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Results-based approaches in agriculture: what is the potential?

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Results-Based Approaches in Agriculture: What is the Potential?

Heiner Janus
Sarah Holzapfel

Results-based approaches in agriculture: what is the potential?

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Abstract

Increased and more effective public and private investments in the agricultural sector are needed to address the challenge of ending hunger and achieving food security by 2030. This paper analyses the potential of results-based approaches – an innovative financing instrument that links payments to pre-defined results – to contribute to this challenge. Results-based approaches promise several potential advantages over traditional aid modalities, such as a greater focus on results, better accountability systems and improved incentives that increase aid effectiveness. They are also discussed as an important tool to accelerate innovation and to leverage additional resources from private investors for agricultural and food security interventions.

Although widely applied in the health and education sectors, there are only a few experiences with results-based approaches in the agricultural sector, and the suitability of the sector for the instrument is debated. The aim of this paper is to contribute to this debate by reviewing three pilot interventions representing different types of results-based approaches: results-based aid (contract between governments), results-based finance (contract between a funder/host-country government and a service provider/company) and development impact bonds (contract between a funder, service provider and private investor). The analysis draws on existing literature on results-based approaches, expert interviews as well as on programme and guidance documents by various development agencies.

The three interventions are compared based on three dimensions that have been shown in the literature to be important building blocks of results-based approaches. These are (1) selecting measurable results (2) setting up payment and verification mechanisms and (3) providing support to the incentivised actor. In addition, the potential and limitations of each pilot are assessed towards dealing with external factors influencing results, such as climate variability, addressing the complexities of different rural worlds – ranging from large-scale agro-economic companies to the landless poor – and the prospects for scaling-up.

The analysis shows that results-based approaches have the potential to foster innovation in agriculture and can play an important role to increase food security in developing countries. Results-based aid programmes can provide additional incentives for partner country governments to focus on reducing hunger and malnutrition in the long run. Results-based finance programmes – by offering economic incentives to service providers or private companies – can help to overcome market failure and foster the adoption of new technologies. Development impact bonds are an innovative way to engage private actors in addressing development challenges.

However, we also find that the agricultural sector poses additional challenges for implementing results-based approaches. For example, paying for results is more difficult in agriculture than in many other sectors. Desired outcomes such as increased yields or incomes are highly variable and influenced by external conditions (e.g. weather and world market prices). Intermediate outcome or output indicators, such as increased areas under irrigation or hectares under new technologies, are easier to measure and more attributable to a programme, but leave less room for innovation and experimentation. In addressing the complexities of different rural worlds, results-based programmes already show their benefits in targeting specific groups. However, a more systematic assessment of the inter-linkages between the rural worlds can yield additional benefits for the implementation of results-based approaches.

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Bonn, December 2016

Heiner Janus
Sarah Holzapfel

Abbreviations

CFC	Common Fund for Commodities
DFID	Department for International Development
DIB	Development Impact Bond
DIE	German Development Institute / Deutsches Institut für Entwicklungspolitik
DLI	Disbursement-linked Indicator
KIT	Royal Tropical Institute
MT	Metric Tonne
MINAGRI	Rwandan Ministry of Agriculture and Animal Resources
MIS	Management Information System
NGO	Non-governmental Organisation
PforR	Program-for-Results
PMO	Prime Minister's Office
PSTA III	Third Strategic Plan for the Transformation of Agriculture
PVA	Provitamin A
RBA	Results-based Aid
RBF	Results-based Finance
SDG	Sustainable Development Goal

1 Introduction

Increased and more effective public and private investments in the agricultural sector are needed to achieve Goal 2 of the Sustainable Development Goals (SDGs), that is, end hunger, achieve food security and improved nutrition, and promote sustainable agriculture by 2030. Globally, there are still almost 800 million hungry people worldwide, with most of the poor and food insecure living in rural areas (Food and Agriculture Organization, International Fund for Agricultural Development, & World Food Programme, 2015). In countries with low levels of income, high poverty rates and large shares of the labour force living in rural areas, enhancing agricultural growth in particular is a requirement for poverty reduction and improving food security (Conceição, Levine, Lipton, & Warren-Rodríguez, 2016).

It is estimated that USD 125 billion is needed annually to achieve SDG 2 by 2030 (Schmidt-Traub, 2015). There is still a large financing gap, and development actors are searching for innovative financing instruments and policy reforms in pursuit of sustainable development. Results-based approaches that channel public and private resources in a targeted manner into the achievement of SDG 2 could be a key direction in this regard. They link payments to pre-defined results and promise several potential advantages over traditional aid modalities, such as a greater focus on results, better accountability systems and improved incentives that increase aid effectiveness. Results-based approaches are also discussed as an important tool to accelerate innovation and to leverage additional resources from private investors for agricultural and food security interventions.

Although widely applied in the health and education sectors, there are only a few experiences with results-based approaches in the agricultural sector, and the suitability of the instrument for the sector is debated. Masters and Delbecq (2008) point out that the agricultural sector is particularly suited for results-based approaches. Unlike in the health sector, there are no interventions, such as providing vaccines, where the results chain is clear and outcomes are documented. Instead, agricultural programmes operate under conditions of complexity, and there is ongoing adoption and replacement of a variety of agricultural innovations that are often specific to local conditions. Since the value of agricultural innovations is often not clear a priori, paying for outcome-level changes encourages experimentation and the local adaptation of innovations. At the same time, however, key outcomes in agriculture, such as yields and smallholder income, are influenced by a variety of external factors and subject to high measurement errors (Global Donor Platform for Rural Development, 2008; World Bank, Food and Agriculture Organization, & United Nations, 2010).

In light of the opportunities and challenges outlined above, there is growing interest in results-based approaches among funders and implementers of agricultural programmes, indicating that new results-based pilot programmes in the sector will appear and existing interventions will be geared towards a stronger results-orientation. The aim of this paper is to contribute to the debate on whether results-based approaches are suitable instruments in the agricultural sector, and on how they should best be implemented. We do this by reviewing three pilot interventions in Rwanda, Zambia and Peru that represent different types of results-based approaches: a results-based aid programme (contract between governments), a results-based finance programme (contract between a funder/host-country government and a service provider/company) and a development impact bond (contract

between a funder, service provider and private investor). The three interventions have been chosen because they are among the first in their respective areas and because they show a high level of innovation.

The selected interventions are compared based on three dimensions that the academic literature has identified as important building blocks of results-based approaches. These are (1) selecting measurable results (2) setting up payment and verification mechanisms and (3) providing support to the incentivised actor. In addition, we analyse how far the three interventions deal with the specific challenges that the agricultural sector poses for results-based approaches. First, measuring results in agriculture is extremely challenging due to climate variability, seasonal variations, changing market prices, the diversity of crops and the heterogeneity of production patterns (World Bank et al., 2010). Second, agricultural programmes should consider the heterogeneity of the rural population, ranging from large-scale agro-economic companies to the landless poor (Organisation for Economic Co-operation and Development [OECD], 2006). Results-based approaches can directly target small-scale producers or set incentives at the level of large-scale producers and enterprises to encourage the adoption of innovations that benefit the rural poor.

The paper proceeds as follows. In Chapters 2 and 3, we provide the background to the study. Different types of results-based approaches are introduced, the lessons learnt from programmes in other sectors are summarised and criteria for the analysis of the three selected pilot programmes are identified. Moreover, the specific challenges of results-based approaches in the agricultural sector are discussed. In Chapter 4 we analyse the three selected interventions based on the criteria identified in Chapter 3. Subsequently, the three pilot programmes are compared. Last, the main findings of the analysis are summarised and recommendations for development actors are provided.

2 Results-based approaches

Results-based approaches are relatively recent innovations in development cooperation. In traditional aid approaches, aid allocations depend on the amount of inputs required to finance the desired results through a pre-defined input to impact chain (e.g. funding of training of extension agents/personnel to increase the quality of extension services). Results-based approaches differ in this respect, as payments are made only after certain predefined actions[1] have been taken, or results (outputs or outcomes) have been delivered.[2]

There are various definitions of results-based approaches, and different types of results-based approaches exist that use their own label, such as Cash on Delivery (Birdsall, Savedoff, Mahgoub, & Vyborny, 2011), output-based aid (Mumssen, Johannes, & Kumar, 2010) and payments by results (Department for International Development [DFID], 2014). In this paper we use the terms results-based aid (RBA), results-based finance (RBF) and development impact bonds (DIBs) to distinguish between three main categories of results-

1 An action taken could also be certain public expenditures for specific sectors or sub-sectors.

2 The paper follows a relatively broad definition of "results-based approaches" and not only includes approaches that deliver results (outputs, outcomes and impacts), but also approaches that disburse aid when pre-defined actions have been taken.

based approaches (Clist & Verschoor, 2014; Janus & Klingebiel, 2014; Pearson, 2011; Perakis & Savedoff, 2015).

The three approaches use contracts that define results and link funding to performance indicators, but they differ in terms of which actor provides the funding and who is responsible for implementation. Depending on whether governments, private companies or non-governmental organisations are being incentivised, the results-based approaches differ strongly in terms of capacity requirements, the ability to deal with risks or volume, for instance.

Results-based aid (RBA) is implemented as a partnership between a donor and a government. By linking aid to results, the donor aims to provide incentives to the partner country government to focus on results prioritised by the donor and to change its behaviour. The aim of an RBA programme could also be to set incentives to achieve greater resource efficiency in a certain sector. RBA programmes therefore often support public sector reform programmes.

Results-based finance (RBF) instruments use domestic government and/or donor or private resources to reward sub-national governments, non-governmental organisations, the private sector, households or individuals for pre-defined activities undertaken, pre-defined results delivered or the achievement of performance goals (Claessens, Cassimon, & Van Campenhout, 2007, p. 10; Mosley, Hudson, & Horrell, 1987, p. 24; Rondinelli, 2013, p. 3).

Development impact bonds (DIBs) are a sub-type of RBF programme that involves private investors (Center for Global Development & Social Finance Ltd., 2013). Four parties are involved in DIBs: (1) outcome funder (donor agency or government); (2) private investors that pre-finance activities and are paid back by the outcome funder if – and only if – evidence shows that the programme was successful; (3) service providers that are contracted to carry out activities to achieve the agreed results; and (4) a coordinating intermediary organisation.

2.1 Results-based approaches and agriculture

Most results-based approaches to date have been implemented in social sectors, such as health and education, whereas there are few approaches in agriculture. There are two basic differences between the agricultural and social sectors that have to be considered. First, agriculture is a productive sector. Hence, market forces and private actors play a much more important role in agriculture. Services in the education and health sectors are predominantly provided and/or financed by the government. The government is also involved in the agricultural sector through, for example, research and extension services, but development very much depends on the decisions of millions of farmers and enterprises.

Second, Masters and Delbecq (2008) point out that there is no silver bullet in agriculture to achieve productivity growth. Instead, farmers and enterprises use a variety of locally adapted innovations. The value of agricultural innovations in a specific context is often hard to predict, as it depends on a variety of biological, physical and social factors. For

example, a funder may think that a certain innovation, such as disease-resistant or drought-tolerant varieties, is important, but whether or not the innovation generates the expected returns remains unknown until it is observable at the farm level. In practice, the adoption of innovations, although beneficial in theory, often fails due to a variety of factors, such as a lack of access to credit, inputs, labour and information, small farm sizes, insufficient human capital and poor transport infrastructure (Feder, Just, & Zilberman, 1985).

