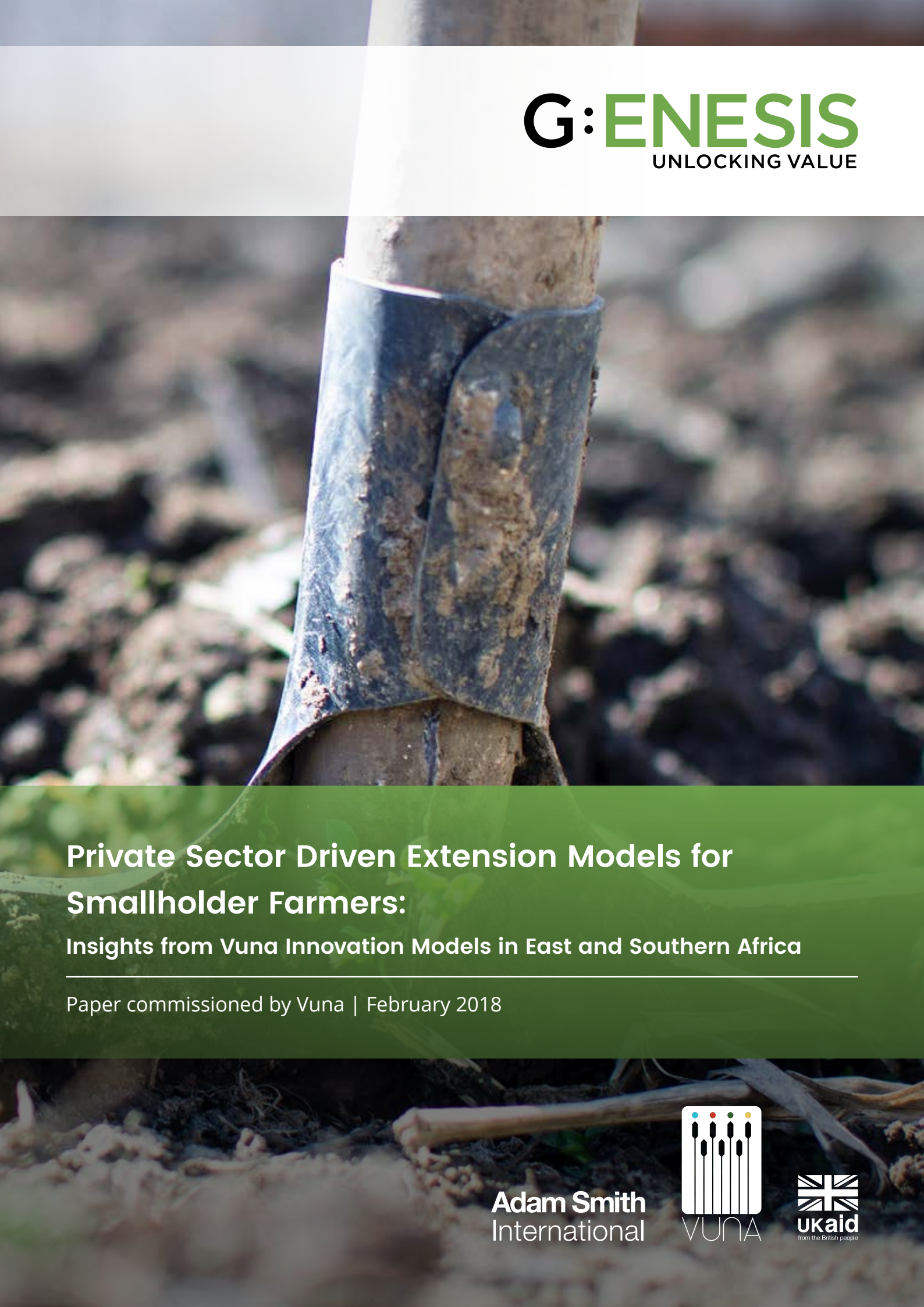

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Private Sector Driven Extension Models for Smallholder Farmers:

Insights from Vuna Innovation Models in East and Southern Africa

Paper commissioned by Vuna | February 2018

Adam Smith International

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Please cite this publication as follows:

Genesis Analytics, 2018. *Private Sector Driven Extension Models for Smallholder Farmers: Insights from Vuna Innovation Models in East and Southern Africa.* Vuna Research Report. Pretoria: Vuna.

Project Name: Private Sector Driven Extension Models for Smallholder Farmers: Insights from Vuna Innovation Models in East and Southern Africa

Vuna is a DFID-funded regional Climate Smart Agriculture Programme. The British Government's Department for International Development (DFID) financed this work as part of the United Kingdom's aid programme. However, the views and recommendations contained in this paper are those of the consultant and DFID is not responsible for, or bound by the recommendations made.

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TABLE OF CONTENTS

List of Tables

List of Figures

List of Boxes

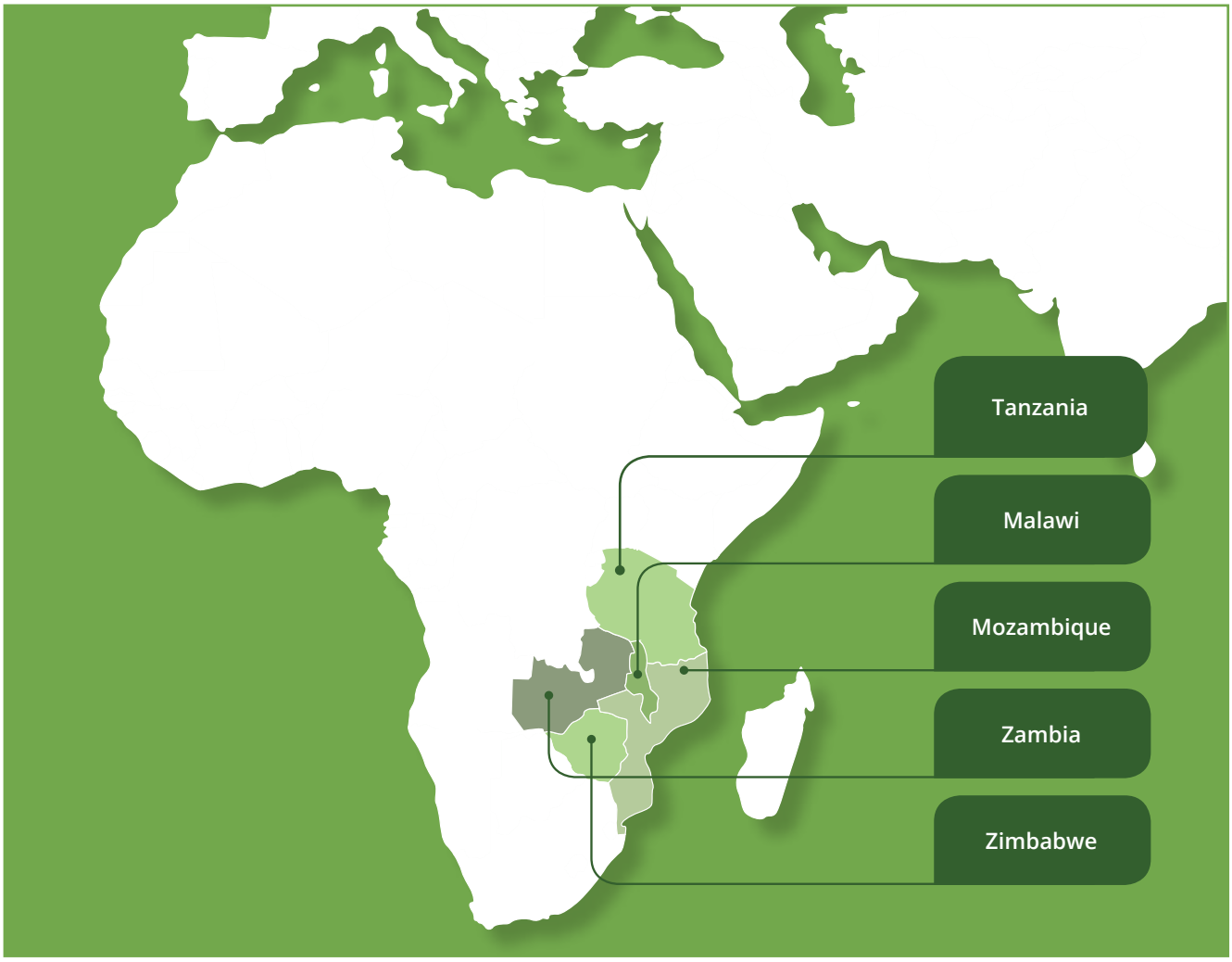
Preface

This paper forms part of a set of three thematic papers that draw from action research conducted on the approaches used in implementing Climate Smart Agriculture (CSA) innovation models in East and Southern Africa (ESA) by Vuna, a DFID funded regional CSA programme managed by Adam Smith International. Categorised in various agriculture related themes, the papers explore different models designed to promote the uptake of CSA practices among smallholder farmers. The thematic papers assess the various approaches that Vuna employed to improve CSA adoption. The implementation period of the Vuna innovation models was short, ranging between 9 and 12 months. Consequently, the findings contained herein are based on emerging insights and early signs of potential of the innovation models to support resilience building in a scalable and sustainable manner.

