wages, permanent employees receive an employment package. This comprises access to private health care and employer's contribution to a private pension fund. Furthermore, employees at AIF are entitled to various types of leave. In the first place, employees get 18 annual leave days on a yearly basis, excluding weekends and public holidays. Since the production continues 24/7, it is possible that shift workers work during public holidays. In such a case, workers are entitled to a compensation day.

In case of illness, employees are entitled to 18 days of sick leave annually – though the illness needs to be confirmed by a doctor. In the event of prolonged illness, employees are entitled to receive full pay during the first three months. If the sickness still takes longer, employees can get unpaid employment suspension. Special arrangements are in place for women who suffer miscarriages. In case this happens, women are entitled to ten additional leave days (or a month, if the event happens during the third trimester).

Furthermore, permanent employees are entitled to special leave as well. Examples of special leave are maternity leave (12 consecutive weeks, with a possibility to start the leave two weeks before the tentative delivery date), paternity leave (4 days), study leave (5 days), circumstantial leave (3-8 days, depending on the circumstances) or unpaid leave (not more than 3 months).

For casual workers, however, the situation is different. Casual workers get paid for the days that they work, and do not get any paid leave of sick leave, nor do they receive health insurance. At baseline, casual workers indicated to not receive any employment benefits, such as sick leave, annual or parental leave or access to private health case. Interviews confirmed that this has not changed since. AIF pays the employers' contribution to the national pension fund (RSSB) for the casual workers. All other contract conditions are determined by the external company in line with common employment conditions for unqualified labour in Rwanda.

Safety and security

Safety and security are very high on the agenda at AIF, at each level. All employees that participated in interviews, without exception, indicated that they felt safe while doing their job. There is a Safety, Health and Environment (SHE) policy, monitored by a SHE committee, which ensures the embedding of the policy in the organisation. Every employee, regardless of their position, is to undergo a safety training. This training can be basic, or very extensive, depending on the position. Safety is also being monitored continuously: there is a SHE representative present on site at every shift, and each meeting or shift starts with a short SHE briefing.

Employees are provided with the necessary personal protective equipment (PPE) by AIF, and it is ensured that everybody makes use of these PPEs. There are also fire drills, as well as health check-ups for employees.

Because of these measures, employees feel that the degree towards the SHE policy is implemented and monitored is progressive compared to other Rwandan companies.

Due to this strong emphasis on SHE, accidents are very rare. Since the plant becoming operational, 10 accidents or near misses that led to injuries have occurred in total, mostly minor. An example of such an accident happened in the beginning of 2021, when a casual worker was hit by a forklift, resulting in a foot injury. A near miss also occurred in 2021, when a welding face shield was left in the dryer after maintenance. Since such accidents are rare and taken very seriously, we conclude that the safety situation at AIF is appropriate and well-managed.

AIF employees, as well as policy documents, confirm that accidents and near misses are taken very seriously. Accidents and near misses are to be reported to the responsible shift manager or SHE manager and will be investigated in detail to determine the root causes, after which the required measures will be taken.

Throughout the investment period, FMO has closely monitored the potential risks of the investment, including potential risks with regard to employees, through E&S tracking. Risks identified at the start of the included operational health and safety risks, working conditions for various actors (including vulnerable people in the workplace) and supply chain working conditions. These risks have been monitored on a regular basis and were generally found to be well managed by FMO. FMOs E&S team concluded that there is a good ESMS in place, and that safety studies and procedures are followed strictly. AIF has updated their reporting system for operational and SHE-matters, to achieve better integration of environmental health and safety and to be able to incorporate lessons from past incidents and near misses.

Feedback mechanisms, grievance and complaints

There are various possibilities for employees to provide feedback to AIF management. In the first place, workers are represented in worker representation groups within departments, and can also communicate issues through an ombudsman. Besides that, AIF actively encourages an open-door policy, where workers can walk in. This policy is confirmed and appreciated by permanent employees.

A point of attention is the transparency towards employees regarding these processes. Not all employees seem to be aware of these mechanisms, especially the representation through workers groups. Employees indicate that is unclear how to get elected as part of this committee, how regularly the committee meets, and what they do with the issues that arise.

In case employees want to provide anonymous feedback, there is a suggestion box, where employees can anonymously enter complaints or suggestions. This box can only be opened by the country manager. Furthermore, AIF organises annual employee satisfaction surveys. The results of these surveys show that a majority of the employees is satisfied with their work at AIF, and that satisfaction is gradually increasing. The overall satisfaction rate increased from 71% in 2018, to 72% in 2019 and 76% in 2020. Several measures were taken based resulting from feedback given in the employee satisfaction survey. Office furniture was, for example, changed, after employees complained about back issues resulting from outdated chairs and desks. Another suggestion was raised on the transportation provided by AIF for commuting to work. When employees complained that the distance covered by the company transportation was insufficient, AIF worked towards a middle ground: it was too costly to drop everybody at home at all times, but people are now dropped as close to home as possible at night. A final suggestion concerns company communication. It turned out that AIF's communication was not reaching everybody. Therefore, AIF has given everybody an email address, and provided desks at the plant which people can use. They have also gotten all employees on a CUG (Closed User Group) phone service, so that they can all communicate easily and freely.

However, few of these mechanisms are easily accessible for casual workers. Casual workers are not included in employment satisfaction surveys and are not structurally represented in workers groups or committees. The first point of escalation for a casual worker is their management. However, there is no structural mechanism for taking up complaints and communicating on this, and casual workers indicate to have the feeling that issues are not taken up. Casual workers stated to have raised issues, often about compensation and working conditions, but are still waiting for an official answer. Although AIF states to practice an open-door policy, workers indicate to experience barriers in doing so.