In addition to these basic differences between the agricultural and social sectors, the agricultural sector poses two main challenges for implementing results-based approaches. First, agricultural opportunities and constraints are highly context-specific and inter-dependencies between rural worlds have to be taken into account when deciding on incentive structures. Second, key results in agriculture, such as higher yields and incomes, are influenced by a variety of external factors and subject to high measurement errors.

Diversity of agricultural systems and interdependencies between rural worlds

Results-based approaches are easiest to implement if there is a good understanding of the results chain and an explicit theory of change for setting appropriate incentives. Typically, these approaches work well when there is a clear link between the intervention and desired development outcome. For instance, more students graduating school leads to more educated and larger populations, and increased numbers of vaccinations make people healthier. Without underestimating the challenges of designing good education and health programmes, results-based approaches in these sectors can be straightforward.

Rural and agricultural systems and dynamics are highly complex and diverse, depending on agro-ecological conditions as well as local socio-economic and market situations, for instance. Especially in the poorest countries, the majority of the poor work in the agricultural sector. To address the needs of the rural population, results-based approaches need to account for the complexity of rural and agricultural systems. Designing results-based approaches needs to be based on an understanding of the place of agriculture in the rural economy and in people's livelihood strategies. Such an understanding often involves identifying the target groups of agricultural policies and programmes – the farm households and those households indirectly depending on agriculture – which matters for the kinds of incentives, support, regulation and technologies needed. The OECD (2006) has suggested distinguishing between five types of rural livelihoods, the so-called Five Rural Worlds, which are characterised by individual needs and development pathways:

- Rural World 1 – large-scale commercial agricultural households and enterprises
- Rural World 2 – traditional agricultural households and enterprises, not internationally competitive
- Rural World 3 – subsistence agricultural households and micro-enterprises
- Rural World 4 – landless rural households and micro-enterprises
- Rural World 5 – chronically poor rural households, many no longer economically active

The Five Rural Worlds model provides a useful analytical framework because it considers poverty-relevant groups (Rural Worlds 2 to 5) and at the same time explicitly acknowledges the role that large-scale farms and enterprises can play in the growth

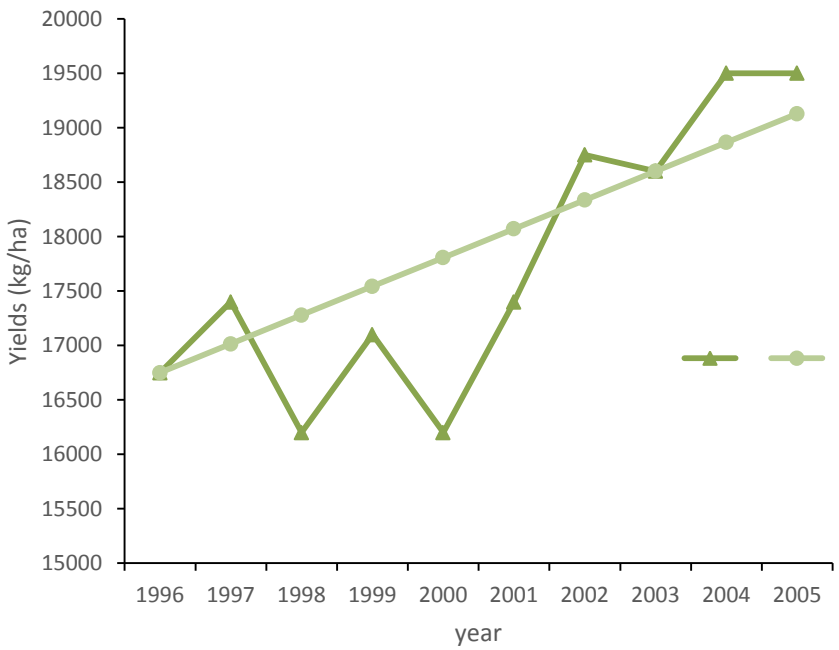
process (Rural World 1). We use the model as a tool to reflect on the extent to which different results-based approaches can impact rural dynamics, and to identify how targeting of one rural group can improve or impair the livelihoods of others, for instance.

The Rural World categories can partially overlap and are not applied as a strict framework. A particular focus can be placed on Rural Worlds 4 and 5, the landless rural households, micro-enterprises and the chronically poor households, who often live in precarious living conditions and are in great need of support.

External influencing factors and measurement errors

Indicators that measure changes in total production levels (crop, livestock, fish), yields as a ratio of production to area cultivated or smallholder income from agricultural production are the most obvious outcome indicators of agricultural development programmes (Global Donor Platform for Rural Development, 2008). These, however, are highly variable over time and subject to a variety of external factors such as climate variability and changes in world market prices. Rainfall, or the lack of it, has a particularly strong influence on production and, consequently, yields can vary considerably from one year to the next, especially in non-irrigated conditions, which are prevalent in sub-Saharan Africa (Global Donor Platform for Rural Development, 2008; New Partnership for Africa's Development, 2003). Due to global warming, it is expected that variability in production will increase and that crop failure and livestock death, which already impose high economic losses in parts of sub-Saharan Africa, will get even more severe in the future (World Bank, 2008). Due to the high variability in production, the Global Donor Platform for Rural Development (2008) states that it can take several years, in some cases seven or eight, until trends in yield levels can be detected (see also Figure 1).

Figure 1: Detecting a trend in maize yields



Source: Global Donor Platform for Rural Development (2008, p. 28)

In addition, measurement errors of key outcome indicators in agriculture, such as yields, gross margins and smallholder incomes, tend to be particularly high in developing countries with large populations of smallholders (Fermont & Benson, 2011). Among the diverse problems when measuring smallholder crop areas, production and crop value are ill-defined or even non-existent plot boundaries, intercropping, irregular planting density, non-standardised measurement units (e.g. bunch or pieces), a high share of subsistence production and significant post-harvest losses (Carletto, Jolliffe, & Banerjee, 2013; Fermont & Benson, 2011; Global Donor Platform for Rural Development, 2008).

3 Lessons from implementing results-based programmes

In analysing results-based approaches, several lessons can be deduced from experiences with implementing results-based approaches in other sectors. Most experience with results-based approaches exists in social sectors such as health (Grittner, 2013) and education (Holzapfel & Janus, 2015). While acknowledging differences between sectors, a number of lessons from previous research on results-based approaches are transferable to the agricultural sector. These lessons can be grouped in three categories: 1) selecting the results, 2) setting up payment, measurement and verification processes and 3) supporting the incentivised actor.

3.1 Selecting the results

When selecting the results, several decisions have to be taken. A first critical consideration is that results should be chosen in the most consultative and participatory manner. Otherwise, the identified results are at risk of having little relevance and appeal to the incentivised actor. To comply with the criterion of ownership, results should always be based on a country's own development strategy and priorities (Janus, 2014, p. 5; Pearson, 2011, p. 8). Second, implementation partners have to choose the level at which results are measured. Both outcome- and output-level indicators have their respective advantages and disadvantages. These should be discussed and carefully assessed by all involved actors within the context of the programme.

Outcome-level indicators encourage innovation and are more appropriate under conditions of complexity because they only specify the result but not the way to achieve it (O'Brien & Kanbur, 2014). When outcome-level changes are rewarded (e.g. higher yields or reduced soil erosion), the incentivised actor has the freedom to decide how to achieve the desired outcome and is motivated to identify the most innovative and cost-effective way. As pointed out above, the agricultural sector is highly complex, and it is often not clear a priori which agricultural innovation is the most useful in a given context. Linking payments to outcome indicators therefore has clear advantages and leaves room for experimentation (Birdsall et al., 2011, p. 25).

At the same time, outcome-level indicators imply a high risk because of external factors influencing the outcome and the limited degree of control of incentivised agents over these factors (Holzapfel & Janus, 2015, pp. 8–9). Especially in agriculture, climate conditions may have an unpredictable influence on success or failure in achieving results. Moreover,

it often takes several years until undertaken actions lead to measurable changes in outcome indicators (Angelsen, 2016, p. 10; Global Donor Platform for Rural Development, 2008). If the agreed result can only be influenced by the actor to a limited extent, two unintended scenarios may occur. In the first scenario, the actor undertakes strong efforts to improve the agreed measure, but there are external factors that negatively influence the result and efforts of the actor are not sufficiently rewarded. To avoid discouragement of the incentivised actor, a risk premium should be paid. In the second scenario, the actor is rewarded, although no additional efforts have been undertaken and only positive external influences were responsible for achieving the result (Clist & Verschoor, 2014, p. 7). In this case, the results-based approach has not incentivised any additional results and represents a lump-sum benefit for the incentivised actor.

Considering the conditions outlined above, outcome-level indicators should only be used if two conditions are fulfilled. First, the actor should still have a reasonable degree of influence over the result. Second, since it may take a significant amount of time until efforts translate into measureable changes in outcome indicators, the programme timeframe must be reasonably long. Moreover, it should be considered to use rigorous impact-evaluation methods, which control for external factors and allow the attribution of results to a programme.

Activity indicators (e.g. participation in a training programme) and output indicators (e.g. solar irrigation pumps installed or number of trees planted) have the advantage that incentivised actors have a greater level of control over achieving the agreed results. Only if results are attributable, it is guaranteed that efforts will be adequately compensated ex-post, which also implies strong incentives for the actor to invest. However, activity and output indicators have the disadvantage that the incentivised actor is more tied to a certain pathway of implementation, which may not be the most efficient and sustainable one (Holzapfel & Janus, 2015, p. 8). Therefore, activity and output indicators should only be used if there is a strong evidence base that the pre-defined activities or outputs lead to the desired outcomes or impacts. If the results chain is uncertain, then outcome-level indicators are preferable.

3.2 Setting up payments, measurement and verification processes

Determining the precise payment, measurement and verification processes is another set of challenges. To calculate payments, one approach is to cover the total costs of an agreed activity or a result, and another approach is to pay a bonus or to only cover a certain percentage of costs. If payments are only a proportion of costs, they effectively act as a subsidy or a price incentive.

In addition to the payment amounts, different options exist regarding the payment structure. Payments could either be scaled in proportion to performance or conditional on achieving a threshold level (Gelb & Hashmi, 2014, p. 12). Proportional payments are only possible if continuous variables are used as a measure of success (e.g. number of trees planted). If success is phrased as a yes/no question (e.g. reform plan was drafted/not drafted), fixed-sum payments are made. Whether payments are incremental or fixed has an influence on the effectiveness of incentives. When payment rewards incremental progress,

relatively stable incentives are provided.[3] In comparison to scale-based payments, indicators that are threshold-based provide high incentives for performance at the margin but low incentives if the threshold is set too low or too high (i.e. the threshold can be achieved with minimum effort or achievement seems unlikely) (Gelb & Hashmi, 2014, p. 15).