This series of the thematic model papers include:

- Integrating Climate Smart Agriculture into Outgrower Models: Insights from Vuna Innovation Models in East and Southern Africa;
- Private Sector Driven Extension Models for Smallholder Farmers: Insights from Vuna Innovation Models in East and Southern Africa; (this paper) and,
- Inclusive Seed Systems: Insights from Vuna Innovation Models in East and Southern Africa.

The research was conducted between October 2017 and February 2018, in three phases. First, available literature on CSA, climate change and agriculture in the focus country and within the region was reviewed. Second, desktop research of Vuna project documents (baseline reports, quarterly reports, grant application(s), and the Vuna project plan) was done. Third, field research was conducted to assess the extent to which the innovation model has been adopted and whether it's being adapted to enhance desirable outcomes for key value chain actors. Field research results were analysed to determine the potential for the sustainability of the interventions.



Acronyms

CSA	Climate Smart Agriculture
DFID	Department for International Development
EGS	Early Generation Seed
ESA	East and Southern Africa
GAP	Good Agricultural Practice
MFCL	Musoma Food Company Limited
NGO	Non-Governmental Organisation
OPV	Open Pollinated Varieties
SAMP	Seeds and Markets Project
ZCB	Zambia Cotton Board
ZSS	Zimbabwe Super Seeds

> Vuna means 'harvest' in many languages in East and Southern Africa. Our name like our work is inspired by the region.

Executive summary

Poor extension support is at the core of persistently low productivity in smallholder systems across East and Southern Africa (ESA). Inadequately trained and poorly resourced public extension officers are expected to support millions of farming households. As a result, the majority of smallholder farmers still use outdated technology and practices leading to stagnation of yields, food insecurity, and limited participation in markets and persistent poverty.

With a changing climate worsening their already dire circumstances, smallholders in ESA are facing an increasingly challenging environment within which they have to maintain their livelihoods. Unless urgent and decisive action is taken to reform extension approaches, efforts to promote Climate Smart Agriculture (CSA) are bound to fail. Innovative alternatives, particularly those that are driven by commercial interests of private sector actors are now receiving growing attention. This paper assesses how sustainable private sector driven extension models are and their potential contribution to resilience building of farmers and other market players. The paper draws on experiences from six CSA focused innovation models that are being implemented with support from Vuna, a DFID funded climate smart agriculture programme in ESA managed by Adam Smith International.

Findings of the review show that the Vuna supported businesses have adopted three broad typologies of extension models for supporting smallholder farmers: (i) In-house model - where extension services are provided and funded by the private company; (ii) Third party extension model – where extension services are provided by an independent service provider; and (iii) Plural models that bring together public, private and/or donor or NGO partners for cooperation in extension service provision. These three typologies are, however, far from being homogeneous, with several variant sub typologies within each.

In-house and third-party models have limited application in smallholder systems: These two typologies were only adopted by one firm each. Foremost among the weaknesses cited for the in-house model is the high upfront costs, only justifiable where the firm is fairly certain that the returns to such investment are significant and not threatened by side-selling or other forms of default. Only large well established firms with a significant resource base are able to sustain an in-house extension system.

The third-party model was criticised for its limited interaction with farmers and weaknesses in promoting long term trust building between farmers and other value chain actors. The experiences from the business model that deployed donor funds to support this approach demonstrate the challenges with sustainability of this approach and the impracticality of internalizing extension functions once the services of a third party are terminated.

Hybrid models are complex, but more sustainable and effective in building resilience: These models bring together multiple value chain players, some with little history of working together and often divergent expectations. Hybrid models are typically complex and require good coordination. But a number of Vuna supported business models demonstrate that this approach can harness the mutual interest, expertise and resources of various key value chain players to effectively and sustainably deliver extension support to smallholder farmers.

Innovation is required to harness the potential and overcome the inertia within government extension systems: Insights from Vuna supported business models suggest that to be effective, hybrid extension models require innovative practices to energize effective participation of government extension systems. Investing in unlocking the vast human and institutional capital within the government extension system is worthwhile and more efficient, cost effective, and more sustainable than investing in parallel systems. The scale of current available capacity within state extension systems makes it a worthwhile and potentially game changing investment with system-wide resilience building impacts. The major challenge here remains the availability of financial resources to effectively deploy government extension personnel.

Return on investment in extension is positive for private firms: Examples from some of the Vuna supported business models show that return on investment for extension is positive and significant for private sector firms. Although upfront costs are high, these decline as farmers become accomplished in what they do, and only require limited support. Additionally, productivity and quality of produce also tends to increase as farmers' competences improve. Improved productivity, quality, and consistency of supply unlocks value for both the farmer and the offtaker and thus creates commercial incentives for a sustainable partnership. In addition, extension support to farmers was shown to minimise the problem of side selling by building trust and loyalty, and improving communication and interaction between farmers and private companies.

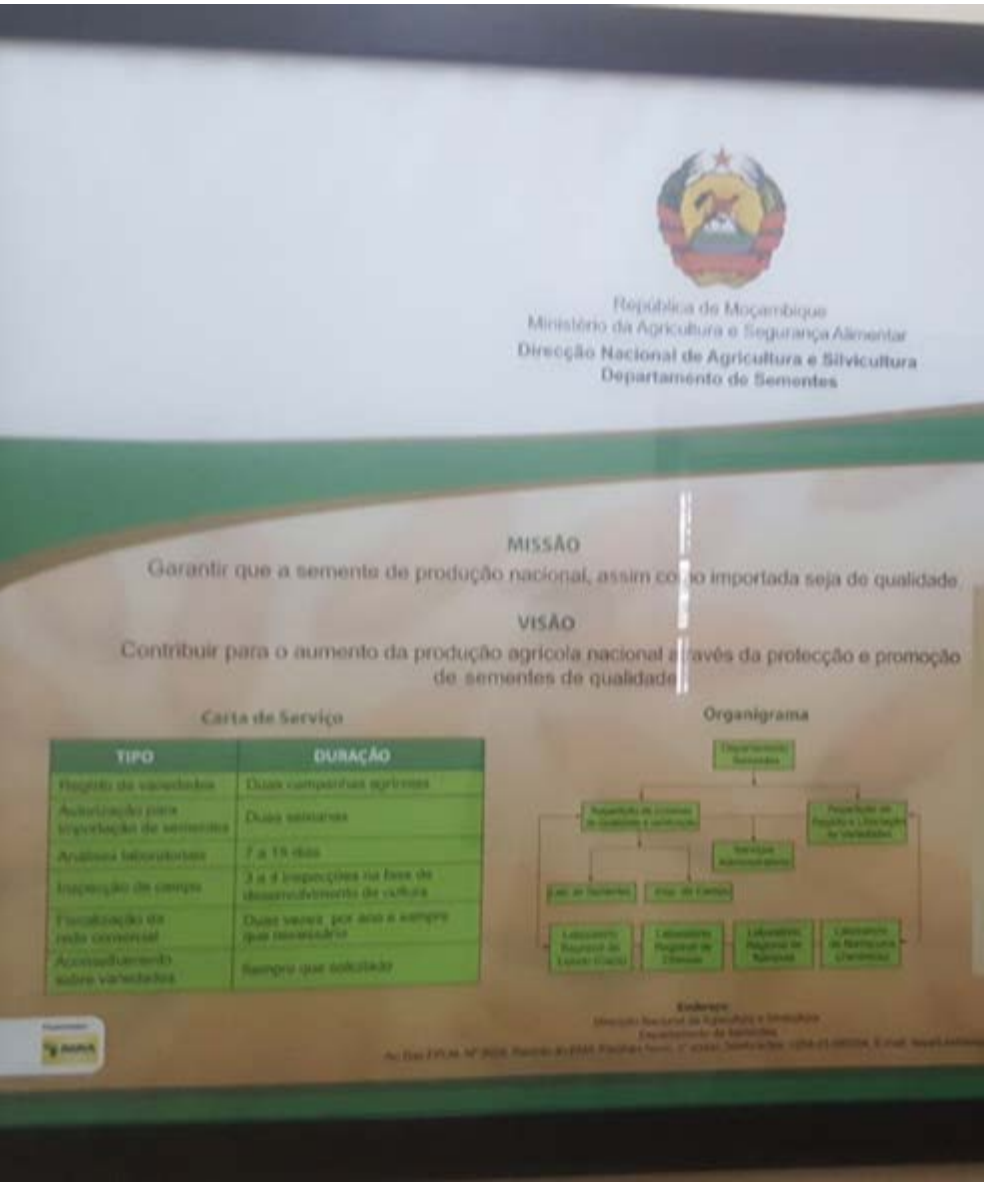
Robust methods are needed for cost benefit calculations for investments into extension: Demonstrating a business case is key to getting buy-in from private sector players. More detailed extension cost benefit calculations, (particularly those

that more accurately project and discount future benefits and costs) will improve the assessment of benefits of extension and lead to stronger business cases.