6.2 Gender

In general, AIF provides an inclusive environment for both male and female employees. Due to the nature of the work (production work in a factory), the majority of employees are male. However, the gender balance differs per department. The majority of operational jobs are fulfilled by male employees, but office jobs are more often fulfilled by women. Overall, the number of female workers (in relative and absolute terms) has been growing steadily. The share of female permanent workers grew from 19% at the start of operations to 27% at current. The share of female casual workers decreased from 22% to 16% - however, this is mostly due to an increase in the number of male casual workers. The absolute number of female casual workers increased as well.

AIF also ensures female representation in management. Currently, there are two women in the executive committee, and a lot of management positions are held by women as well. AIF indicates to stimulate an environment where women can thrive, and actively facilitates this. An example is the introduction of a family room, which breastfeeding women can use for nursing. The introduction of this room resulted from complaints of female staff that the job was difficult to combine with family care. Before, young mothers were provided with additional leave (e.g. leave work an hour early, or take a longer lunch break) for nursing, but since AIF is located 10 km outside of Kigali centre, this was insufficient for many women. The recently introduced nursing room is meant to overcome this challenge. AIF management stated that there are plans to change this facility into a proper nursery in the future, though it is uncertain whether there are concrete plans for the introduction of such a facility.

Another example concerns measures taken regarding transportation during the COVID-19 related lockdown and curfew. Before that time, it had been common for employees to be dropped at central points in the city, at some (walking) to their homes. However, during curfews, employees, particularly women, indicated to feel unsafe, when they were dropped by AIF transportation and had to walk the remainder of their journey home with few people on the streets. After indicating this, AIF initiated a compromise. It was not possible to drive all staff home at all times, but at night-time employees were dropped as close to their homes as possible.

The women participating in interviews as part of this study, all confirmed that AIF was an inclusive environment, where they were stimulated to develop themselves. Moreover, none of the women had ever experienced any discrimination. Women in management positions felt like they were taken seriously by all their colleagues and felt that any discriminatory behaviour would not be tolerated by AIF management.

6.3 Career opportunities and personal development

AIF indicates to highly value personal development of its employees. Various employees have indicated that there are sufficient possibilities to get promoted to higher functions. A number of employees interviewed as part of this study, has started in their career at AIF at a different, lower position than the position they currently occupy. Permanent employees indicate that AIF is an environment that stimulates their development. There is a lot of scope for mentoring, especially in the operations department, and workers that perform well and show an interested to develop can be given small additional tasks helping them grow to their new position – however it is not common to receive a training to grow to a higher position. In exceptional cases, AIF can grant their employees unpaid study leave.

Especially for casual workers, the prospect of a potential promotion is a large motivation in the work. However, higher-level jobs are scarce and therefore difficult to receive, and mentoring is less common, to the discontent of casual workers.

6.4 Effect of COVID-19 on employees

The effect of COVID-19 on employees has been very limited. Since AIF is a company in the food industry, which is considered an essential service, the production plant remained open, and operations did not come at standstill. Employees were able to work their shifts as usual, and no staff were let go. There have also not been any salary cuts. Since work at AIF is done in shifts, there were never a lot of people on site at the same time. Employees working at the offices, were requested to work from home, which was sometimes challenging but provided no real issues.

AIF worked closely with the local governments and was able to provide all employees with permits entitling them to be outside during curfew hours. In the absence of public transport during this period, AIF had to organise transport for employees usually traveling by public transport, which resulted in some additional costs but ensured safe travel possibilities for everyone. All vans were cleaned and fumigated. Furthermore, AIF provided face masks and sanitizers for everybody, and supervisors on site ensured that there were used. Employees indicated that they felt safe and were always provided with the necessary equipment.

Finally, AIF employees were amongst the first in the country who were able to get vaccinated. AIF collaborated with the health services and ensured that people were able to go to health centres to get vaccinated. Later on, vaccination sessions were organised on site.

In conclusion, although COVID had large implications for sourcing and economic performance, employees did not experience many impacts at their work and were able to continue their activities and maintain their income.

6. Sourcing from smallholders and wider socioeconomic effects

In this section, we present our findings with regard to AIF's sourcing strategy, raw material needs and effects on farmers. Starting with the main findings in the caption below, we discuss AIF's maize sourcing history and strategy, followed by the effects on smallholder farmers. The section concludes with a brief summary of the estimated value added of AIF on the agricultural sector, and the economy as a whole.

With some 30,000 MT sourced annually, maize is, by far, the most important crop for AIF. As the original sourcing strategy to source all maize through forward delivery contracts with cooperatives failed, a smallholder cob model was introduced. In this model, farmers sell their maize unshelled to AIF directly after harvest, for a price that reflects the calculated weight of shelled maize.

The cob model provides various benefits to both AIF and farmers. For AIF, the cob model ensures rapid delivery of high-quality maize. This decreases dependency on sourcing maize from other countries in the region, and the risk of large rejection rates due to quality issues. The model has also proven to be scalable. For farmers, the cob model decreases maize losses and rejection rates (based on quality standards). Since no post-harvest handling is required, the model decreases costs and labour investments at the household level, and ensures that maize can be sold relatively quickly after harvest.

The model, however, also brings some disadvantages for some farm households. These include the loss of husks for farmers (which they often use as complementary fuelwood), less control over maize allocation, and a decreased demand for on-farm wage labour.