A key requirement for setting the right incentives is that results are easily measurable and that data quality is high. Ideally, in line with the aid effectiveness agenda, monitoring and reporting structures should, as much as possible, build on existing structures within a country and not build up parallel structures. For funders to engage in a results-based approach, it is important to know that they only pay for "true" results. Incentivised actors, on the other hand, need to be convinced that measurement and compensation of their efforts is fair and transparent. Consequently, independent verification of results is key to ensure fair conditions, and organisations have to be identified that are capable of collecting, monitoring and verifying the data (Cambridge Economic Policy Associates & Euroconsult Mott MacDonald, 2014, p. 16). In many contexts, the verifier plays a crucial role in mediating between funders and incentivised actors. Therefore, verifiers need to possess technical expertise on the one hand and the ability to deal with conflicting interests on the other hand.

3.3 Supporting the incentivised actor

When planning results-based programmes, a decision also has to be made on the level of donor engagement in planning, implementing and monitoring and on the provision of technical assistance (Keijzer & Janus, 2014, p. 5). Payments in results-based approaches are only made after pre-defined results have been delivered. This implies that a results-based approach should only be implemented if the incentivised actor – for example partner country government, private actor or non-governmental organisation (NGO) – has the capacity to achieve results, is able to pre-finance the necessary investments and has the ability to cope with the risk of non-payment.[4] These conditions are, however, often not fulfilled, and therefore most results-based programmes provide access to finance and/or technical assistance before and during implementation. Providing support to the incentivised actor can occur in the form of pre-financing and/or capacity development support, especially for facilitating the starting phase of an intervention.

Funders have the option of taking a "hands-off" or a "hands-on" approach. Under the "hands-off" approach, funders do not engage in the planning or implementation process. This implies that the incentivised actor is fully responsible for achieving results and is given the freedom to decide independently on the strategies and approaches needed.

Under a more "hands-on approach", the funder chooses to play a more active role in the planning and implementation process. For example, the funder could provide advice on the results framework of a programme, offer technical assistance during implementation

3 It does, however, become more difficult to deliver results once a certain amount of progress has been made (diminishing returns). This could be reflected by successively increasing the amount of payment per unit. Such a phased approach for successively adjusting payments per unit can help in avoiding performance plateaus.

4 Development impact bonds offer a crucial advantage here because programmes are pre-financed by private investors.

and actively monitor not only the agreed results but also other activities undertaken by the incentivised actor to achieve results. Such an approach can be beneficial when funders possess key knowledge that implementers need or when implementers strongly rely on external technical support. Yet, Keijzer and Janus (2014, p. 5) argue that responsibilities could become blurred when the funder takes a more active role. The danger is that it may not be clear who should take responsibility in case of missed results and non-payments.

In reality, most results-based programmes are somewhere in the middle of a spectrum ranging from "hands-off" to "hands-on". In addition, RBF programmes, including DIBs, place most of the responsibility on service providers, whose capacity is often more straightforward to assess than the capacity of governments. Considering that most programmes in the agricultural sector are early pilots, there is a natural tendency of funders to be strongly engaged in implementation. Yet, most implementing organisations of results-based approaches already report that they value the comparatively high degree of autonomy and flexibility in implementing results-based approaches compared to traditional ways of development finance (Gelb, Diofasi, & Postel, 2016).

In general, it is also possible to transition from phases of stronger support from funders – especially in the start-up phase – towards a more hands-off approach in the longer-term that strengthens the autonomy of the implementers. The key for analysing a results-based programme is therefore to closely monitor the demand for support as well as the type of support provided over the implementation cycle and, if necessary, adapt results-based programmes.

4 Overview of results-based approaches in agriculture, rural development and food security

It is still an open question whether results-based approaches can be a suitable modality for achieving the SDGs (Janus & Klingebiel, 2016) and whether there is potential for scaling-up the existing portfolio of pilot programmes. The subsequent analysis therefore has two objectives. First, we aim to contribute to the emerging literature on practical experiences with results-based approaches and, second, to identify challenges and opportunities specific to the agricultural sector. Through such an analysis, it can be assessed how results-based approaches can be better adopted in the agricultural sector and what their potential is to contribute to achieving SDG 2 and related SDGs, such as those concerning water, health and poverty.

To identify suitable programmes for this study, we reviewed the existing literature and the portfolios of different development agencies. The most important criterion for the selection of cases was the type of results-based approach (RBA, RBF, DIB), with one of each type being represented, in order to describe the wide range of options in implementing results-based approaches. The second criterion was that the programmes are being implemented already in order to highlight practical experiences in contrast to theoretical models. Third, we also took into account the amount of information available on pilot projects and the degree of innovation. We found that although a significant amount of conceptual work on results-based approaches in agriculture exists, there are actually very few pilots that are being implemented already.

To date, there is only one RBA programme (the World Bank Programme for Results in Rwanda) and one DIB (in support of indigenous livelihoods and the protection of rainforests in Peru) that are already being implemented in the agricultural sector.[5] Both were selected as case studies for this paper. In the area of RBF, we were able to identify a results-based extension services programme in the Democratic Republic of the Congo, implemented by CordAid, and several pilot programmes under the AgResults Initiative. Due to a lack of information on the programme in the Democratic Republic of the Congo and the innovativeness of the AgResults approach, we chose one of the first AgResults pilot programmes, the Zambia Biofortified Maize pilot. AgResults engages the private sector to incentivise the adoption of agricultural innovations that improve food and nutrition security, health and smallholder incomes. Finally, we excluded pilot programmes from consideration that were not primarily targeting improved agricultural productivity or food and nutrition security. For instance, payment for environmental services programmes (Engel, Pagiola, & Wunder, 2008), although closely linked to the agricultural sector, were excluded because they primarily aim at conservation.

An overview of the different programmes chosen is given in Table 1. The table details the respective type and model of the results-based approach and describes the funders, the incentivised actors and the focus of the interventions.

Table 1: Results-based programmes to promote agriculture and food security

Type of results-based approach	Specific model	Example	Funders	Incentivised actor	Focus
Results-based aid	Program-for-Results (PforR)	**Rwanda** agricultural sector reform - USD 144 m - 2013–2016	World Bank Department for International Development (DFID)	partner country government (Rwanda / Ministry of Agriculture)	country-wide agricultural sector reform with results-based payments
Results-based finance	pull-mechanisms in development finance AgResults initiative	**Zambia** Biofortified maize - USD 7 m - 2012–2019	Australia, Canada, UK, US, Bill and Melinda Gates Foundation	private sector companies (Zambian millers and seed companies)	introducing pro-vitamin A enriched “orange maize” in Zambia to fight vitamin A deficiency
Development impact bond	social impact investing	**Peru** smallholder coffee/cocoa farmers - USD 110,000 - 2014–2015	Common Fund for Commodities (CFC) Schmidt Family Foundation	Schmidt Family Foundation	strengthening cocoa and coffee production of Asháninka families

Source: Authors

5 Another DIB for reducing sleeping sickness in Uganda by treating cattle is still at the inception stage (DFID, 2016a).

The following section assesses and compares the three different pilot programmes selected as case studies for this paper. In analysing the three programmes, attention is placed on the extent to which each programme addresses the categories outlined in Chapter 3, such as the choice of the results, the payment function, measurements, verification process, capacity of implementation partners and forms of support by the funder. In addition, a particular focus is placed on the challenges related to external factors influencing outcomes in agriculture, such as climate variability, as well as on how programmes deal with measurement errors and rural complexities. In terms of opportunities, the main interest lies in determining the level of innovation featured in these approaches and their potential for broader application.

4.1 Program-for-Results – Rwanda

The World Bank's PforR financing instrument "Transformation of Agriculture Sector Phase 3" in Rwanda is the first PforR in agriculture (USD 100 million loan). It can be classified as RBA, where the donor is the World Bank and the incentivised actor is the government of Rwanda, more specifically the Rwandan Ministry of Agriculture and Animal Resources (MINAGRI). The programme supports the implementation of the third phase of a broader national sector reform, the Third Strategic Plan for the Transformation of Agriculture (PSTA III). The overall objective of the PforR is "to increase and intensify the productivity of the Rwandan agricultural and livestock sectors and expand the development of value chains" (World Bank, 2014b, p. vii).

The PforR supports the national sector reform in agriculture, which is divided into four programme areas and 24 sub-projects (World Bank, 2014a). It selects seven key "drivers of growth" out of the national reform, which are used as disbursement-linked indicators (DLIs).[6] The World Bank finances up to USD 100 million through the PforR and the total costs of the overall reform are estimated at USD 1.2 billion (World Bank, 2014b, p. 25). An additional USD 44 million[7] is financed by the UK's DFID and channelled into the World Bank's PforR over four years (2014–2018) (DFID, 2016b).

4.1.1 What are the selected results?

The World Bank programme mirrors the complexity of the government's PSTA III. Based on PSTA III, the World Bank has created a results framework for the PforR programme. The results framework contains 14 indicators, out of which seven are DLIs. The other indicators are called "core indicators", which are considered in the overall programme progress but are not directly linked to disbursements.

Only one of the seven DLIs is an outcome indicator (see Table 2 below). DLI 3 measures average productivity levels (yields) of cassava, coffee and milk and accounts for 15 per cent of overall disbursements, reflecting a rather careful approach towards outcome

6 The seven drivers are: agriculture and animal resource intensification (soil conservation and land husbandry, irrigation and water management, livestock development), research and technology transfer, advisory services and professionalisation of farmers (research and technology transfer, extension services for producers), value chain development and private sector investment (agricultural finance).

7 The original amount is GBP 34 million and has been converted into US dollars for this study.

orientation. For all DLIs, disbursements are made proportional up to 75 per cent of the target level. Once the target is achieved to 75 per cent or more, the full amount of payments will be released. Such an incentive structure rewards strong results while also allowing for the option of partial failure (Gelb et al., 2016). For DLI 3 there is a further special provision. In case either crop or yield insurance payouts are made during the year for these crops, the target achievement is lowered to 40 per cent (World Bank, 2014a).

As outlined above, agricultural yields are subject to high measurement errors, and often there is a time lag until the effects of policies and technologies introduced lead to a measurable increase in average yields. Yield increases are outcomes over which there is limited control in the short-term. Although several of the sub-projects that are part of the PSTA III can be expected to have a significant impact on yields, it may take several years until these effects are realised and translate into measurable increases in outcome indicators. Increases in yields that are detected in the short-term are more likely to be a result of earlier efforts than a direct effect of activities that are part of the PforR. Moreover, in Rwanda, rain-fed agriculture is dominant and only 7.2 per cent of the cultivated area is irrigated using formal or informal water-control practices (Svendsen, Ewing, & Msangi, 2009), which implies a high variability in yields, depending on rainfall.

The indicators on soil erosion protection (DLI 1), irrigated land (DLI 2) and technology adoption (DLI 4) measure key outputs that contribute to achieve the development objective of the programme (increase and intensify agricultural productivity and expand the development of value chains). They are also relatively easy to measure and verify.

The indicator measuring agricultural finance (DLI 5) could be improved. The agricultural finance indicator is used as a proxy for "competitive and private sector-driven value chain development and expanded commercialization of production for domestic and export markets" (World Bank, 2014b, p. 64). First, agricultural financing is only one of the potential means of implementation contributing to the objective. An indicator that captures the desired outcome more directly (e.g. indices of agricultural commercialization) would be more suitable. The results framework indicators "increased % of agricultural production marketed" and "increased value (total production and exports) of major competitive value chains" – both would capture the objective more directly. Further, increasing private finance to the agricultural sector and improving private sector engagement is not purely within the control of MINAGRI. Setting such results, therefore, might set the ministry up for failure. Finally, measuring such results and attributing them to the PforR is extremely challenging.