The risk of crowding out private investment in extension needs to be managed: The potential risk of crowding out the emergence of commercially motivated and driven extension investments needs to be managed as perverse incentives can potentially distort decision making in some private firms, discouraging investment in extension support for farmers despite acknowledgement of the benefits. The deployment of donor resources to support extension is better channelled to support the growth of commercially driven extension service provision, and should be structured in a manner that ensures the phasing in of investment by private sector value chain players.

Drivers of success in private sector driven extension provision include:

- Positive commercial return on investment
- Leveraging existing technical and institutional capacity
- Innovation to unlock capacity within state extension system
- Harnessing the mutual interest of multiple market system actors
- Presenting a compelling business case to private partners
- Embedding mechanisms to secure investments (e.g. by tackling side selling)
- Ensuring high quality extension services that address commercial imperatives
- A dynamic market environment
- Appropriate deployment of development funding



1 Introduction

The state of agricultural extension services for smallholder farmers across ESA is a cause for great concern. Although the causes of persistently low productivity in smallholder systems are multi-faceted, a dysfunctional extension system is believed to be at the core of this challenge[1]. Unlike in the large-scale farming sector where a combination of high levels of productivity and economies of scale enable farmers to pay for quality private extension, the majority of smallholder farmers only have access to poor quality publicly funded extension services[2]. Foremost among the weaknesses of public extension systems across ESA is a poorly trained, inadequately funded staff complement, operating with only a fraction of the resources they need, and inordinate farmer-to-extension officer ratios. Given that most of the targeted farming households have some of the lowest levels of literacy[3], limited access to information and are dispersed in remote locations, these half-hearted investments in extension services have failed to meaningfully influence farming patterns in most parts of the region. As a result, the majority of farmers still use technology and practices that is outdated and woefully inadequate to tackle the challenges posed by changing climatic patterns today. The lack of progress has resulted in stagnation of yields at below a third of the other developing regions and only a fifth of the world average[4].

A faltering agricultural extension system is a microcosm of a broader failure of the agricultural developmental paradigm that has dominated sub-Saharan Africa. Despite half a century of rural development cooperation, at least 70 percent of the very poor are still found in rural areas, most of them depending partly or completely on agriculture for their livelihoods[5]. Smallholder farmers who depend on highly climate-sensitive forms of agriculture make up the majority of the 836 million people in the world who still live in extreme poverty[6]. Climate risk is endemic to their production systems and a changing climate is set to worsen the challenges they face, with far reaching consequences for their livelihoods.

> **"In a sense Africa is facing a perfect storm with food deficit, climate change impacts and rapid population growth. The key is to help small holders manage their natural capital in a sustainable manner—the land, soil, water, vegetation and genetic resources that are vital for continued and increased agricultural productivity."**
>
> *Global Environment Facility (GEF) CEO Naoko Ishii*

As the quantum of challenges envisaged under a changing climate is becoming more apparent, there is heightened concern that failed efforts to transform smallholder agriculture and eradicate poverty now places millions of farming households at a disproportionately high risk from climate change. Described by the Global Environment Facility as "a perfect storm", the likely impacts of climate change on smallholder systems in Africa in their current state are alarming. It is clear that unless urgent and decisive action is taken to reform extension approaches, delivery of promising adaptation approaches such as Climate Smart Agriculture (CSA) are set to fail as they call for farmers with even higher levels of technical, managerial and organizational competencies. Many of the CSA options are information intensive and technology driven and are likely to remain beyond the reach of most farmers unless they are adequately and consistently supported through high quality extension services.

Consistent with the growing consensus for the need of a paradigm shift in transforming smallholder agriculture, is also the need for a new generation of extension approaches. Although the public extension system is set to continue as the dominant form, many variants and innovative alternatives are already being pursued with varying levels of success. This paper explores some of these innovations, particularly those that are linked to private sector based models for building climate resilience. The paper draws on experiences from a number of CSA innovation models that are being implemented with support from Vuna, a DFID funded climate smart agriculture program that is promoting the adoption of CSA in ESA.

Although private sector investment in extension for smallholder farmers is likely to remain limited for some time to come, a growing number of pioneering agribusinesses are increasingly open to exploring promising options. An understanding of the

1 FAO, 2016; Tata & McNamara, 2016
2 Davis et al., 2014; Tata & McNamara, 2016
3 IFAD, 2017; UN 2015
4 FAO, 2016
5 IFAD 2011;2017; FAO 2016
6 IFAD 2011; UN 2015

business case, as well as effective and sustainable approaches for private investment in extension for smallholder systems is however still lacking, particularly among decision makers within both the public and private sectors. Even development programmes are still grappling with how best to design effective farmer support programs and how to present compelling cases for private sector investment in extension. Insights from this paper are intended to enrich this knowledge base by sharing lessons of what works and some of the key considerations in designing programmes for private sector investment in extension for smallholder systems.

Although this paper reviews extension models used in private sector based CSA interventions, many of the lessons and insights are also applicable in partnerships that are not necessarily focused on climate change adaptation. The focus on CSA is motivated by both the urgency of adaptation needs for smallholder systems and market systems that depend on them, and the complexity of addressing these without a functional extension service. This discussion comes at a time when many in the private sector are well aware of the potential consequences of climate change on their business interests and the need to be part of the solution. For development practitioners frustrated by lack of progress in transforming smallholder agriculture, harnessing the financial, technological, and intellectual capital within the private sector brings a new dimension in designing and implementing climate smart solutions.

1.1 Private sector driven extension within a changing climate

A changing climate across sub-Saharan Africa is significantly elevating the climate risks for both farmers and agribusinesses, threatening their operations, their competitiveness, and their profits. Many of these risks are shared by these key value chain actors as they are interdependent. Within many progressive agribusinesses, it is increasingly acknowledged that these 'shared imperatives' can only be addressed effectively when tackled jointly with those value chain actors who also share them. This convergence of mutual interest is the basis for private sector investment in resilience building of other key value chain actors such as farmers. For agribusinesses that supply inputs or depend on products from smallholders, investing in supporting the adoption of technologies and practices that build the resilience of these farmers is among their best adaptation pathways. Supporting smallholder farmers to sustainably increase or stabilize yields and incomes in the face of climate change is key to guaranteeing sustainable supply of products as well as demand for inputs.

> ""Shared imperatives - They are 'shared' because we can only tackle joint risks in partnership with those who also face them. By working together with local communities, suppliers, governments, consumers and beyond, we can create value for all"
>
> *– SABMiller.*

Despite compelling arguments on the prospects for private sector investments to support resilience building for smallholder farmers, examples of such partnerships are still in the minority and remain largely limited to direct transactions for offtake of produce or pre-financing of inputs. Particularly uncommon are investments that seek to strengthen extension services for farmers. This is despite evidence that shows that focusing on access to technology (e.g. improved seed) or markets alone without extension support to improve management has a limited impact on productivity and farmers' incomes (see Box 1).

Drawing from the experiences of Vuna supported resilience focused business models, this paper explores some of the key reasons why investments by agribusinesses into providing CSA extension services for smallholder farmers remain unattractive despite significant scope for mutual benefits. The analysis explores possible solutions to some of these challenges based on the innovations deployed by the Vuna funded interventions and experiences from elsewhere.

For a private company, supporting extension services in a smallholder setting typically comes with a unique set of challenges that increases the risks associated with such an undertaking. To start with, extension services in the smallholder sector are not ordinarily perceived as an 'input' into the production process that farmers are accustomed to pay for, but rather as a public good usually delivered by the state. As such, there are no acceptable transactional norms for cost recovery unlike with other inputs. Making a business case for such an investment hinges on the degree to which a private entity can secure benefits that accrue from investing in resilience building for farmers, such as higher and more stable yields and improved quality that guarantee supply of produce regardless of climate variations. The upfront costs of providing high quality extension to smallholders are significant and often beyond the means of small-to-medium sized agribusinesses. As such provision of extension by private businesses in smallholder systems has seen significant innovation seeking to overcome these challenges as in the case of Vuna supported business models. Many of the extension models are still evolving, and just like many other aspects of transforming smallholder systems in sub-Saharan Africa, there are neither certainties nor standard ways of doing things.

An analysis done by ICRISAT (2013) shows that the productivity response from the introduction of improved seed varieties is insignificant, if not complemented by improved crop management (see Figure 1). However, a combination of high quality seed varieties and extension resulted in doubling of yield. Evaluations by companies participating in the COMPACI program in Mozambique and Zambia (2015) also confirmed productivity gains of up to 90% from effective extension without any extra inputs. These productivity gains were from the adoption of CSA/GAP (specifically planting time, plant spacing/population, weeding and crop protection), in combination with general good crop husbandry.