One of the development goals of AIF was to decrease chronic malnutrition in Rwanda. An impact study conducted by CHAI shows that chronic malnutrition has decreased considerably in Rwanda during the last decade. Although malnutrition among the vulnerable mothers and children receiving AIF's products through GoR has decreased, the effects cannot be attributed to FBF products alone, as they are combined with GoR distribution efforts and other interventions targeting the same households.

Due to the large quantities sourced, AIF's sourcing strategy has a large impact on the maize sector. A modelling assessment by NORC estimates the net added value of AIF on the local maize market (derived from local sourcing) at US$ 105m over the period 2016-2031. Overall, NORC estimates the total incremental value added of AIF to the Rwandan economy, at US$ 758.5m over the evaluation period (2016-2032), whereby the added value is defined in terms of 'supply side added value' (direct and indirect effects from maize production, transport, and the production plant itself) and 'demand side added value' (cost savings from increased consumption of nutritious foods).

Box 4: main conclusions on sustainable sourcing and impacts on farmers

7.1 AIF's maize sourcing history and strategy

At time of initial investment, AIF's intention was to source 100% of the maize requirements from smallholder cooperatives in Rwanda based on forward delivery contracts. The programme comprised three main components:
(1) technical assistance to cooperatives (especially extension services by CHAI);
(2) forward delivery contracts between cooperatives AIF; and
(3) access to credit for inputs by IFC-KCB.

The first two seasons of sourcing from agricultural cooperatives were not successful due to high side-selling rates by contracted cooperatives and poor maize quality. AIF therefore had to supplement its maize input with produce from local and international traders and commercial farmers. In light of these sourcing challenges, the forward delivery contracts were discontinued and with it, the component facilitating access to credit for inputs[35]. AIF was forced to adopt a flexible sourcing strategy to adapt to local circumstances and the situation in Import markets. Ultimately, AIF settled on a two-pronged sourcing strategy, being smallholder cob model supplemented by traders, each which will be highlighted. This strategy refinement gradually enabled AIF not only to ensure a consistent supply when prices, quantities or quality vary, but also allows for processing of different maize formats (cobs and dried maize).

Rwandan smallholder cob model

In 2017, AIF introduced the so-called 'cob model'[36]. Under this model, farmers sell their maize unshelled, on the cobs, directly after harvest. The cobs are then transported to a central facility, where they are threshed and dried within 24 hours. The quick processing prevents the development of aflatoxins in the grains and therefore ensures the delivery of high-quality maize.

The cob model was first developed and piloted with Kumwe, a logistical company on the collection and processing (threshing) of the maize cobs. As results of the pilot were promising, the cob model was further expanded and since 2019, the cob model has been AIF's main sourcing model for maize from Rwanda. Since 2020, Kumwe harvest has been formally taken over by AIF. Cooperatives continue to play an important role in the cob model; yet, contrary to the early experience with the CHAI smallholder project, where contracts on on-cob maize sales were included, AIF does not use long-term contracts with cooperatives. Instead, field agents draw up short-term "commitment sheets", specifying the estimated quantities that the farmers want to sell, the commitment by AIF to buy the maize and a guarantee that farmers will receive payment within three days.

Since this model allows for more control over maize quality, it has a number of advantages to both AIF and smallholders.

- For AIF, the model brings advantages due to its ability to deliver locally produced, high quality maize. Maize purchased through the cob model has very low rejection rates compared to maize purchased

[35] Due to the failure of the sourcing programme with smallholder cooperatives and the subsequent change in sourcing strategy, CHAI has become less prominently involved in AIF. Regardless, CHAI remains relevant for the legitimacy of AIF, as CHAI coordinates the evaluation to study the effects of AIF's products on reducing malnutrition and stunting of infants.
[36] This was originally developed jointly with a company called Kumwe Harvest. In 2020, AIF formally acquired the name and assets.

through conventional channels. This benefits consumers by reducing aflatoxin contamination, with aflatoxin levels of AIF claimed to be 4% compared to a national average of which is considerably higher.
- Moreover, the cob model has resulted in a stable supply of maize from Rwanda and lower dependency on maize imports from other countries in the region. Data shows that the cob model is fulfilling its purpose: since its introduction, the quantity of maize sourced locally gradually increased, up to 80% in 2021[37].
- Another advantage is the scalability of the cob model, which has been achieved by cooperating with different NGOs who work with maize farmers (e.g. CHAI, World Vision International[38], World Vision Rwanda, One Acre Fund) and with Rwanda's public extension service.
- The model is cost-effective. A study by the WFP confirms the cost-effectiveness of the cob model compared buying grains, largely due to the possibility to purchase cobs at a discounted (pre-quality) price per kg versus a premium quality price for maize grains with low aflatoxin levels[39].

However, there are also limitations of the cob model, including high processing costs, including transport costs due to the bulkiness of the product, and in-house drying and cleaning costs. Moreover, the inclination of farmers to sell cobs or maize grains largely depends on the market price and may vary from season to season, as market outlets for maize are readily available. This suggests that the sustainability of the cob model is questionable as long as liquidity constraints and market prices are dominant decision-making factors for farmers[40].

Finally, side-selling remains a risk – though this risk is well managed by AIF. To reduce side selling, AIF created strong links with middlemen and aggregators. These are actors that typically have some working capital and storage capacity[41] and are therefore able to purchase from farmers in need of immediate cash. AIF has invested in capacity building of these actors (mainly in terms of quality assurance) and is now able to buy maize from them. Another common reason for side selling – fear of rejection (based on quality standards) – has also been limited by the introduction of the cob model.