The remaining two indicators measure activities that are expected to be essential for ensuring the smooth operation of the programme and for achieving results. DLI 6 measures improvements in the Management Information System (MIS), which is important to monitor the programme and contribute to minimising risks. The MIS is also expected to contribute to enhanced evidence-based decision making and to a more efficient and effective allocation and management of expenditure priorities. DLI 7 measures approval, preparation and implementation of agricultural reforms in key areas (seeds, fertiliser, agricultural finance), which are expected to lay the foundations for sustainable agricultural growth. Yet, the provision of reaching 75 per cent of the target also applies to these indicators, and it is unclear what 75 per cent of an MIS system (DLI 6) or seed policy (DLI 7) looks like (Gelb et al., 2016).

Table 2: PforR agriculture Rwanda – indicative list of results and DLIs (2013/14 – 2015/16)	
Result (USD amount)	**Disbursement-linked indicator** **(Baseline and targets – figures refer to cumulative amounts)**
1) Increased soil erosion control (20 million)	**DLI 1** Annual increases in terraced land area (progressive and radical), based on agreed technical standards (figures are cumulative) (ha = hectare) • Baseline 2012: 802,292 ha (progressive); 46,246 ha (radical) • Target by end of 2015: 903,240 ha (progressive); 69,640 ha (radical)
2) Increased area under irrigation and adequately maintained (10 million)	**DLI 2** Annual increases of irrigated area (ha) in marshlands and hillsides, based on agreed technical standards, with adequate operations & maintenance (figures are cumulative) • Baseline 2012: 3,075 ha hillsides; 24,721 ha marshlands • Target by end of 2015: 6,075 ha hillsides; 30,121 ha marshlands
3) Increased average productivity levels of major food and export crops and livestock (15 million)	**DLI 3** Increases in average crop yields per ha for key food and export crops and livestock (dairy) (MT = metric tonne) (kg = kilogramme) (l = litre) • Cassava: baseline 2012: 15 MT/ha Target for 2015: 18 MT/ha • Coffee: baseline 2012: 2.2 kg of cherry per tree per year Target for 2015: 2.7 kg of cherries per tree per year • Milk per cow: baseline 2012: 4 l/day: Target for 2015: 5.5 l/day
4) **Improved generation and adoption of agriculture technologies, sensitive to agro-ecological potential, farmers' needs and market prospects** (15 million)	**DLI 4** No. of innovation technologies introduced, released and adopted by farmers • Baseline 2012: 5 technologies Target by end of 2014/15: 10 additional innovation technologies (adoption rates for the 3 years: 25%, 40% and 50%, respectively)
5) Increase in agricultural finance lending for agri-cultural sector (including production, agro-traders, and agro-processing) (10 million)	**DLI 5** Percentage increase in agricultural finance available of total finance • Baseline 2012: 3.6% Target by end of 2015: 7.0%
6) Strengthened gender-sensitive MINAGRI agricultural sector MIS, including its operationalisation and utilisation (10 million)	**DLI 6** Enhanced gender-sensitive MIS framework/ action plan for agricultural sector completed, approved, initiated and fully operational • Baseline 2012: draft monitoring and evaluation framework (fragmented and partial) Target 2015: enhanced MIS for agricultural sector and action plan completed, approved, fully operational and utilised (with periodic reports disseminated)
7) Enhanced operational policy environment for enabling rapid and sustainable agriculture growth (20 million)	**DLI 7** Approval of seeds, fertiliser and agricultural finance policy, preparation and initial implementation of action plan (based on agreed milestones) • Seeds: baseline 2012: draft of policy exists Target by mid-2015/16: seeds policy approved, action plan prepared and initiated • Fertiliser: baseline 2012: draft of policy exists Target by mid-2014/15: policy approved and action plan prepared (end 2014) and initiated (by mid-2015) • Agricultural finance: baseline 2012: none exists Target by end-2015/16: approved and action plan prepared and initiated (by mid-2016)
Source: World Bank (2014a)	

4.1.2 How are payment, measurement and verification processes organised?

Country systems are used to produce data on indicators as well as for verification. MINAGRI is responsible for gathering data on DLIs, whereas the prime minister's office (PMO) is in charge of the verification process. Once the PMO has confirmed the results, MINAGRI presents a report to the World Bank, at which time disbursements are triggered. The funds are directly allocated to the government of Rwanda's national budget, and can therefore be part of the national budget planning process, in a similar way to how sector-budget support is organised.

The PMO[8] is part of the government of Rwanda, which renders the verification only semi-independently. A fully independent verification mechanism is more robust because otherwise political interests can influence verification more easily. However, the World Bank argues that conducting the verification is in line with the PMO's institutional mandates, including promoting the economy, efficiency and effectiveness of the use of public resources. On a technical level, the World Bank states that the PMO has the required technical and financial capacities to carry out this verification task, and that it could contract the services of specialised technical assistance entities to provide technical support in the independent assessment of the DLIs.

In addition, the World Bank (2014b, p. 25) assesses the current overall national monitoring and evaluation system as being sufficient to report and verify data on the DLIs. At the same time, several constraints of the monitoring and evaluation system were identified by the World Bank, which questions the ability of the ministry to produce reliable and timely data. These are: (i) a fragmented MIS system and a lack of harmonisation among MINAGRI-implementing agencies providing data, (ii) MINAGRI indicators do not relate to the governments sector reform plan PSTA III, (iii) formats used by different reporting entities are not harmonised and are oversimplified, and (iv) there are capacity and budget constraints (World Bank, 2014b, p. 68).

Overall, the PforR channels funds into the government system and strongly relies on the system for verifying results. Such an embrace of government systems is a precondition for sustainability. However, relying strongly on government systems also brings challenges. For instance, there can be delays in channelling funds from the national budget to MINAGRI, and the system that collects administrative data making disbursements decisions could be improved. An independent verification entity would further strengthen the design of this programme.

4.1.3 What support is provided?

The World Bank's PforR instrument includes provisions to provide advance financing. If a government requires advances to finance the activities needed to achieve results, the

8 The prime minister's office has three main tasks: it is in charge of (i) performing ex-ante site visits and field survey measurements and assessments; (ii) confirming that specified achievements have been completed based on relevant documentation and standards specified in the verification protocol (i.e. policy work, monitoring and evaluation reports); and (iii) for providing independent technical verification of the yield statistics of national averages, for the baseline period and for figures generated (World Bank, 2014b, p. 26).

World Bank can provide up to 25 per cent of total PforR financing as an advance on one or several DLIs that have not yet been met. The advance is deducted as soon as the DLIs have been met. Then, it is possible to apply for a new round of advances (revolving advances) to finance activities to achieve results expected later in the programme (World Bank, 2012, pp. 38–39).

A lack of funds is less of a problem if a PforR is implemented as part of existing programmes that are financed by the national budget and by other development partners than if it supports the start-up of a new programme (World Bank, 2012, pp. 38–39). Nevertheless, there may be additional needs for financing in case of budget constraints, and in particular in low-income and fragile or conflict-affected countries. This is also the case for the PforR in Rwanda, which supports the implementation of the third phase of the PSTA. Although there are funds in the national budget to finance the PSTA III, the government applied for an advance of 5 per cent to cover financing gaps. In addition, it was agreed that 25 per cent of the budget was to be disbursed before the agreement was signed (prior results) (World Bank, 2014b, pp. 23–24). This is the maximum that can be disbursed before the programme start.

For all PforR programmes, the World Bank carries out integrated risk assessments (including technical, fiduciary, and environmental and social systems assessments) to identify measures to build capacity and mitigate key risks. The key measures are then compiled into a Programme Action Plan. The World Bank technical assessment report (2014b, p. 158) for the PforR in Rwanda mentions capacity gaps at the level of the implementing agencies and the district level that may hinder successful programme implementation. To overcome this gap, the World Bank provides implementation support as part of the PforR (World Bank, 2014b, p. 160). In addition, DFID provides technical assistance to support the Programme Action Plan and to strengthen capacities in MINAGRI. Implementation support is mainly aimed at realising the full potential of the results-based incentive system and focuses on resolving implementation problems, monitoring, risks management and capacity-building for the MIS (World Bank, 2014b, p. 158).

4.1.4 What are the opportunities and challenges?

The PforR finances a significant share of Rwanda's spending in the agricultural sector. The budget of the PSTA III is USD 1.2 billion, out of which USD 100 million is financed by the World Bank and USD 44 million by DFID. Apart from the European Union, the World Bank and DFID are the only donors in the agricultural sector providing sector-budget support, meaning that funds are directly channelled to the Ministry of Finance and are therefore part of the government's regular budget. Compared to project aid, which is closely linked to direct expenditures outside the government's regular budget, Rwanda prefers this aid modality (Swedlund, 2013, p. 364).

So far, the disbursement reports indicate that all results have been achieved, triggering full disbursements. In addition, some of the targets have been revised upwards, meaning that the programme managers decided to become even more ambitious. Therefore, Rwanda is very capable of using the instrument towards improving results as well as mobilising donor finance. Climate variability also does not seem to have affected the results in any way so far, although the country has been experiencing a severe drought in 2016

("Rwanda's longest drought", 2016). The provisions in the programme design for the case of extreme weather events (triggered by crop insurance payouts) have not been prompted, and despite the drought in the eastern province, Rwanda will also receive full disbursements for the yield indicators in 2016.

As the PforR funds the government's nation-wide reform of the agricultural sector, it affects 7.5 million farmers, 80 per cent of whom are subsistence farmers (World Bank, 2014a). The effects of the programme therefore cut across the Five Rural Worlds, affecting large-scale commercial enterprises, traditional households, subsistence households, landless rural households and the chronically poor. Using the export crop coffee as well as the food crop cassava as yield indicators is an expression of this cross-cutting approach of the programme.

Several researchers argue that Rwandan "green revolution" reforms largely benefit medium and large farmers, who are capable of engaging in capital-intensive agricultural techniques, while disadvantaging the poorest (Cioffo, Ansoms, & Murison, 2016; Dawson, Martin, & Sikor, 2016). As to how far the PforR fits into this pattern, it is still an open question. It can be said that there are no specific provisions in the PforR to target particular groups of farmers. In theory, however, the PforR instrument could be used to target specific groups of farmers more directly, for instance through exploring synergies with Rwanda's home-grown social protection and poverty classification system "Ubudehe". Ubudehe analyses a household's or citizen's situation and places them in one of four categories defined by a set of criteria, from the poorest category (without land, facing difficulties finding food) to richer people (Niringiye & Ayebale, 2012). Ubudehe shows similarities to the Five Rural Worlds concept, and both could be used to finds ways of adapting agricultural policies in Rwanda towards a stronger pro-poor focus.

Finally, the PforR in Rwanda has to be analysed against the background of a strongly performing government with a capable bureaucracy and existing results-orientation (Booth & Golooba-Mutebi, 2012). Although the PforR in Rwanda demonstrates the potential of RBA as an aid modality that combines programmatic support with a focus on results, it is less clear that the approach would also work in countries with lower capacity.