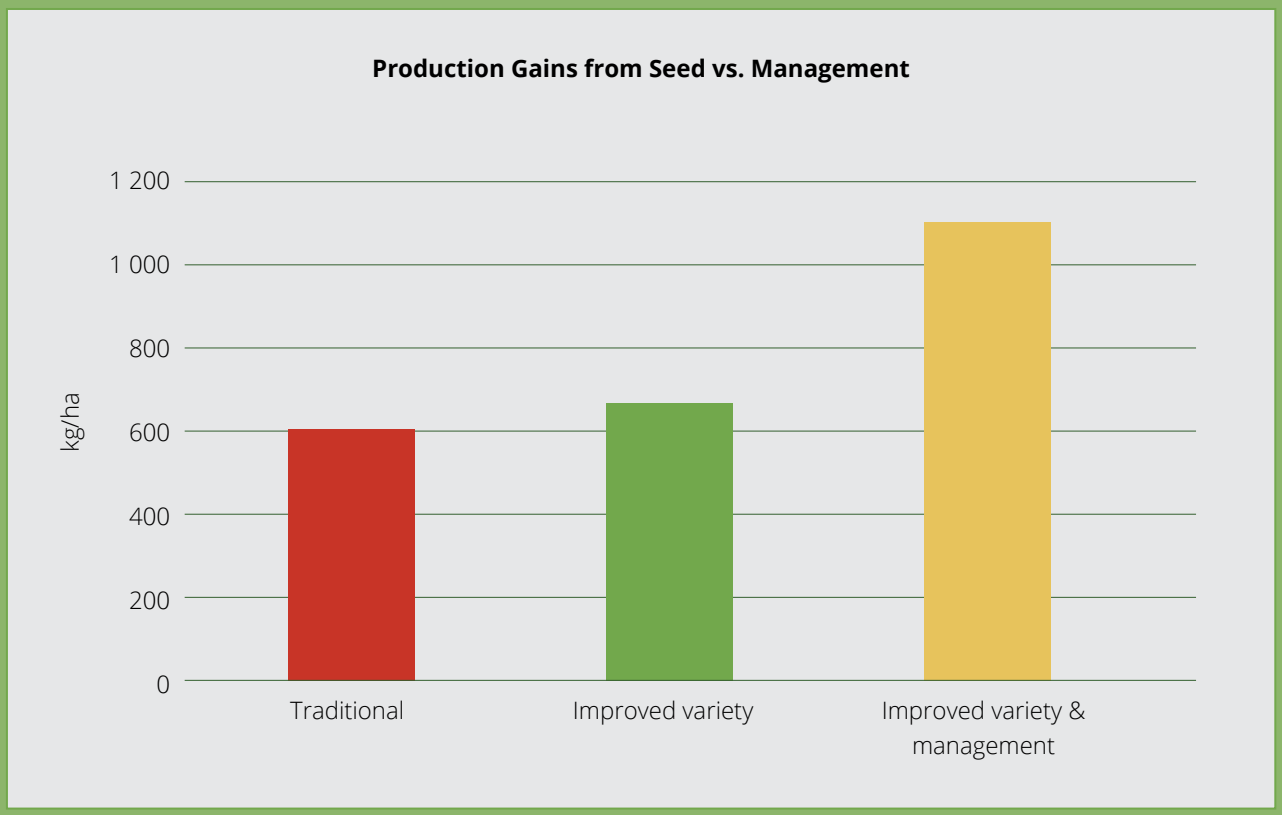


Figure 1 : Impact of technologies (seed), and extension

Box 1: The link between extension and productivity gains

2 Typologies of private sector based extension models

2.1 Overview of typologies

Vuna supported private sector investments into CSA focused extension for smallholder farmers have generally adopted three broad typologies (see Table 1): (i) in-house model - fully funded internally by the company to provide direct extension support to farmers; (ii) third party model - service provider engaged to provide extension services to farmers; and (iii) plural/hybrid model - public, private and/or donor or NGO partnership for cooperation in extension service provision. It must be noted that these three typologies are far from being homogenous, with several variant sub typologies within each. Below is a description of these broad typologies, including examples from Vuna supported interventions. .

Table 1 : Typologies of private sector-driven extension models

Model attributes	Business model typology		
	In-house model	**Third-party model**	**Plural/hybrid model**
Type of service provider	Company employees	Independent entity, private or NGO	Company(ies) employees/ government extension staff/NGO/ third parties
Funding	Fully funded by company	Fully/partly funded by company/ donor/NGO	Fully/partly funded by company/ donor/Govt/NGO
Focus of extension services	Commodity/inputs of interest to the firm	Commodity/inputs of interest to the firm	Wider focus
Quality of Extension	High quality extension	Good	Generally good-but also depends on entities involved
Coverage/Scale	Limited capacity for large-scale coverage	Limited capacity for large-scale coverage	Potential for large scale coverage possible
Effectiveness in driving systemic change	Limited systems wide impacts	Limited systems wide impacts	Potential for significant system wide impacts
Cost/risk on company	Significant costs and risks as most of the expenses are funded by company	Low/no cost and risk in this case as extension costs were covered by donor funds	Reduced costs and risks due to cooperation of several partners
VUNA Innovation models in each typology	NWK	ETG	ZSS, Musoma Foods, Musika E-voucher, AfriSeed, G2L

2.2 The in-house extension model

2.2.1 Key attributes of the model

A key attribute of this typology is the existence of internal capacity within the private company that directly provides extension services to farmers. Of the Vuna supported business models, only NWK is using this model as most of others are small-to-medium scale entities without the capacity for the required levels of investment. The NWK employs specialized staff within its establishment to provide full time extension services to their contracted cotton farmers across five provinces (see Box 2). The extension services provided are tailor made for cotton production. The motivation of NWK in extension provision is to

increase productivity, quality, and ensure consistent volumes are delivered to its ginneries, grow its market share, build trust with its farmers, and reduce incidences of side selling. In many of their operations there is a thin line between marketing and extension functions as field agents in their network tend to play both roles. Other Vuna supported business models cited the significant costs involved in funding a full-time extension service as the main constraint to adopting this approach. Some have however borrowed from this typology in setting up other forms of extension partnerships, particularly the plural model described in *Section 2.3*.

Discussions with the Zambia Cotton Board (ZCB) highlighted that the quality of NWK extension services is highly rated. However, ZCB expressed concern as many of cotton processing companies are not offering extension services to their farmers. In fact, the board indicated that other companies are downsizing their extension services due to unfavourable cotton prices in recent years. As such, the number of farmers with access to this form of extension service was said to be only a small fraction. Contract farmers under NWK are less than 20% of the 300 000 cotton farmers in Zambia.

The NWK in Zambia runs a lean, dedicated extension system for its contract farmers in all cotton producing districts across five provinces. Each district has approximately 1,300 cotton contracted farmers and is managed by an agricultural officer who supervises 'shed area' managers. Each shed manager works with 'distributors' or lead farmers that are responsible for recruitment, training, input distribution, loan recovery and on-going monitoring of farmers. During the selling season, distributors are also responsible for aggregating cotton on behalf of NWK. Some distributors also own trucks and transport cotton to ginneries. Distributors sign contracts with NWK, are provided with transport (e.g. bicycles) and are motivated through commission on loan recoveries and volumes of cotton collected. Each distributor works with about 100 farmers, but big distributors manage up to 300 farmers and typically own productive assets such as tractors and trucks that they also hire out for various services. They can earn up to ZMK80,000 (USD8,000) per season from commissions from NWK. Distributors are selected by farmers in each area as they are best placed to identify suitable candidates. With Vuna support, distributors were trained and equipped to establish CSA demonstration plots. This was described as critical for the sustainability of the model. Vuna support is also enabling NWK to involve local level (Camp) government extension officers to enable expansion. The major challenge is the extension officers are biased towards maize and generally have limited understanding to the cotton sector. Some also have expectations of payments from NWK.

Based on interview with Mr Joseph Mwanza, Training and Projects Manager - NWK

Box 2: NWK extension model

Top among the challenges highlighted by NWK is side selling. As the company is operating in a competitive market environment, their investment in extension for "their contract farmers" is often threatened by other buyers who do not respect industry wide ethical codes that prohibit side selling. The Zambian cotton sector has now agreed on steep penalties (to be administered by ZCB) for companies that are implicated in side selling as a way of managing the problem. While other agribusinesses in the Zambia cotton sector have resorted to downscaling their extension services under pressure from side-selling and low trade volumes in the cotton sector in the last 3 years, NWK has responded by intensifying their investment in extension and marketing as a way of increasing volumes traded and build trust as well as better understand and counter local dynamics that cause side selling. If sustained, this level of extension support should have a positive outcome for smallholder farmers.