Traders

To avoid sole dependency on smallholders, AIF purchases additional maize from traders in the Rwandan and regional markets (in the form of grain). This has the advantage of being able retain flexibility while enforcing quality standards. At the same time, AIF pays end-market prices for quality product (plus additional transport cost), which can be volatile. Where possible, traders from Rwanda will be contracted, there are only very few large traders in the country and maize prices tend to be higher than in neighbouring countries. Furthermore, access to international markets requires bulk purchases, which necessitates access to working capital and sufficient storage capacity. To date, GoR has been brokering on behalf of AIF with ministries of other governments[42] to support cross-border raw material flows and has waived import duties on maize (and other

[37] Based on notes of annual reports and commentaries AIF, locally-sourced maize was 5% in 2017, 51% in 2018, 45% in 2019, and 50% in 2020. Early indications are that 2022 will be a lesser harvesting year with lower yields.
[38] World Vision for instance loops in individual farmers who are not linked to cooperatives in groups.
[39] Source: WFP (2022).
[40] Source: KIT (2019).
[41] There are three maize seasons in Rwanda, with season A (February – May) being the largest. AIF needs roughly 30-35,000 MT of maize per annum and aims to purchase as much as possible during the seasons as prices are most attractive then. Given the peak market supply periods and limited storage capacity at AIF (20,000 MT for both maize and soy), AIF seeks out aggregators who possess their own storage capacity.
[42] International supplies may be additionally subject to currency controls, export bans, import / export duties and cross-border handling.

imported products). Nonetheless, international supply chains can be disrupted, as in recent years borders were closed amongst others due to COVID-19 (Tanzania) and disputes (Uganda) causing disruptions in the supply chain and production stoppages.

7.2 Effects on smallholder farmers

The cob model also brings advantages to farmers. First, it reduces post-harvest processing by farmers (oftentimes by hand or using small-scale shelling machines), which is time- and labour-intensive, and increases quality deterioration of maize (e.g. mould, pest infections, rotting, animal consumption, weather-induced damage), leading to high post-harvest losses. Reduced post-harvest processing by farmers has the following benefits[43]:

- First, it decreases rejection rates and post-harvest losses for farmers. An impact study done by the University of Chicago, comparing farmers belonging to AIF cooperatives with a comparison group, confirms that, at farm level, the introduction of the cob model has led to a reduction in post-harvest losses of maize. When comparing losses in the A season between 2016 and 2018, the study found a significant decrease of 7kg, which was a decrease of almost 50% as compared to a comparison group.
- Second, farmers benefit from cost savings due to reduced post-harvest processing, which farmers use to cover household needs, and purchase seeds and other agricultural inputs. We calculated that post-harvest handling costs amount to 17.48 RWF/kg under the cob model[44] , compared to 42.53 RWF/kg for shelled maize (grains)[45], offering cost savings of 25.05 RWF/kg (while not factoring the price received per kg).
- Third, the cob model leads to time gains resulting from reduced post-harvest handling activities (drying, shelling and cleaning), which is mostly done by women. However, it remains unclear whether this leads to less labour burden for women or simply implies a shifting of tasks (e.g. towards other farming activities). Furthermore, due to intra-household power dynamics, women may not be able to determine how they use the time gained.
- Furthermore, the reduced post-harvest processing by farmers also implies that maize can be sold quicker after harvest. On average, maize cobs are sold 14 days after harvested, compared to shelled maize, which is sold 20 days after harvest. Thus, the cob model provides farmers with a quick source of income. While AIF currently aims for payment within three to five working days, this is perceived as a disadvantage by some farmers who are in immediate need of cash. Those farmers prefer to work with buyers that can provide immediate cash, such as traders and millers on the local market. Strong cash constraints of farmers affect their decision-making on where to sell.

A disadvantage of the cob model is the loss of husks for farmers, which they often use as complementary fuelwood. A study by WFP[46] found that particularly women tend to dislike the cob model for this reason. Moreover, some farmers perceive that they have less control over their maize when they sell cobs. With shelled maize, they can sell smaller quantities depending on cash needs and market prices, and they can keep maize for household consumption, if need be[47]. Finally, the cob model is likely to have negative implications

[43] Source: KIT (2019).
[44] Costs included in the calculation: extra bags because of increased volume of cob compared to grains; costs for ropes and labor for loading; and cooperative services. When the costs of the loss of the cobs for fuelwood are included, costs increase from 17.48 RWF/kg to 30.66 RWF/kg.
[45] Costs included in the calculation: cooperative services, drying costs, shelling costs, cleaning costs, losses during drying and losses during shelling.
[46] Source: WFP (2022).
[47] Source: KIT (2019).

for the availability of rural on-farm wage labour opportunities due to the reduction of post-harvest handling of maize. This affects men more than women, as they are the primary hired labourers[48].

Finally, AIF-affiliated farmers have been receiving support through several projects, in combination with the Rwandan government and NGOs. These projects initially focussed at improving farm productivity, but later shifted towards creating market linkages. Though this support only reaches relatively small numbers of suppliers, it does provide benefits for maize suppliers in Rwanda, including increased productivity[49]. There is no evidence of (quantitative) impact on important variables such as food security, poverty, women empowerment, and household resilience.