4.2 AgResults – Zambia

AgResults is a multi-country RBF programme that is funded by several donor organisations and countries, including Australia, Canada, the United Kingdom, the United States, the World Bank and the Bill & Melinda Gates Foundation (AgResults Secretariat, 2015). The overall volume is USD 118 million, and the main idea is to incentivise and reward agricultural innovations through "pull mechanisms" (Elliott, 2010; Masters, 2003). Pull mechanisms allow donors to stimulate demand for new technologies and can be a useful complement to traditional "push mechanisms", whereby donors directly fund the supply of research or agricultural inputs. The advantage of pull mechanisms is that they facilitate private sector engagement in agricultural research and development, and that donors only pay for specified outcomes that have been delivered and adopted (Elliott, 2010).

The objectives of AgResults are to "1) overcome market failures impeding agricultural innovations by offering results-based economic incentives ('pull' financing) to competing

private actors for the uptake of new agricultural technologies; and to 2) test the effectiveness and efficiency of pull financing in comparison with traditional approaches to the promotion and uptake of innovative agricultural technologies" (AgResults Secretariat, 2015, p. 1). The implementation of AgResults is overseen by a steering committee comprised of the five donor agencies and the World Bank, which acts as a trustee. Deloitte consulting operates the AgResults Secretariat, which designs and manages the pilot projects. There are six AgResults pilots at different stages of implementation. They focus on aflatoxin reduction in Nigeria, improved on-farm storage in Kenya, the creation of a sustainable, nation-wide market for biofortified maize in Zambia, emissions reduction in Vietnam, development of a legume seeds market in Uganda, and research and development of a vaccine for the livestock disease Brucellosis.

In Zambia, the maize pilot supports the rollout of provitamin A (PVA) maize by stimulating the market for the new hybrid varieties of biofortified maize through incentives aimed at industrial millers and seed companies. In the detailed presentation of the AgResults RBF programme, the focus is placed on the Zambia pilot.

4.2.1 What are the selected results?

The Zambia Biofortified Maize pilot is a five-year, USD 7 million project for supporting the introduction of biofortified PVA maize into commercial rural and urban markets through incentive prizes for seed and milling companies (AgResults, 2016b). Maize biofortification is a low-cost method to combat vitamin A deficiencies, which lead to up to 250,000 child deaths annually in Africa. In Zambia, vitamin A deficiency rates can be as high as 31 per cent in children and 21 per cent in women (AgResults Secretariat, 2014c).

The AgResults pilot aims to increase both the supply and demand of PVA maize. To increase supply, incentives are set for seed companies to produce, promote and sell maize seeds to farmers. To increase demand, millers are incentivised to purchase maize from farmers and increase the amount of milled maize meal sold to consumers (AgResults Secretariat, 2016).

The incentivised results are the amount of PVA maize seed and milled PVA maize meal sold by seed companies and millers, which can be classified as a short-term outcome. The AgResults Secretariat (2014c) expects that by year four, millers will sell 67,000 metric tonnes (MT) of PVA maize meal annually to consumers. Consumers are expected to receive an additional 124 µg of vitamin A per day, which is 24 per cent of the average requirement. Increased intake of vitamin A is anticipated to lead to improved long-term health outcomes and longer economic productivity per capita among consumers (impacts).

4.2.2 How are payment, measurement and verification processes organised?

Separate grant payments are organised for millers and seed companies.

Commercial millers

The payouts and thresholds are detailed in Table 3 in a simplified manner that only lists the minimum thresholds and maximum ceilings. The programme is implemented in two stages.

Table 3: Commercial millers and biofortified PVA maize meal sales thresholds and payouts				
	1st stage: marketing and sales plan competition	2nd stage: thresholds and per-unit sales prize		
Year	Launch (September 2013 – February 2015)	Grant period 1 (2015/2017)	Grant period 2 (2017/2018)	Grant period 1 (2018/2019)
Performance threshold (indicator)	Selected marketing and sales plans	250 MT in individual sales (Max: 6,000 MT)	500 MT in individual sales (Max: 9,000 MT)	750 MT in individual sales (Max: 12,000 MT)
Payout 1: base threshold payment	-	USD 6,225 (Max: USD 182,245)	USD 14,970 (Max: USD 232,265)	USD 22,470 (Max USD 294,765)
Payout 2: per unit payment (USD/MT)	USD 50,000 per miller (four millers)	USD 25 per MT (Max: USD 80)	USD 30 per MT (Max: USD 70)	USD 30 per MT (Max: USD 70)
Source: Own compilation based on AgResults (2016b); AgResults Secretariat (2014b); expert interviews				

The first stage was the marketing and sales plan competition (September 2013 – February 2015), in which interested millers were asked to submit a plan laying out how they would successfully source, produce, market and sell biofortified PVA maize meal. This stage was completed in February 2015, and four millers were awarded USD 50,000 each to cover the initial costs of implementing their business plans.

In phase two (April 1, 2015 – March 31, 2019), any miller in Zambia can participate, provided that a minimum milling capacity of 45 MT per day outside of the Lusaka metropolitan area and 90 MT inside the Lusaka metropolitan area is met.[9] Once they have reached a minimum threshold MT of maize meal sold during a one-year sales period (after harvest until the next harvest), all millers are eligible to receive a payout consisting of two parts: (i) base threshold payment and (ii) a per unit prize payment. The base threshold payment corresponds to one of the six prize threshold ranges, and there is a respective per unit payment for each threshold range.[10] This design is chosen to incentivise millers to increase the amount of PVA maize meal sold.

9 The lower milling capacity required outside of Lusaka is chosen to reflect the reduced consumption capacity in less-populated areas (AgResults, 2016b).

10 To simplify the presentation, we only provide minimum thresholds and ceilings. The six different threshold ranges all correspond to different threshold payments and per unit payments, and are different for each of the three grant periods. As an example of a typical payment, we imagine a miller during grant period one. The first threshold range for grant period one is 250–499 MT, with a corresponding base threshold payment of USD 6,225 and a per unit payment of USD 25 per MT. If a miller sold 300 MT in grant period one, he would receive USD 6,225 (base threshold payment) plus USD 7,000 (USD 25*300 – per unit payment).

Seed companies

The payouts and thresholds are detailed in Table 4 in a simplified manner, only listing the minimum thresholds and maximum ceilings. The programme is implemented in two sales periods, and there are five threshold ranges. In each sales period, seed companies will be eligible to receive grant payments if they exceed the defined sales thresholds for a given sales period. Similar to the payment structure for millers, the grant payment will be calculated as (i) a base threshold payment (i.e. a fixed amount payable based on the total sales threshold reached) and (ii) an additional unit payment for each metric tonne of the PVA seed sold above the applicable sales threshold.[11]

Incentives to seed companies are provided to ensure that a higher amount of PVA maize seeds are sold to farmers, and ultimately that a sufficient amount of PVA maize can be procured by commercial millers. In addition, increasing the amount of PVA maize planted by farmers can contribute towards decreasing the prevalence of vitamin A deficiency among farm households. The majority of maize produced in Zambia is home-consumed, and Lividini and Fiedler (2015) show that cultivators of PVA maize benefit more from PVA maize than non-cultivators due to higher consumption levels.

Table 4: Seed company PVA maize seed sales thresholds and payouts

Year	Grant Period 1 June 1, 2016 – May 31, 2017	Grant Period 2 June 1, 2017 – May 31, 2018
Performance threshold (indicator)	50 MT in individual sales (Max: 350 MT)	100 MT in individual sales (Max: 600 MT)
Payout 1: base threshold payment	USD 14,700 (Max: USD 78,875)	USD 34,650 (Max: USD 130,275)
Payout 2: per unit payment (USD/MT)	Min: USD 300 per MT (Max: USD 550)	Min: USD 350 per MT (Max: USD 650)

Source: Own compilation based on AgResults (2016b), expert interviews

Measurement and verification

Each AgResults pilot is managed by a so-called pilot manager, who reports to the AgResults Secretariat and is based within the pilot country. The pilot manager is further responsible for awards assessment and disbursement; dispute and fraud management; organisation and oversight of an advisory committee; reporting (budgeting, work plan tracking, performance, etc.) and public relations. This list of critical tasks already highlights that there are many potential challenges, and that the role of the pilot manager is key to the overall success of the pilot.

The pilot manager also oversees the payments and contracts a "pilot verifier" with special expertise in monitoring. In managing and supervising the pilot verifier, the pilot manager

11 To simplify the presentation, we only provide minimum thresholds and ceilings. The five different threshold ranges all correspond to different threshold payments and per unit payments, and are different for each of the two grant periods.

can perform spot checks and ensures that the verifier reports challenges and lessons learnt (AgResults Secretariat, 2014b). The pilot verifier then regularly determines whether the participants – in this case the millers and seed companies – have achieved the results and submits regular audit and verification reports to the pilot manager. More specifically, the pilot verifier will perform audits of pilot participants' claims of sales, interview relevant third-party stakeholders to collect independent information on participants' activities and conduct further investigations and sampling, as required, to assess participants' claims (AgResults Secretariat, 2014b).

This setup fulfils the requirement of independent verification, as the pilot manager and pilot verifier are two different entities. However, the pilot verifier is mostly accountable to the pilot manager and less to the pilot participants, who again can only complain about the assessment results to the pilot manager. Hence, the pilot manager has a key role in balancing the interests of all stakeholders involved.

At first glance, monitoring participating millers and seed companies appears to be a manageable task. Only millers meeting a certain milling capacity per day are able to participate, which limits the number of millers who have to be monitored. Verifying whether thousands of MT of maize meal and maize seeds have actually been sold and reached consumers and farmers is, however, extremely challenging and requires regular random checks among sales outlets. Moreover, there is the challenge of ensuring the integrity and quality of PVA orange maize (Mainville, 2015). Millers have an incentive to market cheaper white or yellow maize as PVA maize to reap prize premiums without incurring additional costs for the procurement of PVA maize. Two factors complicate the task of ensuring the integrity of PVA maize. First, there are no published standards for PVA maize yet that protect its quality, and second, a new maize variety – Advanta's PAC 6M 745, which is also orange but not biofortified and intended to be used as stock feed – has recently been introduced in Zambia. Since it is also orange, it can easily be confused with PVA maize (Mainville, 2015). This problem has now been resolved because the Advanta seed company agreed to stop selling their orange maize when they joined the pilot.

4.2.3 What support is provided?

There are support structures on different levels for participants of the pilot projects. First, there is the AgResults Secretariat, which coordinates and oversees all pilot projects. Second, there is the Steering Committee, comprised of the five donor agencies and the Trustee, which is responsible for strategic oversight of the initiative and the monitoring of the pilot projects and the initiative as a whole. Third, there is the pilot manager, who is the key contact person within the country for all project participants. Finally, AgResults has contracted an independent evaluator to measure impacts and compare experiences with traditional "push mechanism" development approaches.