2.2.2 Key model actors

As NWK is the only Vuna supported firm using an in-house extension model, its structure is used to illustrate the key actors within this model. The key players and their role in the extension system are outlined in Table 2 below.

Table 2: Key actors and their roles in the NWK In-house extension model

Actor	Role
NWK Zambia – the company	• Employs full-time extension staff • Provides operational requirements and funding • Buys cotton • Pre-finances inputs for contract farmers
The Training and Projects Manager	• Full-time staff of NWK • Heads all training and capacity building activities of the firm nationally
Agricultural Officer	• Full-time staff of NWK • Heads all district training and capacity building activities • Supervises shed area managers
Shed Area Managers	• Full-time staff of NWK • Works directly with 'distributors' or lead farmers • Supports distributors in recruitment, training, input distribution, aggregating cotton, loan recovery and on-going monitoring of farmers
Distributors	• Not full-time staff of NWK, engaged on a commission basis • Each distributor works with 100 contracted farmers, some have up to 300 farmers under them • Conduct recruitment of farmers, training, input distribution, aggregating cotton, loan recovery and on-going monitoring of farmers • Under the Vuna supported activities, Distributors establishing and managing CSA demonstration plots
Camp level government extension officers	• Engaged under Vuna supported activities • Support CSA training and establishment of demo plots.

2.2.3 Theory of change

The NWK in-house extension model is premised on high quality, specialized support and advice to cotton farmers that improves and stabilizes yields and improves the quality of cotton delivered to NWK ginneries. Consistent support to farmers and local presence of NWK representatives is also expected to build trust with farmers, improve loan recoveries, lower aggregation costs, and discourage side selling, resulting in higher trading volumes for NWK and in turn higher revenues.

2.2.4 In-house model potential pathways to building resilient systems

Significant productivity and quality improvements from the NWK investment into extension have been confirmed by both NWK and ZCB. Although resilience building is a multi-faceted and long term process, productivity increase is one of the key building blocks. Complemented by the introduction of CSA practices, input finance, and a guaranteed market, the NWK extension model is promising and has the ingredients for building an inclusive cotton value chain. The in-house extension model's weaknesses however, relate to its specialized focus, which limits its impact on a broad-based transformation and diversification of production systems, potentially putting farmers at risk in case of climate or market related shocks. The resilience building benefits are also closely tied to the fate of individual companies rather than a broader market system, exposing farmers to greater risk in case of company specific changes. This has been witnessed in the case of cotton where the withdrawal of a few key private companies has ruined livelihoods of many farmers who largely depended on cotton for their livelihood.

2.2.5 In-house model potential pathways to sustainability and scalability

The NWK's in-house extension model is closely linked to the company's input distribution, and cotton buying functions. The same structure that distributes inputs and provides extension services also works to build trust with farmers, improve loan recoveries, support aggregation of cotton and discourage side selling. This dual role seems to be at the centre of the sustainability of NWK's in-house extension system. Without it, the company is likely to suffer higher rates of loan defaults and side selling, resulting in lower trading volumes and declining revenue. In the highly competitive cotton sector, NWK is using its extension system as a competitive edge against its competitors. These factors suggest that NWK is likely to sustain the provision of extension services as it is central to the overall success of the company's business model.

Prospects for scaling up NWK's in-house model are significantly improved by the way it is structured. The lean management structure at the top is complemented by a broad farmer-based network of distributors (lead farmers). This allows for exponential growth of the network of farmers without necessarily adding to the costs incurred by NWK. Distributors are remunerated on a commission basis, giving them incentives to keep recruiting farmers into their network.

2.3 The third-party model

2.3.1 Key attributes of the model

For varying reasons, agribusinesses (usually off-takers) sometimes prefer to engage a third party to provide extension services to farmers in their value chains, particularly those that are in a contract farming arrangement. Only one Vuna supported business model, ETG in Mozambique adopted this approach (see Box 3). Although purely commercial, third party arrangements are also feasible, ETG received donor support to engage Solidaridad, an NGO, to provide CSA focused extension services for farmers producing pigeon peas in Mozambique. As is typical of such partnerships, Solidaridad (the third-party service provider) brings specialized competencies, capacities, efficiencies and existing relationships with farmers that the private company does not have internally. Solidaridad services are currently fully financed by a grant from Vuna, although the idea is for ETG to eventually take over the full funding of these extension services. Solidaridad largely operates independently with little to no day-to-day input from ETG beyond defining target groups, geographical locations and delivery terms. The extension service provider also maintains their identity and branding, with limited to no visibility of ETG.

2.3.2 Key model actors[7]

The ETG model is the only Vuna supported intervention using a third-party extension model. As such, its structure is used here to illustrate the configuration of this model. The key players and their role in the extension system are outlined in Table 3[8].

With funding support from Vuna, ETG has engaged Solidaridad (an NGO) to provide CSA focused extension services to farmers in its pigeon pea value chain. Solidaridad works independently with farmers, providing training and capacity building on CSA. This includes establishment of demonstration plots and hosting of field days to showcase good practices. ETG does not have a direct relationship with farmers except through its buyers of pigeon peas in various districts. As such there is limited scope for brand loyalty and trust building[7].

Box 3: ETG/Solidaridad partnership for extension

7 Genesis Analytics, 2018a

8 ibid

Table 3: Key actors and their roles in the ETG Third Party extension model

Actor	Role
ETG (the company)	• Contracted Solidaridad to provide CSA focused extension services for pigeon pea farmers • Guides the focus of extension services • Buys pigeon peas from farmers and exports
Buyers	• Purchases produce at the farmgate or at community-level buying posts
Solidaridad	• Provides training and capacity building on CSA • Establishes demonstration plots, hosts field days to showcase good practices and encourage learning and exchange for farmers
Vuna (Development partner)	• Provides funding for the extension services
Lead Farmers	• Support training and capacity building of farmers • Host demonstration plots, field days to showcase CSA • Production of pigeon peas for sale, mainly to ETG • Supports the aggregation of produce
Farmers	• Production of pigeon peas for sale, mainly to ETG

2.3.3 Theory of change

Third party extension models are premised on the third party bringing skills, relationships with farmers, and efficiencies that are not available within the anchor company such as ETG. This is intended to strengthen the quality of extension services provided to farmers to improve and stabilize yields, and quality of produce. Improved yields and quality would also increase trading volumes and revenues for the anchor company. Working with lead farmers is intended to foster farmer-to-farmer exchange and learning on CSA and other good practices. Strengthened farmer networks are also expected to improve aggregation of produce, reduce transaction costs, and ultimately increase traded volumes. The use of development funds to fund extension services as in the case of ETG and Solidaridad is expected to offset the high upfront costs of extension. These costs are expected to decline as farmers become more accomplished with CSA. As extension costs decline, and productivity and trading volumes increase, ETG is expected to have the capacity to internalize and sustain the funding of extension services to farmers.

2.3.4 Third party model potential pathways to building resilient systems

The ETG-Solidaridad partnership demonstrates that third party models can indeed deliver quality extension services as significant productivity gains for pigeon pea producers in the focus districts in Mozambique were reported even after just one season. Productivity increase is a key ingredient to the process of building resilience for both farmers and the private sector company. Market related uncertainties that resulted in a collapse of the price of pigeon pea[9] are however a major threat to any progress made in setting the farmers on a path to resilience.

2.3.5 Third party model potential pathways to sustainability and scalability

The justification for using donor resources (as in the case for Vuna and ETG) to assist a private company in providing extension services is premised on the need to buy down the risk associated with high upfront costs and low baseline productivity. As the cost declines and productivity increases, the company is expected to take over the funding of extension services on a long term basis (see Figure 2, also Annex 1). In the case of ETG, this transition seems unlikely to occur probably because the company still lacks the technical and financial capacity (and perhaps willingness) to internalize the function. Indications are that ETG anticipates continued access to donor funds to cover such costs, as such the company has little incentive to take over the financial burden. As such, it is highly unlikely that ETG will fully fund and sustain the extension service to farmers post-Vuna.

9 For example, prices declined from 45MT/kg in 2016 to 8MT/kg in 2017 due to a good harvest in India which remains the main market for ETG

Reluctance of ETG to internalize extension functions also seem to be driven by other factors that include a lack of competition, or a preference for an extensification-oriented[10] business model (as opposed to intensification-based). In the short-to-medium term it seems ETG will focus on widening their buyer network to reach more farmers, rather than trying to increase productivity of individual farmers.