7.3 Wider impact of AIF

Impact on Rwanda's maize market and value chain

Maize production in Rwanda has remained relatively stable over the past years and is estimated at roughly 450,000MT[50]. AIF requires slightly more than 30,000MT maize per annum, of which the majority is sourced in Rwanda. AIF entered a market already characterized by relative scarcity due to high domestic maize consumption, which cannot be met by national production and needs to be supplemented with imports. AIF has meanwhile become one of the country's major maize buyers, next to a handful of other large-scale buyers, such as Minimex and WFP. AIF has among the strictest quality requirements, accepting only Grade 1 maize, whereas other large buyers also accept Grade 2[51]. Nonetheless, AIF's entry has increased the competition for high-quality maize.

Despite AIF's demand for high quality maize, the lion's share of market transactions continue to be driven by price with generally lacking or unclear quality standards, limited awareness of quality requirements and poor post-harvest quality management (e.g. lacking drying facilities) and quality control. Most maize is traded on the informal market through (small-scale) traders and brokers. This has led to high aflatoxin levels in maize in Rwanda.

AIF's entry has contributed to highlighting the necessity of quality improvements along the maize value chain, which requires investments, e.g. into infrastructure and training, by value chain actors, government and development partners. Other actors such as WFP have also lobbied for aflatoxin control. The prevalence of aflatoxins has also become an increasing concern within the East African Community (see, e.g., the Kenyan suspension of maize imports from Uganda and Tanzania in February 2021 due to aflatoxin concerns). Official aflatoxin handling rules were therefore tightened in April 2021, requiring all warehouse operators, wholesalers, and other companies dealing with maize and a range of other commodities to have aflatoxin testing facilities prior to purchasing, storing, or processing the grain. Due to the higher prices that AIF offers, smallholders are incentivised to produce higher-quality maize in general. This has a positive impact on all maize produced in the country with potential spin-off effects on other industries (such as animal feed) or even other crops.

[48] Source: KIT (2019).
[49] Source: NORC at the University of Chicago (2020).
[50] According to the National Institute of Statistics in Rwanda (NISR), season A maize yield in 2021 amounted to 378,641MT and 349,907MT in 2022. Season B maize yield was 104,041MT. Season A typically runs from September through January. Season B runs from February through June. This present estimated quantity has been confirmed by AIF. GoR targets 2024 production at 760,506MT in its PSTA4.
[51] Source: Carnegie & KIT (2017). AIF requires that the moisture content of its maize should be below 14%.

Finally, AIF's impact on the maize market in Rwanda can be seen in the form of the cob model. Purchasing maize cobs was previously largely unknown (at least for agro-processing purposes) and was not even formally allowed by the Ministry of Agriculture. This was changed with the piloting and upscaling of the cob model, which is closely connected with AIF. Due to AIF's position as a major maize buyer, awareness of the cob model among farmers is high[52].

Impact on malnutrition

Products produced by AIF were expected to directly contribute to decreased malnutrition in Rwanda (and neighbouring countries). Since 2017, the Government of Rwanda has purchased fortified maize flour from AIF and distributed this, fully subsidized, through the public health supply chain to infants in the poorest socio-economic groups in Rwanda. As AIF enters into its 6th year of full operations in 2022, its reach is 1.6 million consumers and beneficiaries per annum[53].

A team of researchers from the Clinton Health Access Initiative and the London School of Hygiene and Tropical Medicine (2021) conducted a quasi-experimental evaluation to assess the impact of increased access of fortified foods to the most vulnerable children and mothers in Rwanda. In this study, children in the poorest and most vulnerable households (Ubudehe 1[54]), with access to subsidized fortified foods, were surveyed in 2017, 2018 and 2021. The team found a significant decrease in chronic malnutrition, as well as a significant improvement in micronutrient status among children living in the poorest households in Rwanda. An assessment of stunting-rates over time shows that stunting has decreased the prevalence of stunting among children 18-23 months in the Ubudehe 1 from 47% at baseline (2017) to 35% at endline (2021). This contrasts with the national level data that reports 49% prevalence among children younger than five years. The evaluation also showed there was a reduction in the prevalence of anemia and iron deficiency from 35% to 9% and from 32% to 23%, respectively. These results show that the intake of improved foods does significantly contribute to decreasing malnutrition, and that the support program by GoR is a contributor to that. At the same time, the study shows that households outside the target population (non-Ubudehe 1 households) also experience improvements in nutritional outcomes[55]. That implies that the positive effect cannot be solely attributed to the intervention of subsidizing FBFs, and that a combined effect likely exists of subsidizing FBFs and other supportive programs or general positive trends that contribute to the positive results.[56]

Added value to Rwanda's economy

A study conducted by NORC[57] estimates the added value of AIF to the Rwandan economy as a whole. Although verification of this information is out of scope of this study and we are therefore unable to confirm nor reject the estimations, it is shared as illustration of the potential added value of AIF. Based on economic (cost-benefit) modelling for all components of AIF's activities, NORC estimates the total incremental value

[52] Source: KIT (2019).
[53] https://africaimprovedfoods.com/.
[54] Please also refer to footnote 7 for the classification of Ubudehe.
[55] The study lacked a control group or a counterfactual within Ubudehe 1 for ethical reasons. No systematic monitoring was conducted how participants interacted with other nutritional or livelihood interventions that may have taken place during the course of the evaluation.
[56] Source: Hebert et al. (2022). This was done through a difference-in-difference analysis, aiming to compare the differences over time with a 'no-intervention' counterfactual scenario.
[57] Source: NORC at the University of Chicago (2018), "Economic Impact Assessment of the AIF Project in Rwanda".

added of AIF to the Rwandan economy, at US$ 758.5m over the evaluation period (2016-2032). Added value is defined in terms of 'supply side added value' (direct and indirect effects from maize production, transport, and the production plant itself) and 'demand side added value' (cost savings from increased consumption of nutritious foods).