In the case of Zambia, there is tailored support for all participants in addition to the prize incentives. The incentives for seed companies only started in year two of the pilot. To ensure supply in years one and two, traditional input financing was provided and AgResults collaborated with HarvestPlus, a challenge research programme of the Consultative Group for International Agricultural Research to procure 50 MT of PVA maize seed. With the assistance of HarvestPlus, 35 MT of the seed was sold to commercial

farmers and was expected to yield 9,000–12,000 MT of orange maize. The remaining 15 MT of the seed were distributed among smallholder farmers, including to more than 350 women's smallholder farmer groups (AgResults Secretariat, 2014b). The AgResults Secretariat also facilitated the transfer and sale of any maize that the farmers were unable to sell via the Grain Trader Association, the World Food Programme and other entities (AgResults Secretariat, 2014a). The Zambian government is also supporting the campaign by HarvestPlus to replace traditional white maize with orange PVA maize and has included PVA maize seeds under its Farmer Input Support Programme, which subsidises access to seeds (HarvestPlus, 2015).

Millers were also supported by AgResults. First, the initial prize of USD 50,000 per miller is an initial subsidy to allow millers to start marketing the maize. During the pilot process, it was found that millers were only able to stimulate the market to some extent. To improve promotion and marketing, it was decided that the pilot manager would bring in a Behavior Change Communication Specialist in support of millers (AgResults, 2016a). In addition, the AgResults team, in collaboration with HarvestPlus, supports the promotion of PVA maize through various public activities. For example, PVA maize was promoted at the annual Zambia Agricultural and Commercial Show in 2015, and the team leader appeared on TV to talk about the benefits of PVA maize (AgResults, 2015).

4.2.4 What are the opportunities and challenges?

The Zambia pilot project experienced several challenges during the starting phase. In response to these challenges, the AgResults team decided to make several changes to the initial pilot design. The challenges and subsequent changes can be summarised as follows.

The initial design implied a comparably high risk and a low level of control for millers

The initial design included a proportional prize stage, which started in year two of the pilot. Under the proportional prize stage, payments to individual millers were only made once millers had reached a collective sales threshold of 20,000 MT in year two, 40,000 MT in year three and 60,000 MT in year four (AgResults Secretariat, 2014c). This design implied a high risk and a low level of control for individual millers. AgResults found that millers did not work together and that individual millers did not want to take the risk of investing in the promotion of PVA maize when they did not know whether the activities and contributions of other millers would be sufficient to reach the collective threshold.

Uncertainty and low incentives

Prior to the redesign, there were no strong incentives for millers to increase the amount of PVA maize meal being sold. In year one, the per unit subsidy of USD 50 was fixed and did not change with increased sales. In years two to five, during the proportional prize stage, millers were to compete for a collective prize pool. Hence, the per unit sales prize they were to receive depended on the amount of sales they made themselves and on the amount sold by other millers. This design introduced uncertainty for millers. The amount of subsidies in the revised design is now fully dependent on what individual millers sell and the per unit sales prize increases with the amount of sales.

Supply of PVA maize was lower than expected due to a drought and government regulation of the maize market

Whether or not the minimum sales threshold can be met by millers depends not only on the millers' capability to stimulate demand for PVA maize, but also on whether there is sufficient supply of PVA maize. Due to a drought – in combination with excess rain during the growing season – AgResults (2016a) estimated that the projected harvest would be reduced by more than 80 per cent. In addition, the amount of PVA maize on the market was lower than expected. One reason was that the government put in place several policies to regulate the maize market in response to the drought. Most importantly, an export ban was introduced, which led to farmers keeping their maize instead of selling it, as they expected maize prices to increase once the export ban had been lifted. Another reason was that the government only buys white maize, leading to farmers keeping the PVA maize for home consumption while selling the white maize. Due to the low availability of PVA maize in the market, the minimum sales threshold had to be lowered.

Incentives for seed companies to market PVA maize were missing

The initial design of the pilot project only included a competition for commercial millers, whereas seed companies were not targeted. There were two reasons for the introduction of a competition for seed companies. First, AgResults realised that seed companies had PVA maize in their inventory but did not actively market it. Second, by targeting seed companies, the number of farmers who grow and consume PVA maize could be increased. Since the majority of farmers in Zambia belong to Rural World 3 and use the majority of maize produced for home consumption, targeting seed companies could indirectly contribute towards decreasing the prevalence of vitamin A deficiency in rural areas.

The changes outlined above show that the AgResults programme had to react to a variety of challenges, and that external factors greatly impacted the design and implementation of the programme.

The new design lowers the risk for participating millers to invest in promoting PVA maize. Nevertheless, millers still face uncertainty with respect to the demand for PVA maize meal. At the start of the pilot project, PVA maize was unknown to most Zambians, and a first evaluation mission found that consumers tended to confuse the orange PVA maize with yellow maize, which was once distributed during a famine and is often seen as inferior (Mainville, 2015). Consumers therefore first have to be convinced by millers that PVA maize is a superior and nutritious product. Mainville (2015) points out that discounting orange maize compared to white maize may stimulate demand in the short-term, but there is the risk that orange maize will continue to be seen as inferior. Charging a high price, on the other hand, is a risky strategy for the pilot as a whole because poor and price-sensitive consumers, who can be expected to suffer most from vitamin A deficiency, may be discouraged from buying PVA maize.

In terms of targeting different Rural Worlds, the Zambia pilot shows potential in terms of providing benefits for the poor and food insecure through engaging the private sector and working with medium- to large-scale enterprises. Results-based incentives are provided to commercial millers and seed companies belonging to Rural World 1, but the aim of the project is not to foster the growth of the latter, but to achieve better nutrition for poorer

parts of the population who suffer most from vitamin A deficiency (the urban poor and Rural Worlds 3–5).

However, there is one important shortcoming in the original theory of change and its focus on millers. The focus on industrial millers means that only those who buy some or all of the maize they consume from millers have access to markets where PVA maize is sold, and those who have the resources to buy refined maize meal could benefit significantly. The design therefore ran the risk that the urban poor as well as poor and food insecure groups in rural and geographically isolated areas, especially Rural Worlds 3, 4 and 5, would be only partly reached. Sitko et al. (2011) show that the poor in urban areas often buy wholegrain maize and then pay to have it milled by small-scale processors because it is considerably cheaper than purchasing already refined maize meal. Subsistence agricultural households (Rural World 3) can also be expected to be only partly reached by a programme that incentivises commercial millers. Small-scale farmers in Zambia produce the majority of maize they consume themselves, and 68 per cent of all maize consumed in Zambia is maize that households have produced for home consumption (Lividini & Fiedler, 2015). The introduction of the competition for seed companies is therefore a sensible addition to broaden the impact of the Zambia pilot. Moreover, there is the complementary push mechanism of HarvestPlus and the government input subsidy programme, which both mainly target Rural World 3.

The potential of the overall AgResults initiative has to be assessed in the context of pull mechanisms in agriculture, which represent a promising results-based approach. Yet, the first pilots also show the highly context-specific challenges that each project brings. Among the lessons learnt from the Zambia pilot is that risks for incentivised actors have to be minimised and incentive structures should be simple and clear. In addition, it is important to be flexible and to be prepared to change the design of the pilot when external conditions change. The main challenge for the Zambia pilot did not lie in the results-based issues around indicators, measurement and incentives, but rather in the broader context of implementation, in particular a drought as well as government regulation of the maize market, which have affected the supply of PVA maize.

On a more general level, the major appeal of pull mechanisms, compared to other results-based approaches, is the strong catalytic potential that these mechanisms have. They can foster innovation among project implementers and bring greater overall benefits, such as combating vitamin A deficiency, that are many times greater than the initial investment. However, the number of actors involved in AgResults pilots (Secretariat, Steering Committee, Trustee, implementers, pilot managers, pilot verifiers) makes the project fairly complex. A first briefing on lessons learnt by the AgResults Secretariat therefore concludes that the "'pull projects' complexity requires careful project planning, design of prize structures, coordination with teams on the ground during implementation, and flexibility as circumstances change" (AgResults Secretariat, 2016, p. 6).

4.3 Development Impact Bond – Peru

The Development Impact Bond in Peru aims to benefit indigenous Asháninka families in the Peruvian Amazon region by strengthening and modernising their cocoa and coffee production. The initial impact investor is the Schmidt Family Foundation, which provided

an upfront investment of USD 110,000. The Rainforest Foundation UK is the service provider implementing the project and the United Nation's Common Fund for Commodities (CFC) is the outcome funder that will pay back the investor, depending on the success of the project. There is no explicit intermediary organisation in this pilot, and the tasks of structuring the deal and bringing parties together were shared among the three stakeholders. The verification of results indicators is being conducted by the Royal Tropical Institute (KIT) in Amsterdam.

This DIB is the first impact bond in the agricultural commodities sector. DIBs are an adapted form of social impact bonds (Lindenberg & Pöll, 2015), which are being more widely implemented in recent years, particularly in the United States and the United Kingdom. The main difference between DIBs and social impact bonds lies in who the outcome funder is. With social impact bonds, the outcome funder is usually the government, which plans to save costs by finding private funders of public services. With DIBs, the funder is usually a donor agency or – as in the case of Peru – an intergovernmental financial institution.

The main problem addressed by the DIB in Peru is an outbreak of hemileia vastatrix, a fungus that causes "coffee leaf rust", which can lead to a 50 per cent drop in production (ABN AMRO, 2015). In 2014 nearly 70 per cent of coffee plantations in the Peruvian Amazon region were affected by the fungus. The first goal of the Rainforest Foundation UK is to support local farmers in dealing with the fungus by building facilities for planting new saplings of fungus-resistant coffee strains. The second aim is to increase the quality of Asháninka cocoa by helping to improve the infrastructure for the post-harvest process, while also rehabilitating the 20 hectares of coffee plantation that were lost to coffee leaf rust – an area providing a livelihood to some 40 coffee farmers (ABN AMRO, 2015).

4.3.1 What are the selected results?

The objective of the DIB is to support the indigenous Asháninka people of Peru by assisting the members of the Kemito Ene Association, a farmer association, in establishing an environmentally sound production and marketing system for coffee and cocoa (Belt, 2015).

The stakeholders involved agreed on four indicators: increase of coffee supply, improved cocoa yields, cocoa bought and sold, and newly established coffee plots. The main entity in charge of delivering the results is the Rainforest Foundation UK, which works together with a local NGO, the Asháninka Center of the Ene River (known as CARE) for implementing the DIB. The farmers themselves, however, are not directly incentivised by the DIB and also were not involved in designing the intervention. Furthermore, the implementers, Rainforest Foundation UK and CARE, are not reimbursed through the intervention's indicators, and their main incentive for performing well is rather to manage a successful intervention and continue working with each other and the outcome funders in the future. In addition, the investor – in this case the Schmidt Family Foundation – is incentivised, as it should have an interest in earning the full return on its investment. The foundation could, for instance, support implementation by providing entrepreneurial knowledge or expertise to the implementers, but this did not occur with this DIB.

Table 5: Development Impact Bond Peru indicators		
No.	**Indicator**	**Results level**
1	60% of Kemito Ene members increased their supply to the association by at least 20%, thereby improving their income received from Kemito Ene	**Outcome**
2	At least 60% of Kemito Ene members improve their cocoa yields to 600 kg/ha or more	**Outcome**
3	At least 35 tonnes of cocoa bought and sold by Kemito Ene in last year of the project	**Outcome**
4	At end of project, 40 producers have 0.5 ha of newly established coffee plots with leaf rust resistant varieties	**Output**
Source: Belt (2015)		

Indicators 1, 2 and 3 are outcome indicators that refer to different amounts of coffee and cocoa bought and sold and that yield improvements. Indicator 4 is an output indicator measuring the establishment of new plots.