2.4 The plural/hybrid model

2.4.1 Key attributes of the model

Perhaps the most variable in its application, the plural extension model is also the most commonly used approach in Vuna supported business models. Plural models are also referred to as 'ecosystem models' because multiple actors within the market 'ecosystem' each bring specialized competencies and resources to provide a holistic set of farmer support services (see Musoma Foods (MFCL) model in Box 4). Partnerships adopted by many of the Vuna supported business models typically brought together public, private and developmental entities with an interest in smallholder agriculture. As the model is built on the cooperation of partners that are already in the market system, it is bound by the convergence of either commercial, developmental or regulatory interests rather than transactional relations as is the case with third party arrangements. Although some Vuna supported business models such as MFCL and ZSS built in performance incentives for some partners (e.g. government extension officers) into the partnerships, direct financial reward is not the main motive for cooperation. As such, hybrid extension models are particularly attractive for small-to-medium businesses such as those supported by Vuna due to manageable levels of financial commitment. In fact, most of the Vuna supported agribusinesses such as ZSS, MFCL, G2L, and AfriSeed, are using these partnerships to leverage either their limited financial resources, or to unlock the input of specialized agencies with existing capacity.

2.4.2 Key model actors[11]

In many of the Vuna supported business models, extension partnerships entailed the anchor private company working with state funded agencies (extension services, inspectorates or other regulatory authorities), other private sector companies (e.g. input suppliers, agro-dealers), research and academic organizations, farmers' organizations, lead farmers, as well as NGOs. While the interests of these entities are different, they converge on desirable outcomes such as raising productivity, building resilience, and increasing market participation of smallholder farmers, creating incentives for cooperation. In many of the Vuna innovation models, participation of non-commercial partners, particularly state institutions, NGOs and research entities, was also motivated by the desire to be part of a vibrant market system with significant potential for energizing key players such as farmers. A rich environment for learning and exchange was also described as particularly appealing for practitioners who otherwise have limited opportunities for such engagements. An opportunity to utilize extensive available capacity particularly within the state extension system was also cited as a major advantage of this model. Examples of key actors that were highlighted in Vuna supported business models and their roles are summarised in Table 4.

The MFCL extension model is anchored on its partnership with the government extension service; input suppliers (e.g. Yara, a fertilizer company) lead farmers, and farmer cooperative committees to conduct training on CSA for its contract farmers. MFCL employs five internal full-time extension staff. These work in partnership with government extension officers in each area, 40 lead farmers and other partners. They establish at least 10 demonstration plots (0,5 acres) in each village (population of about 1,000-1,500 households) with support from their partners (e.g. Yara provides fertilizer, MFCL provide seed varieties, coordinates transport and other logistics, farmers provide land and labour, government extension officers providing day to day support and monitoring). The MFCL typically works with a younger, more open-minded, dedicated group of government extension officers who are enthusiastic about new technology and technical advancement. The contribution of extension officers is seen through higher yields, better quality of crops and consistence of supply to MFCL. They are motivated through innovative in-kind packages that recognize excellence in service to farmers. They also receive limited support for logistics such as transport for field visits[11].

Box 4: Musoma Foods Company (MFCL) extension model

10 This entail a company prioritising expansion of its farmer network to increase trading volumes, rather than investing in fewer farmers to increase productivity and marketed surplus.

11 Genesis, 2018b

Table 4: Key actors and their roles in plural extension models

Actor	Role
The anchor company (e.g. MFCL, NWK, AFRISEED, G2L, ZSS)	• Plans and coordinates extension activities • Pays for its own extension officers • Convenes all partners for CSA trainings, demonstrations, field days • Buys produce from farmers • Incentivises other partners (e.g. government extension)
Other private partners (e.g seed/ fertilizer/agrochemical companies)	• Support CSA demonstration plots establishment, field days by providing inputs, technical advice • Provide training on input use to farmers and other partners
Agro-dealers	• Provides training and capacity building on CSA, input use, weather information • Local supply of inputs • Aggregation of produce
Government entities (e.g. extension, inspectorate, research, seed services)	• Provides training and on-going extension services • Advisory services • Breed, multiply and supply Early Generation Seed (EGS) to seed companies • Registration, monitoring and certification of seed growers
Lead farmers	• Mobilization/recruitment of farmers • Support training and capacity building activities • Host demonstration plots, field days to showcase CSA • Production of crops/seed for sale to anchor company • Supports the aggregation of produce
Farmers groups/committees	• Mobilization and organization of farmers • Training and farmer-to-farmer exchange • First level compliance monitoring on behalf of partner seed companies • Supports the aggregation of produce • Support loan recoveries and peer monitoring to discourage defaults and side-selling

2.4.3 Theory of change

Each of the partners within a plural extension model brings their own competences, resources and relationship to the partnership; although cases of some of the partners (especially non-commercial) being subsidized by others are not uncommon. This lowers costs incurred by the individual companies, making it possible for them to participate in supporting extension. The partners are each driven by their commercial and developmental interests in improving productivity and consistency of produce supply by farmers. For input suppliers, improved awareness, competencies, and buying power (incomes) of farmers drive demand for productivity enhancing inputs and therefore sales and revenue for the private company. For farmers, the adoption of good agricultural practices such as CSA and the correct use of appropriate, yield enhancing inputs increases and stabilises yields, improves quality of their produce, and ultimately earns them higher incomes. Stronger income streams further improves their capacity to afford superior inputs and to invest in expanding and diversifying their operations.

2.4.4 Plural/hybrid model potential pathways to building resilient systems

The Plural model is perhaps the most promising approach with respect to resilience building. A multiple partnership arrangement as demonstrated by ZSS, G2L and MFCL, has not only resulted in significant productivity increases (see Annex 1), but also a diversification of the production system and system wide institutional changes that build resilience of farmers at scale. Participation of multiple partners brings complementarities and addresses a broad range of technical and operational needs of farmers. Although it is still too early to conclude that farmers and other market players have become more resilient, there are many indicators that they are on the right trajectory. Among the indicators that market players are on a resilience building pathway are: increases in productivity and quality of produce, decline in loan defaults or side selling, and consistent or increasing traded volumes, resulting in higher incomes for farmers and improved capacity utilization for processing companies.

Vuna supported plural extension models have demonstrated significant innovation that is leading to system wide improvements, particularly with respect to getting the best out of government extension personnel who are often poorly motivated. Some of the agribusinesses are deploying a number of motivational incentives such as bonuses or recognition for exceptional performance in farmer support (see Box 3). While some of these practices could be seen as potentially controversial and disruptive to the system[12], there is evidence that they work, and there is scope to develop frameworks that guide how such arrangements could be formalized and applied more consistently and transparently. These incentives have resulted in good performance that is driving productivity and quality improvements that are benefiting both farmers and agribusinesses.

2.4.5 Plural/hybrid model potential pathways to sustainability and scalability

A pre-requisite for the sustainability and scalability of private sector based extension models is that the cost of extension needs to justify the additional value unlocked through productivity and quality improvements that result in higher traded volumes, and consistency of supply. In the case of input suppliers, investment in extension needs to drive growth in market share, increased brand loyalty and ultimately, increased sales. Similarly, farmers need to see benefits through increased productivity, less sensitivity to climate risks and higher marketed output. Without this value addition, private sector driven models would be unsustainable. As such it is non-negotiable to ensure that extension is of high quality to ensure that significant value is unlocked. Using information from some of the Vuna supported business models, the cost-effectiveness of investment into extension was determined as one of the indicators for sustainability and potential for scalability.

Creative methods for evaluating the cost-effectiveness of extension have emerged from recent studies (e.g. the COMPACI program[13]), allowing objective assessment of returns to such investments. The most basic approach compares the cost per farmer and the marginal productivity increases as a result of such support. While there are no standard cost benefit calculations (input vs. return) for extension, creative methods currently being used seem to work well. A simple model was introduced and was tested with four cotton companies in the COMPACI program in Mozambique and Zambia. This approach has been adopted for this analysis, to enable comparison of Vuna supported interventions with results obtained within the COMPACI program. The approach calculates extension costs per farmer and compares this investment to the value of additional yield at the prevailing prices. This approach however does not account for the potential long term benefits to the firm from more productive farmers following a few seasons of investment. It also fails to capture gains that result from

12 In some contexts any financial or in-kind rewards to government officers is discouraged as it is seen as introducing disparities within the national system

13 The Bill and Melinda Gates Foundation and the Germany's Federal Ministry for Economic Cooperation and Development (BMZ) decided in 2009 to provide financing to extend the work of the Cotton made in Africa initiative within the framework of the Competitive African Cotton Initiative, known by its acronym COMPACI

improvements in quality of produce by farmers as a result of improved agronomic practices and post-harvest handling. Other qualitative benefits such as trust building, brand loyalty, reduction in side selling and other forms of defaults are also not fully accounted for within this approach.

Table 5 summaries findings based on results from some of the Vuna supported business models[14], juxtaposed with those obtained from the COMPACI programme. The results show that average extension costs for Vuna supported agribusinesses are about USD27 per farmer while those in the COMPACI programme averaged USD18 per farmer. It should be noted however that VUNA supported companies have implemented their programs for shorter time-frames compared to those under the COMPACI programme, which could explain the higher average costs per farmer. For one of the Vuna supported firms, the average cost per farmer (USD 27) is equivalent to 33 kilograms of maize seed or 14.2 kilograms of sugar beans at prevailing prices of USD600 and USD1,400 per ton respectively. As such, seasonal yield gains per farmer need to be above 33 kilograms for maize and 14.2 kilograms for sugar beans to justify investment in extension at current prices. This firm has reported average yield increases in maize from about 0.5 tons to about 2 tons among its contracted farmers over the last four seasons. This translates to seasonal yield gains of around 325 kilograms per farmer, nearly tenfold the cost of extension. Similarly figures for the other two Vuna supported agribusinesses suggest that returns to investment in extension are positive and significantly above the costs (Table 2) based on farmers' reports of nearly three-fold yield increases.