On the supply side, AIF generates US$ 226.4m of direct, indirect and induced net incremental value added. The direct effect of AIF factory is about US$ 4m, and largely comes from wage payments to domestic workers[58]. The income from labour is estimated to add another US$ 62.9m to the economy. Indirect effects of AIF results from incremental benefits approximately 64,000 local maize farmers who are expected to supply maize to the factory (US$ 105.4m), transportation (of raw maize to the AIF factory and the final product to distribution points) (US$ 17.5m) and other, unspecified indirect effects (US$ 36.5m).

On the demand side, the incremental value added is attributed to the distribution and feeding undernourished population of Rwanda (and therefore the reduction in stunting), which is estimated to result in US$ 532.1m in present value of costs-saving in the economy over 16 years. A reduction of costs on the health and education systems, as well as on reclaimed labour productivity due to the decline in morbidity and mortality explain this large economic effect. However, these numbers are modelled figures and as such difficult to verify ex post or in situ, hence we cannot and will not comment on the actual size of the model's predicted effect.

Finally, the share of AIF's production purchased by WFP (at minimum 25,000 MT per annum in the period 2021-2023) and directly supplied to households facing severe food insecurity in countries such as South Sudan is expected to directly benefit large numbers of households in combatting acute malnutrition.[59] This impact is, however, short-term, as WFP, in theory, only provides emergency relief. Therefore, the impact of AIF outside Rwanda can be argued on short term, but is, in its current form, not expected to have a sustainable long-term impact outside of Rwanda.

[58] These payments would also come from shareholder dividends to the GoR, when distributed.
[59] Since no impact studies were conducted on those populations, it is not possible to quantify the impact in terms of number of households or a decrease in acute malnutrition attributable to AIF.

7. Appendix

10.1 Theory of Change

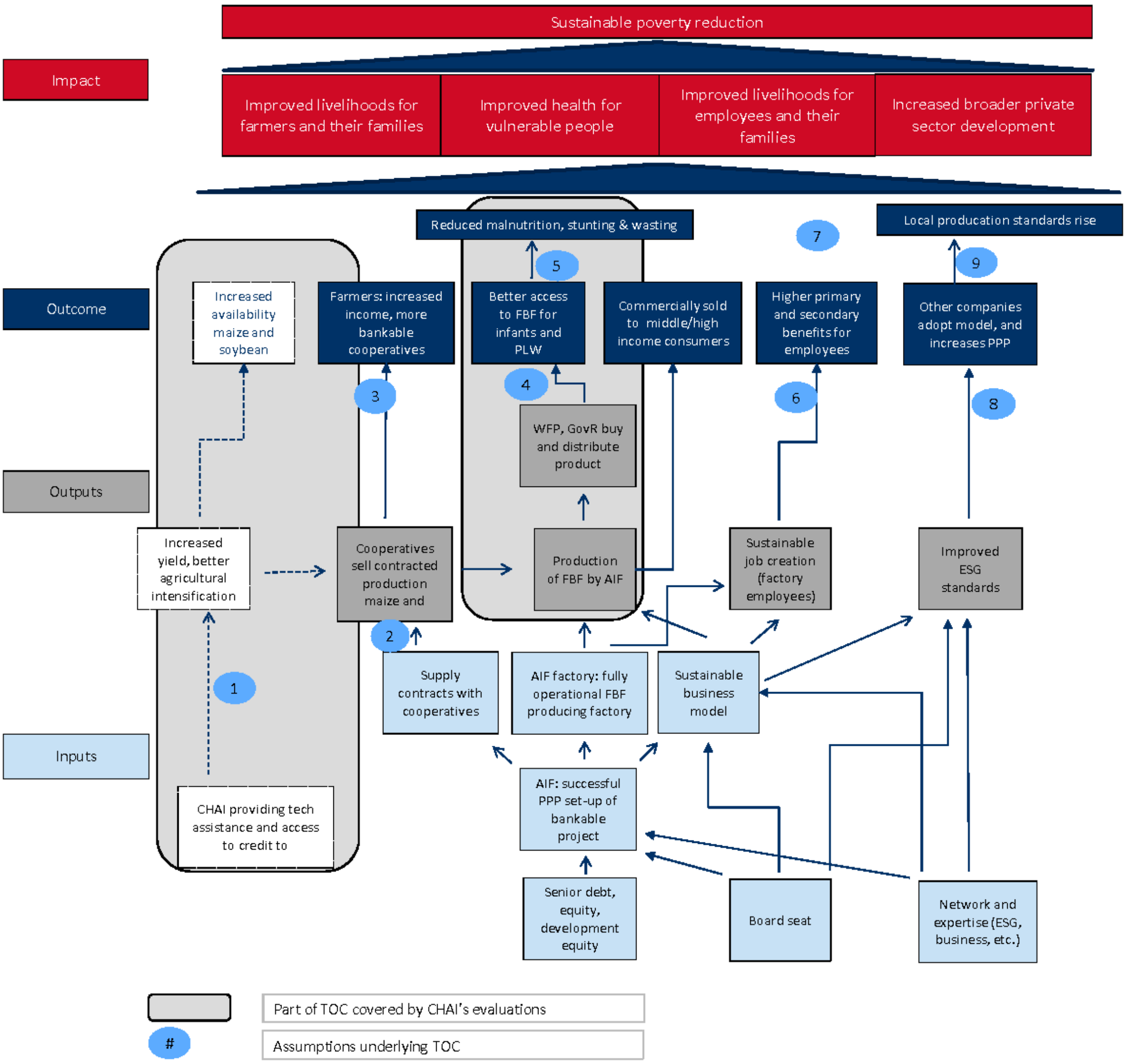


Figure 4. Theory of change AIF at baseline (2016)