The baseline date for all indicators was 31 December 2013; the starting date of the DIB was 1 January 2015 and the end date was October 2015 (Belt, 2015). The timing therefore indicates that the DIB rewards results that were generated over a longer period than its own duration, which has to be considered in attributing results to the project directly. Some problems with the indicators were identified in the verification report. For instance, indicator 1 – increasing the supply to Kemito Ene – was not specified in absolute but in relative terms, meaning that any improvement, even from 0 kg to 1 kg, immediately leads to achievement of the target. Equally, large-scale improvements – from 1 tonne to 1.1 tonne, for instance – would not meet the 20 per cent improvement requirement.

4.3.2 How are payment, measurement and verification processes organised?

KIT in Amsterdam is the independent verifier of the DIB project. This is a good choice, as the institute has a clearly neutral position and possesses expertise in the field of the pilot. The payment for the pilot follows a schedule that is based on degrees of target achievement.

The verification features several different categories of ranges that determine the exact payouts. Each indicator has the same weight and has been allocated a quarter (USD 27,500) of the overall amount of USD 110,000. Furthermore, thresholds of 50 per cent, 75 per cent and 100 per cent of target achievement are applied for each indicator, meaning that 50 per cent of payments are made if at least 50 per cent of the target is achieved, 75 per cent if achievement is above 75 per cent but still below 100 per cent, and 100 per cent when the target is fully achieved (see Table 6). In addition, targets for outcome indicators 1 and 2 have to be attained by only 60 per cent of Kemito Ene members, which reduces the level of ambition. The use of scaled thresholds is a good idea to lower the risk of complete failure. However, fully scaling payments, that is, disbursing for each unit of progress made, would have been preferable for two reasons. First, changes in indicators related to agricultural production and marketing are to a large extent determined by external factors, such as the climatic conditions observed during the implementation period and consumer demand. Since these are unknown at the time when targets are set, targets are often either unrealistically high or lack ambition. Second, unit payments reward each unit of progress equally, implying continuous incentives for improvements and a lower

risk. In the case of Peru, the overall size of the pilot and the number of farmers targeted is quite small, and success rates might be more predictable than in larger programmes. This could explain the use of so many threshold indicators (see Table 6 below).

Table 6: Payment table – Development Impact Bond Peru

No.	Target total achieved (USD 27,500)	Target 75% achieved (USD 20,625)	Target 50% achieved (USD 13,750)	Target not achieved (No payment)
1	60% of Kemito Ene members increased their supply to the association by at least 20%, thereby improving their income received from Kemito Ene	Between 59% and 41% of Kemito Ene members increased their supply to the association by at least 20%, thereby improving their income received from Kemito Ene	Between 40% and 20% of Kemito Ene members increased their supply to the association by at least 20%, thereby improving their income received from Kemito Ene	Fewer than 20% of Kemito Ene members increased their supply to the association by at least 20%, thereby improving their income received from Kemito Ene
2	At least 60% of Kemito Ene members improve their cocoa yields to 600 kg/ha or more	Between 59% and 41% of Kemito Ene members improve their cocoa yields to 600 kg/ha or more	Between 40% and 20% of Kemito Ene members improve their cocoa yields to 600 kg/ha or more	Fewer than 20% of Kemito Ene members improve their cocoa yields to 600 kg/ha or more
3	At least 35 tonnes of cocoa bought and sold by Kemito Ene in last year of the project	Between 34 and 24 tonnes of cocoa bought and sold by Kemito Ene in last year of the project	Between 12 and 23 tonnes of cocoa bought and sold by Kemito Ene in last year of the project	Less than 12 tonnes of cocoa bought and sold by Kemito Ene in last year of the project
4	At end of project, 40 producers have 0.5 ha of newly established coffee plots with leaf rust resistant varieties	Between 39 and 30 producers have 0.5 ha of newly established coffee plots with leaf rust resistant varieties	Between 29 and 19 producers have 0.5 ha of newly established coffee plots with leaf rust resistant varieties	Fewer than 19 producers have 0.5 ha of newly established coffee plots with leaf rust resistant varieties

Source: Based on Belt (2015)

After the project ended in October 2015, the independent verifier visited the project areas to collect information on the indicators and determined the exact results. The target achievement is highlighted in grey for each indicator in Table 6. For indicator 1, there were 45 members of the 99 members who reached the target, which means that 75 per cent of the budgeted amount was paid out. For impact indicator 2, only 15 members reached the yield target of 600 kg/ha. As these 15 members only account for 15 per cent of the baseline, the target was missed and no payouts were made. Indicators 3 and 4 were fully met, as Kemito Ene sold 47 tonnes of cocoa and 62 farmers had installed 0.5 ha of improved coffee varieties. Overall USD 75,625 out of the total USD 110,000 was disbursed.

Interestingly, the yield indicator was missed. The verification report states that the productivity figure collected in the baseline study, 400 kg/ha, was too optimistic (Belt, 2015, p. 9). Cocoa yields were much lower in their project areas due to low-yield varieties and suboptimal management practices as well as a serious outbreak in 2015 of a pest called Mazorquero, which had a strong impact on cocoa productivity (Belt, 2015). In addition, the fertilisation programme was only set up in 2015 and could only lead to increased production and yields in 2016 after the end of the current project.

In the case of Peru, there was a provision in the project agreement to adapt the project according to unforeseen circumstances, if all stakeholders agreed that there was a need to revisit the design of the intervention. However, this provision was not triggered and stakeholders decided to keep the original design of the intervention. The benefit of this approach is that the incentive structures remain clear and easy to understand. The disadvantage in this case was that factors partially outside of the control of the farmers or service providers (wrong estimates, pest outbreak or late delivery of fertiliser) led to non-payment of the investor.

4.3.3 What support is provided?

There are two levels of support in this pilot project. On the design level, all stakeholders – the foundation, CFC and the Rainforest Foundation UK – jointly had to agree on the main features of the intervention, thereby creating the basis for implementation. On the implementation level, the main support provided to the Asháninka families is by the service providers, the Rainforest Foundation UK and CARE. Then mainly CARE helps the farmers in achieving the agreed indicators and communicates the design and features of the DIB to them.

Most concretely, indicator 4 – building new plots and planting fungus-resistant coffee – is facilitated with technical assistance from the Rainforest Foundation UK and CARE. The design of a DIB gives the service implementer a role in supporting the beneficiaries and implementers, in this case the Asháninka families. The service provider has a natural interest in the project succeeding because this might lead to future cooperation with the funder and the investor.

Further, it has to be noted that the service providers are in very different situations in the DIB in comparison to other traditional donor-funded projects. Instead of being presented with a clear logframe and a number of activities to perform, the DIB only sets the indicators while leaving the choice over implementation strategies fully to the service providers. The design of the DIB in Peru therefore follows the philosophy of being "hands-off" on the side of the funder. Especially, in a productive sector such as agriculture, such an approach can help to unleash entrepreneurial activity, as implementers are encouraged to find cost-effective ways of achieving the outcome targets.

4.3.4 What are the opportunities and challenges?

For the specific DIB pilot in Peru, several aspects are noteworthy. First, climate variability or other unforeseen circumstances were not explicitly factored into the project design. As a result, the yield indicator was not met and no payouts were made. The measurements and indicators in Peru could also be further improved towards using more scalable indicators and working with absolute improvements rather than with relative improvements. Finally, the incentivised actor and impact investor, the Schmidt Family Foundation, did not engage in implementation, although it should have had an interest in recovering its investment. A reason might be that DIBs are a new modality in development cooperation and investors have yet to learn about playing a more active role in implementation beyond providing funding.

Regarding targeting of different Rural Worlds, it is important to note that the Asháninka people of the Ene River region lack access to basic infrastructure and quality health and education services. Thus, traditional and subsistence agricultural households and micro-enterprises in particular (Rural Worlds 2 and 3), in the form of the Kemito Ene Association, were targeted as beneficiaries of this project.

On the potential of this pilot for more widespread application, it is difficult to come to a generalised conclusion, not least because the invested amount (USD 110,000) and the number of families targeted were quite small, and the overall timeframe of the project was less than two years. Also, there was no intermediary organisation involved to manage the relations among the different stakeholders and possibly reduce transaction costs. Here investor, outcome funder, service providers and verification entity had to agree on the design among themselves without the help of a moderating organisation. Although many of the involved stakeholders had been working together for years in other contexts, the coordination costs for the DIB were high.

However, the verification report notes several interesting aspects for future DIBs in the agricultural sector (Belt, 2015). First, the Rainforest Foundation UK, CARE and the implementers explained in detail why certain tasks were accomplished and others not, why certain targets were met and others not. The DIB therefore represents a major learning opportunity that enables visibility of the success of development efforts. Second, the DIB is characterised by a large degree of freedom, and the service providers saw the flexibility in determining own strategies for achieving results as the main benefit. There were no longer strict regulations and reporting requirements from donors, but rather only attention to the actual results of the project. Instead of following how the intervention allocated money for which types of activities, the funders and verifier were just interested in the results.

In general, DIBs as a new modality of development finance are also facing several challenges to broader adoption. First, investments are often difficult to put together because many different stakeholders need to align in order for projects to be implemented. Many potential DIB pilots are discussed and even designed but hardly ever implemented. Second, the costs of designing impact bonds currently are still quite high due to the complexity of pilots and lack of experience. A first assessment of 44 social impact bonds in high-income countries concludes that it is unlikely that impact bonds can tackle large-scale social issues facing developing countries because the sums of capital required, the capacity of service providers and the availability of donor backing is still too limited (Gustafsson-Wright, Gardiner, & Putcha, 2015). But the report also notes that as experience with implementing impact bonds grows, a community of practice around social impact bonds will emerge and more such interventions will be adopted.

5 Comparison of pilot programmes

The pilot experiences presented above reflect different results-based approaches that can vary significantly depending on specific contexts. There are, however, common features that are special for results-based approaches in agriculture. These include: dealing with external factors, such as climate variability, and measurement errors, targeting different Rural Worlds and the potential for scaling-up.

Dealing with external factors and measurement errors

The three pilot programmes apply very different approaches to measurement and dealing with external factors influencing results, such as climate variability. The World Bank programme in Rwanda uses outcome indicators by targeting yields but only requires the government to achieve 75 per cent of the target to trigger full payouts. In addition, this rate is lowered to 40 per cent in years where crop insurance payouts are made. However, most indicators for the Rwandan PforR have been met and there have been full payouts.

With the DIB in Peru, it was the opposite situation. The yield indicator was not met and no payouts were made. The target might have been too optimistic, and unforeseen events such as pest outbreaks were not factored into the design of the intervention. In Zambia, where results-based incentives were set for commercial millers and seed companies, yield indicators were not used. However, the AgResults Secretariat had to make sure that enough biofortified maize was grown in preceding harvest cycles. Thus, a lot of seeds for biofortified maize were distributed to ensure supply, which added to programme costs and complexity. Moreover, the achievement of performance thresholds also depended on external factors, that is, on consumer demand for PVA maize, which had to be stimulated by the incentivised millers.