Table 5: Comparison respective extension costs, number of farmers and extension costs per farmer (Dollar value and equivalent in crop kg)[15]

Company[16]	Extension Costs[17]	Number of farmers	Extension costs/ farmer *(per season)*	Extension Cost (in crop kgs, at prevailing prices)
1	460,000	30,000	15.33	51
2	1,400,000	66,000	21.21	70
3	1,350,000	51,000	26.47	88
4	803,000	73,000	11.00	37
Vuna Partner 1	60,000	1,800	33	66
Vuna Partner 2	30,000	1,500	20	33 (14.2)[18]
Vuna Partner 3	203,000	7,185	28	15[19]

The above simple analysis shows that Vuna supported agribusinesses can sustainably provide extension support to farmers. The benefits are particularly high for higher value crops. As long as private companies are guaranteed of the returns to their investment, there is scope for them to invest. Although the upfront cost is high, productivity benefits, reduced transaction costs that come with better organisation, and the improved trust and loyalty are generally significant enough to justify the investment. The data from Vuna supported firms also confirms assertions that extension costs decline over time, while productivity increases (see Figure 2), creating even greater scope for sustainability and scale.

14 The names of the companies involved have been removed due to the commercial nature of information shared

15 COMPACI Figures requested for 2014/2015 season as model, cotton companies in Zambia and Mozambique

16 All information based on company figures, names have been kept anonymous as requested by some companies

17 Based on company information, including, staff salaries, logistics (transport, DSA etc.) and some supervisor costs, calculations and included costs do vary between companies as no standard model does exist as yet. (Companies were requested to include, staff costs, transport, e.g. motorbikes, fuel etc. and supervision costs as far as they related to extension).

18 For maize price at USD600 per ton and sugar beans at USD1,400 per ton respectively

19 Based on the lowest price for beans of TS1200 per kilogram

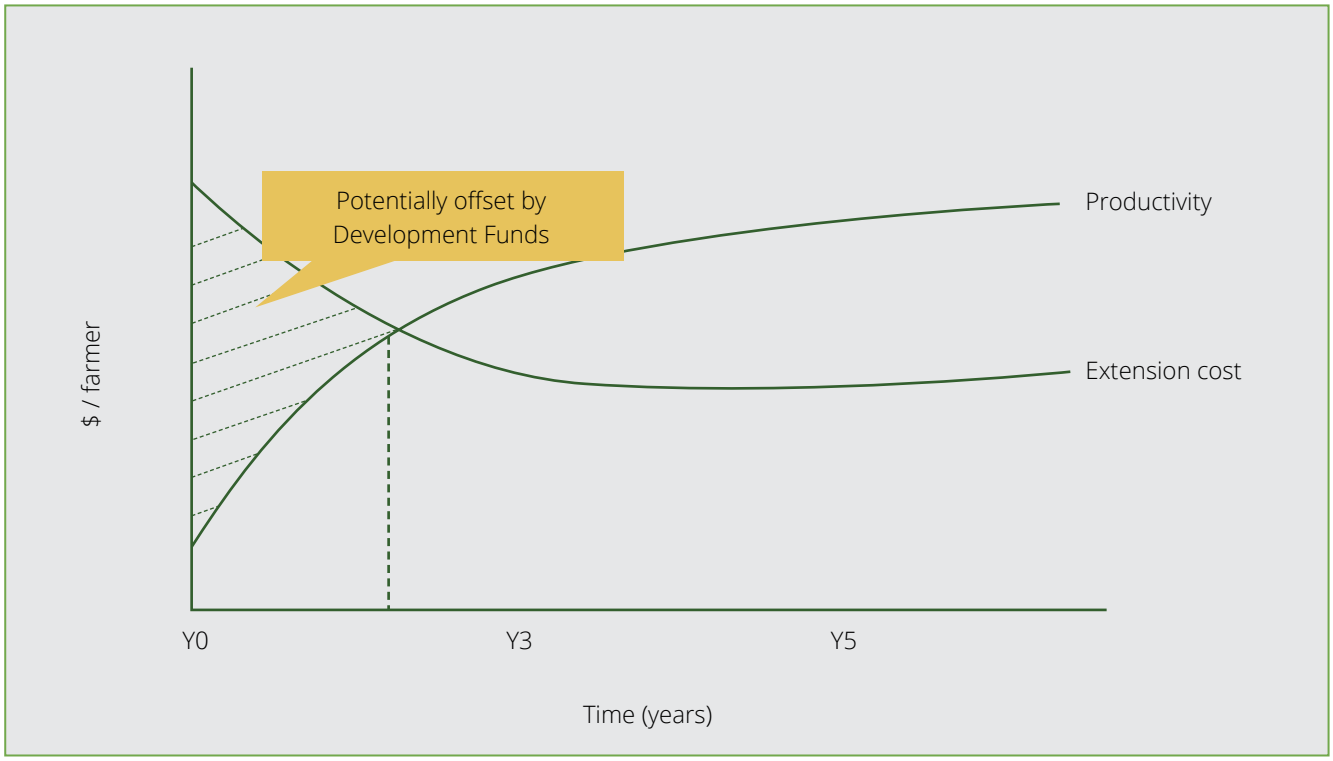


Figure 2 : Trend in extension cost/productivity responses (based on trends from ZSS, MFCL and G2L contract farmers)

More detailed extension cost benefit calculations will improve the assessment of benefits of extension and lead to better targets and enhanced outputs. Robust yet simple extension cost benefit models are needed to convince private sector actors that extension is indeed cost effective. Based on such calculations, companies can easily estimate their extension costs, and the productivity thresholds needed to cover their investment. This will allow them to set targets for farmers, extension staff, or service providers and to effectively monitor extension cost benefits. Although this assessment has not been applied to other services such as climate information services or weather-indexed insurance, it is certainly feasible to extend these cost benefit comparisons to other farmer support services. Where there are favourable cost benefit ratios, these services could be commercially provided to farmers. Just as in the case of extension, simple and yet robust models demonstrating commercial viability need to be developed to influence decision making within private companies.

3 Assessing drivers of success for private sector driven extension models

Although it is too early to find empirical evidence of resilience building from many of the Vuna supported interventions since they are only a year into implementation, the study was able to identify indicators such as productivity improvements and increases in traded volumes to assess whether market actors are on a resilience building trajectory. Pathways, through which resilience building could happen if such trajectories are sustained, are starting to emerge in some cases and these are used to determine which typologies of private extension are more likely to be successful. The sustainability and scalability of these approaches is assessed based on commercial imperatives that provide incentives for key market actors. Below is a discussion of the key drivers of success that where identified by the study.

3.1 Emerging drivers of private extension model success

The study finds that there is potential for sustainably delivering private sector driven extension support to farmers in smallholder systems with the participation of other key players with commercial interests in these value chains. This justifies the thrust towards private sector driven approaches as sustainable vehicles for delivering climate smart solutions. Factors that determine success are related to the context, the design of extension model, as well as its implementation.

3.1.1 Context related factors

A dynamic market environment: Vuna supported models have shown that a vibrant and dynamic market environment is key to the sustainability of private sector driven extension provision. Firms that operate in dynamic markets with strong linkages to a diverse set of end market players realised great returns to investment in extension. Those that rely on thin and volatile markets or where there is potential for government controls tend to be cautious about investing in extension.

Appropriate deployment of development funding: Some of Vuna supported business models have demonstrated how appropriate deployment of development funds can support the emergence of a commercially driven extension system. Co-financing models have been more successful in crowding-in potentially sustained private sector investment, especially where these are linked to delivery of commercially important outcomes that strengthen the business case. Fully donor funded models tend to distort decision making in some private firms and risk crowding-out private investments in extension. These need to be better managed to avoid creating perverse incentives that discourage private investment in extension support for farmers despite acknowledgement of the benefits. Examples of firms that seek to depend on donor funded extension for as long as they can, suggest that ill-conceived deployment of development funds could diminish propensity to invest in extension.