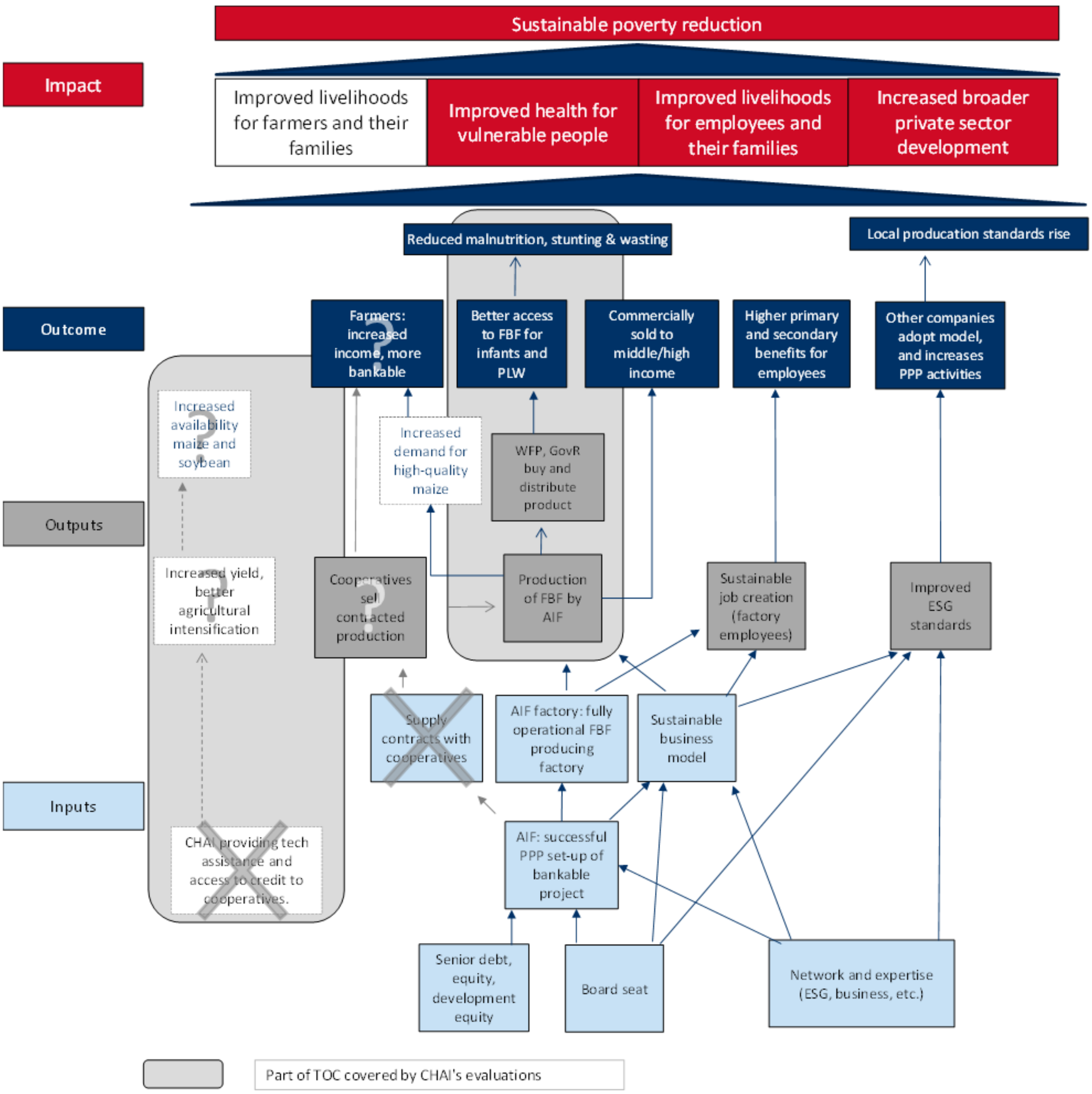


Figure 5. Theory of Change AIF following change in sourcing strategy (2017)