Regarding the use of yield indicators, it can be concluded that their use might be complicated but still feasible when adverse weather events or pest and disease outbreaks are factored into programme design. One way to address variability could be to go beyond measuring outcome changes among the treatment group and to use rigorous impact-evaluation methods. When changes are only estimated for the treatment group, it is impossible to know whether effects are a result of the programme or due to other influencing factors. A counterfactual (what would have happened in the absence of a programme or policy to the same person at the same time) is needed to estimate the treatment effect. A counterfactual situation can be created through the use of control or comparison groups (those that have not participated in an intervention/are not affected by a policy change) (Baker, 2000).

Only random assignment to a treatment or control group leads to unbiased estimates of the outcome. This is, however, only the case in a minority of development programmes that are implemented as randomised control trials. In most development programmes, there are almost certainly non-random differences between the treatment and control groups influencing both programme participation and the outcomes, resulting in biased estimates of the treatment effect (Barrett & Carter, 2010). Several quasi-experimental methods such as difference-in-difference, the instrumental variable approach and matching techniques exist to address different sources of bias (Baker, 2000). Applying them in results-based approaches to estimate changes at the outcome level lowers the risk for both the funder as

well as the incentivised actor and ensures that payments are only made for outcomes that are due to the programme. Nevertheless, they cannot solve the problems of extreme weather events such as droughts that render a treatment ineffective. For example, the use of mineral fertiliser can be expected to improve yields under normal conditions. In the case of a severe drought, its use may only have a very limited or no effect on yields. Hence, there is still a risk that payments are not made despite efforts being undertaken by the incentivised actors.

Moreover, there are certain drawbacks to rigorous evaluation methods. First, their implementation requires a high amount of resources as well capacities. Second, rigorous impact evaluations also do not solve the problem of measurement errors when estimating the value of agricultural production. Third, the use of control groups is not always an option. In the case of the PforR in Rwanda, for example, dividing the population into treatment and control groups might not be possible because the programme is implemented nation-wide and a variety of treatments are carried out at the same time. Rigorous impact-evaluation designs are therefore more suitable for smaller, concentrated programmes such as the DIB in Peru.

Due to the challenges identified above and in cases where rigorous impact evaluations are not an option, following Masters and Delbecq (2008) we recommend the use of output or intermediate outcome indicators that show the rate of adoption of innovations in combination with data from experimental plots and on-farm trials that estimate the impact of adoption on yields. Using this data, yield gains for a sample of adopters can be estimated. Since yield gains on experimental plots and of on-farm trials are usually higher than yields obtained by the typical farmer, a correction factor would have to be applied showing the difference between trial data and actual yields (Masters et al., 1996). This method is also likely to lead to biased estimates but may suffer from fewer measurement errors because yield gains are measured under controlled conditions (experimental plots and on-farm trials) and not based on farmer estimates.

Addressing the complexity of Rural Worlds

The different pilot programmes operate at different scales and therefore impact the Rural Worlds according to their size. In Rwanda the pilot funds a government nation-wide reform of the agricultural sectors that affects 7.5 million farmers, 80 per cent of whom are subsistence farmers (World Bank, 2014a). The effects of the programme therefore could potentially cut across the Five Rural Worlds, affecting large-scale commercial enterprises, traditional households, subsistence households, landless rural households and the chronically poor. However, existing research has shown the difficulties of prior agricultural policies in reaching the poorest, and the PforR could benefit from a clearer focus on Rural Worlds 4 and 5.

The Zambia pilot mostly deals with large-scale commercial farms, and to a lesser extent with small-scale farmers, who receive the biofortified seeds in the start-up phase. The incentivised actors, however, are commercial millers and seed producers, who belong to the world of large-scale enterprises. On the consumer side, the maize should particularly benefit the poorer worlds, provided that they have access to buying maize meal. The poorer households deficient in vitamin A are therefore the main beneficiaries of the Zambia pilot. The Peru DIB is the smallest intervention, as it is implemented within one

region only for about one year targeting one specific community of Asháninka people of the Ene River region. Yet, the Asháninka come from the poor Rural Worlds (2 and 3) and, despite modest means, have been able to engage in a results-based intervention.

In general, two aspects have to be noted with regard to the results-based pilots and the complexity of rural farming, represented through the Five Rural Worlds concept. First, only the AgResults programme in Zambia specifically applies concepts for understanding rural complexities and interdependencies. However, there is no strategy for how to reach those consumers that suffer most from vitamin A deficiencies, and it remains to be seen whether vitamin A deficiency can be reduced significantly. In Rwanda there is no consideration of how commercial and subsistence farming work together and impact the chronically poor, for instance. Similarly, the intervention in Peru is focused on the direct beneficiaries only.

A first conclusion therefore is that results-based approaches in the agricultural sector could benefit from a more systematic mapping of broader rural interdependencies, for example through the help of the Rural Worlds concept. Here, the richer and more capable Rural Worlds, especially large-scale enterprises, could be the primary target group for RBF programmes. Poorer Rural Worlds could then be featured in the programme design as the indirect beneficiaries of the incentivised actions by the richer Rural Worlds. Alternatively, the results-based interventions already provide interesting cases of targeting poorer Rural Worlds as the primary beneficiaries. Through the tool of setting results and monitoring their achievements, individual Rural Worlds, such as the world of subsistence farmers and micro-enterprises, can directly be incentivised and supported.

Potential and limitations

The overall potential of the different approaches depends strongly on the specific type of results-based approach. The World Bank PforR instrument is geared towards large-scale reforms in one specific sector. The first experiences from Rwanda indicate that this instrument can work well in the agricultural sector. Given that DFID joined the funding of this particular pilot, it is possible that other donors see the appeal of combining larger-scale programmatic approaches to development funding with a stronger focus on results. Within the World Bank, the PforR instrument for the 2015/2016 financial year already accounted for 15 per cent of all new commitments, up from below 5 per cent in previous years. This steady growth is likely to continue, reflecting the interest of the World Bank and governments to introduce more results-based interventions. Following the Rwanda pilot, two more PforR interventions in the agricultural sector are in the pipeline already (World Bank, 2016).

The limitation in this regard might be that Rwanda is a special case with a particularly capable bureaucracy and strong expertise in implementing results-based interventions in the public sector. Other developing countries therefore might face bigger challenges in introducing large-scale RBA programmes.

The pilots in Zambia and Peru operate on a much smaller scale but are characterised by a high level of innovation. The AgResults initiative demonstrates that pull mechanisms are a promising way to facilitate the adoption of agricultural innovations; the Zambia case shows how an intervention can work together with consumers, farmers as well as milling

and seed companies. The Peru pilot similarly can be understood as a proof of concept for DIBs in the agricultural sector. Here, the private upfront investment from a philanthropic actor was used to fund a results-based development intervention targeting a specific group of disadvantaged smallholders. A notable aspect for DIBs is that service providers – different from RBF programmes – do not carry a risk of non-disbursement, as the investor takes over this risk. Hence, service providers can have more room to innovate and apply an entrepreneurial spirit.

Whether pull mechanisms and DIBs will be amenable to being scaled-up strongly depends on the question of how well private actors engage in tackling development challenges in the agricultural sector. If private actors are willing to invest, these RBF instruments are two appealing options.

6 Conclusions and recommendations

The agricultural and rural development challenges addressed by the 2030 Agenda require serious consideration of innovative ways to finance and deliver services more efficiently and cost-effectively. As part of efforts towards demonstrating the effects of development cooperation – including greater emphasis on evidence as a basis for financing as well as value for money – the first results-based approaches in the agricultural sector have emerged.

The analysis has presented the diversity of results-based approaches with regard to type, actors involved, indicators, payments, measurement and support provided. As a primary conclusion, the application of results-based approaches in agriculture demonstrates a great need for flexibility in how to structure interventions and adapt them to local contexts. This flexibility allows various stakeholders to come together, contribute their specific expertise and work jointly with a strong focus on results. Ideally, such settings foster a common focus on outcomes and a stronger culture of performance management.

The second conclusion about results-based approaches in agriculture is that the flexibility highlighted above also makes large-scale adoption of results-based approaches in agriculture difficult. As shown in the analysis, finding good results measures, aligning the interests of multiple actors and dealing with unforeseen events such as droughts, pest and disease outbreaks can be challenging. Yet, as experience and a community of knowledge grow around results-based approaches in agriculture, it can be expected that the design and implementation of interventions will improve.

In this context several preliminary recommendations are formulated based on the analysis above.

Keep the design of interventions simple but factor in unforeseen events: The advantage of simple interventions is that the achievement of results is straightforward, and the incentives for achieving results are clear. Incentives have to be understood by the individuals that are targeted, otherwise there will be a disconnect between the design of the operation and the practical implementation. Therefore, designers of results-based approaches should refrain from complicated and long lists with indicators with complex verification mechanisms and rather select a limited number of key indicators at higher levels of the results chain. Yet, it is important to account for climate variability and other

unforeseen events by scaling payouts according to achievement and allowing lower thresholds in years of extreme weather events, for instance.

Combine outcome and output indicators: The pilot programmes analysed here showcased a good mix of outcome and output indicators. Improving yields is an important objective of most agricultural programmes, but their use in results-based approaches has limitations, in particular if only a before-and-after comparison among the treatment group is made. We suggest two alternative approaches. In regionally concentrated programmes with clear target groups, rigorous impact-evaluation methods are an option. These programmes control for external factors and allow for the attribution of measured changes to a programme. A long-term project horizon is important because it may take several years of providing information and training on innovations until these are adopted in the field and translate into measurable changes in yields.

Alternatively, we recommend collecting data on the extent of the adoption of certain innovations through farm surveys and, in addition, measuring their effects through field experiments and on-farm trials. Combining the data allows for assessing the potential overall effects of innovations. However, it is important to apply a correction factor, since yield impacts tend to be much higher under controlled conditions than on an average farm. The correction factor could be estimated through qualitative approaches, such as focus group discussions, or through farm surveys.

As some World Bank PforR programmes show: the larger the interventions are, the stronger the tendency to use process indicators, such as preparing plans or strategies, and disburse the majority of funds for these indicators, because achievements are more predictable. Yet, designers of results-based programmes should be more ambitious and use outcome indicators whenever possible, as only these represent real results in terms of tangible improvements in people's lives. Moreover, agricultural development programmes usually operate under conditions of complexity, and it is often not clear a priori which innovations are most suitable in a given context. Outcome indicators leave room for a trial-and-error approach to identify those innovations with the highest possible impact.

Embrace failure: Proponents of results-based approaches tend to focus on success stories of the various pilots in terms of the disbursements that were made and the results that have been achieved. It is equally important, however, to embrace learning from mistakes and use these lessons as an asset. Cases where funds were not disbursed offer learning opportunities that help to adjust planning and expectations, especially in a period where results-based approaches in the agricultural sector are implemented, as learning from pilots programmes should be a priority. Furthermore, experiences from results-based approaches in other sectors show that the credibility of a disbursement mechanism is key to its continued relevance. Therefore, communication about results that have not been achieved should be more open and positive. An intervention that meets all results and always disburses might not be sustainable because no incentive effects are created.

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