10.2 Literature consulted

- African Development Bank Group, 2018. Rwanda: New Data Indicate Significant Gains in Poverty Reduction. African Development Bank: Tunis.
- AIF 2017. AIF maize sourcing, April 2016-January 2017. Unpublished data.
- Agri Knowledge Centre 2012. Maize Sector Document Rwanda.
- Ansoms, A. 2010. Views from below on the pro-poor growth challenge: the case of rural Rwanda. African Studies Review, 53(2): 97-123
- Arumugam, K. 2011. Strategies for Sustainable Crop Intensification in Rwanda. Shifting focus from producing enough to producing surplus. Ministry of Agriculture and Animal Resources, Kigali.
- Besamusca, J., Tijdens, K.G., Ngeh Tingum, E., and Mbassana, E.M., 2012. Wages in Rwanda. Wage Indicator Survey 2012. Amsterdam, Wage Indicator Foudnation, Wage Indicator Data Report, March 2013
- Carnegie & KIT. 2017. Impact evaluation Africa Improved Foods. Baseline Report. Carnegie Consult: Maarssen
- Carnegie & KIT. 2018. Impact evaluation Africa Improved Foods. Mid-term Report. Carnegie Consult: Maarssen
- Clinton Health Access Initiative (CHAI). 2022. Tackling Maternal and Child Undernutrition through Production, Provision and Uptake of Quality Fortified Complementary Foods.
- Daly, J., Hamrick, D. Gereffi, G. and Guinn, A., 2016. Maize Value Chains in East Africa. Center on Globalization, Governance & Competitiveness, Duke University.
- DTU/CIDC 2014. Rwanda labour market report 2014. Ulandssekretariat, LO/FTF Council. Danish Trade Union, Council for International Development Cooperation
- ESTA & RWFO, 2014. Analysis of Gender and Youth Employment in Rwanda. African Development Bank: Tunis.
- FAO 2016. Country situation and role of agriculture. Country fact sheet on food and agriculture policy trends. July 2016, FAO, Rome.
- Filep, B. 2009. Interview and translation strategies: coping with multilingual settings and data. Social Geography, 4, 59-70.
- Global Living Wage Coalition, 2020. Anker Living Wage Reference Value. Rural Rwanda 2020.
- Hebert, K., Hariharan, K., CHAI Rwanda, Opondo, C., Ferguson, E., Baribwira, C. 2022. Quasi-experimental evaluation to assess the impact of providing fortified blended foods to children, pregnant women and nursing mothers living in the poorest households in Rwanda, 2017 – 2021. *Unpublished.*
- Hoddinott, J., Maluccio, J., Behrman, J., Flores, R. and Martorell, R. 2008. Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults. Lancet, 371:411-16.
- Hoddinott, J., Maluccio, J., Behrman, J., Martorell, R., Melgar, P. et al. 2011. The Consequences of Early Childhood Growth Failure over the Life Course. Discussion Paper 1073. International Food Policy Research Institute, Washington DC.
- Horton, S. and Steckel, R., 2013. Global Economic Losses Attributable to Malnutrition 1900–2000 and Projections to 2050. In: The Economics of Human Challenges, ed B. Lomborg. Cambridge, U.K.: Cambridge University Press.
- Horton, R and Lo, S., 2013. Nutrition: a quintessential sustainable development goal. Lancet, 382: 1-2.
- IFC 2008. IFC's Additionality in Supporting Private Sector Development, Independent evaluation of IFC's development results.
- Kelly, S. and Mbizule, C. 2014. Institutional procurement of staples from smallholders. The case of common purchase for progress in Rwanda. FAO, Rome.

- KIT, 2019. Understanding the costs and benefits of the cob model for maize farmers in Rwanda. KIT: Amsterdam.
- Martorell, R., Horta, B., Adair, L., Stein, A. and Richter, L., 2010. Weight gain in the first two years of life is an Important of schooling outcomes in pooled analysis from 5 birth cohorts from low- and middle-income countries. Journal of Nutrition, 140: 348-54.
- MINAGRI. 2018. Strategic Plan for Agricultural Transformation 2018 – 2024 (PSTA4), Kigali.
- MINECOFIN. 2020. Vision 2050, Kigali.
- National Institute of Statistics of Rwanda (NISR). 2022. Seasonal Agricultural Survey Season A 2022, Kigali.
- National Institute of Statistics of Rwanda (NISR). 2021. Seasonal Agricultural Survey Season B 2021, Kigali.
- NORC at the University of Chicago, 2017. Global Agriculture and Food Security Program Private Sector WindowImpact Evaluation of Rwanda Projects. Baseline assessment. University of Chicago: Chicago.
- NORC at the University of Chicago, 2018. Economic Impact Assessment of the AIF Project in Rwanda. University of Chicago: Chicago
- NORC at the University of Chicago, 2020. Impact Evaluation of Rwanda Projects, Global Agriculture and Food Security Program Private Sector Window (GASFP PrSW) Midline Assessment. University of Chicago: Chicago.
- Rwanda Demographic and Health Survey 2014-2015 (publicly available data www.measuredhs.com, calculations by Igna Bonfrer PhD).
- Temple, B. & Edwards, R. 2002. Interpreters/translators and cross-language research: Reflexivity and border crossings. *International Journal of Qualitative Methods*, 1(2), Article 1.
- Trading Economics, 2017. Rwanda living wage individual; forecast 2016-2020. Last accessed on 13/06/2017.
- Trocaire 2014. Analysis of national and regional agricultural trade in maize, soybeans and wheat: a focus on Rwanda. Trocaire, Kigali.
- USAID 2016. Rwanda early generation seed study. Country Report.
- Van der Laan, J. 2011. Going Local – the case of Minimex. A report on how Minimex can source from small scale farmers in Rwanda. Agri-ProFocus, Arnhem.
- Van Doorslaer, E., O'Donnell, O., Rannan-Eliya, R., Somanathan, A., Adhikari, S. et al. 2007. Catastrophic payments for health care in Asia. *Health Economics*, 16 (11), 1159-1184.
- Verhofstadt, E. and Maertens, M. 2014. Can Agricultural Cooperatives Reduce Poverty? Heterogeneous Impact of Cooperative Membership on Farmers' Welfare in Rwanda. *Applied Economic Perspectives and Policy*, 37(1), 86-106.
- World Health Organization (WHO). 2016. Stunting and Wasting.