3.1.2 Design related factors

Commercial return on investment drives sustainability: Vuna supported initiatives show that a positive return on investment in extension is a key driver of success. The benefits from improved productivity and better quality of produce need to justify the cost of providing extension to farmers

Leverage existing technical and institutional capital: Results suggest that rather than investing in a parallel system, it is more desirable and cost-effective to leverage the technical and institutional capital available within the government extension system. The scale of current available capacity within the state extensions systems makes it a worthwhile and potentially game changing investment. Some of the Vuna supported agribusinesses are pioneering performance-based approaches to energizing the government funded extension system that is driving exceptional performance in farmers. While views are divergent on some of these approaches, which are sometimes seen as potentially controversial and disruptive to the system, there is evidence that they work, and there is scope to develop and institutionalize frameworks that guide how these could be formalized and applied more consistently and transparently.

Harness the mutual interest of market system actors: The findings suggest that plural extension models have been successful because they capitalize on the mutual interests of key value chain players. Small-to-medium sized companies such as those supported by Vuna have demonstrated that such partnerships are cost-effective when well managed and bring a

diversity of quality technical and managerial skills. Such partnerships have been shown to improve prospects for system-wide changes that build resilience of both production and market systems.

A compelling business case for private investment in extension: Buy-in from private sector partners for investment in extension is driven by presentation of a compelling business case. Robust extension cost benefit calculations, particularly those that accurately project and discount future benefits and costs are key to building a compelling business case that influences investment decision making.

The cost of providing extension declines as productivity improves: Although upfront costs of providing extension are high, these have been shown to decline as farmers become accomplished in what they do. In contrast, productivity and quality of produce tends to increase as farmers' competences improve. This trend creates scope for sustainable investment in extension.

Tackle side selling: Extension models that have built in mechanisms for tackling side selling through trust-building, peer monitoring, and greater local presence have been more successful.

3.1.3 Implementation related factors

High quality extension: Providing high quality extension support to farmers is critical to successful and sustainable investment in extension by private entities. Vuna supported initiatives showed that building farmer capabilities, platforms for learning and sharing, as well as improving access to information were all key to strengthening the human, social and financial capital that is at the centre of resilience building of farming households. A focus on CSA practices and technologies through training, demonstrations, and field days, including the introduction of new crops (e.g. sorghum, legumes) in suitable regions improved productivity and incomes, stabilised yields, created new market opportunities and increased the diversity of production systems in a manner that spread both climate and market related risks. Overall these changes reduced the sensitivity of production systems to variable climatic parameters such as rainfall, and build the adaptive capacity of farming households.

Innovation to unlock capacity within state extension system: Innovation is needed, particularly with respect to overcoming the inertia within vast state funded extension system. Although there are no formal systems for guiding partnerships between the private sector and government entities, those companies that have invested in creative ways of engaging the government extension system have capitalized on the reach of the government system to deploy sustainable, and large-scale support for smallholder farmers.

ANNEX 1:

Trends in productivity increases for ZSS contract farmers

Mrs. Masikati

Mrs. Masikati is a renowned farmer in Chimedza village (Ward 3, Zaka District). She has been contracted by ZSS as a seed grower since the conception of the Seeds and Market Project (SAMP). During this tenure, she has placed sole emphasis on Open Pollinated Maize Varieties (OPV) namely; ZM309 and ZM401. She is also a committee member of the Zaka Seed Growers Association.

Table 3: Yield Assessment (Mrs. Masikati)

Agricultural Season	Crop	Variety	Yield/Ha (Mt)
2011/12	Maize	ZM309	0.5
2012/13	Maize	ZM309	1.75
2014/15	Maize	ZM309	2.5
2015/16	Maize	ZM401	2.7

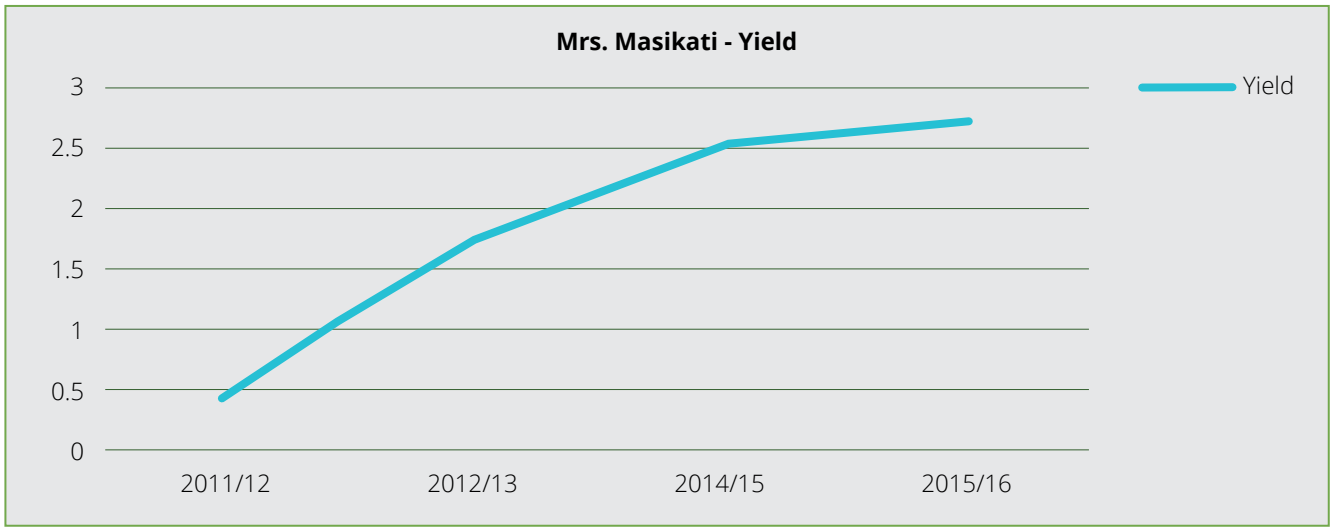


Figure 3: A graph showing the changes in crop yield with time (Agricultural Seasons)

Mr. Gondongwe

Mr. Gondongwe is a well-known cowpea and maize farmer in Zishiri communal lands (Ward 6, Zaka District). He is also producing under the smallholder seed production scheme administered by ZSS. Mr. Gondongwe is the current chairperson of the Zaka Seed Growers Association.

Table 4 : Yield Assessment (Mr. Gondongwe)

Agricultural Season	Crop	Variety	Yield/Ha (Mt)
2011/12	Cowpea	CBC2	0.15
2012/13	Cowpea	CBC3	0.3
2014/15	Cowpea	CBC2	0.5
2015/16	Maize	ZM401	0.75

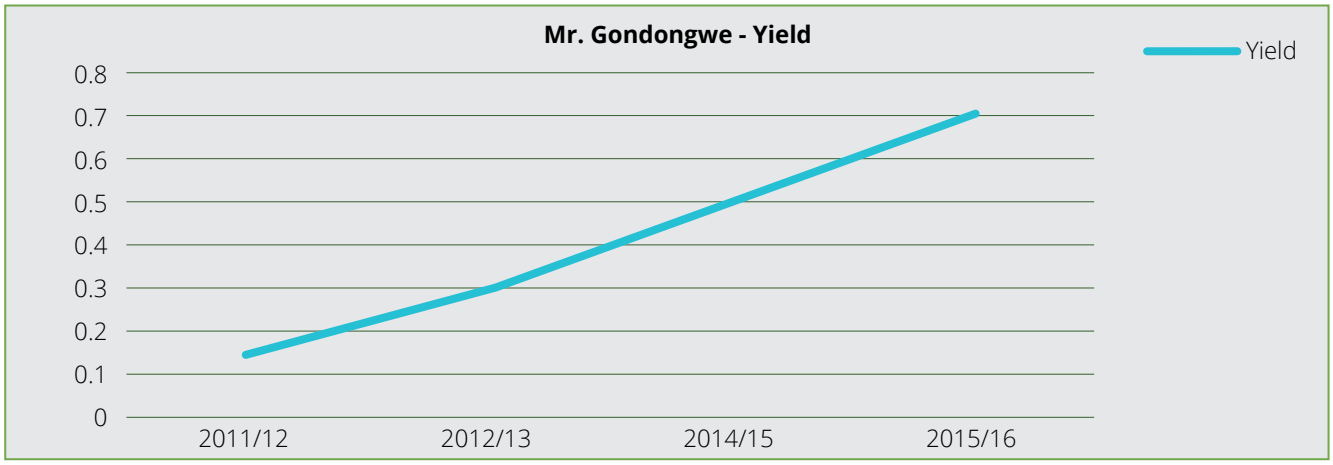


Figure 4 : A graph showing the changes in crop yield with time (Agricultural Seasons)

Mr. Javangwe

Mr. Javangwe is a farmer under the ZSS seed production system. He is one of the highest performers in the program for the past five years. Mr. Javangwe hosted the 2016/2017 Provincial field day at his homestead to showcase the ZM521 maize seed crop.

Table 5 : Yield Assessment (Mr. Javangwe)

Agricultural Season	Crop	Variety	Yield/ha
2011/12	Maize	ZM401	2
2012/13	Maize	ZM401	3.9
2014/15	Maize	ZM401 and ZM521	6.4
2015/16	Maize	ZM401 and ZM521	10

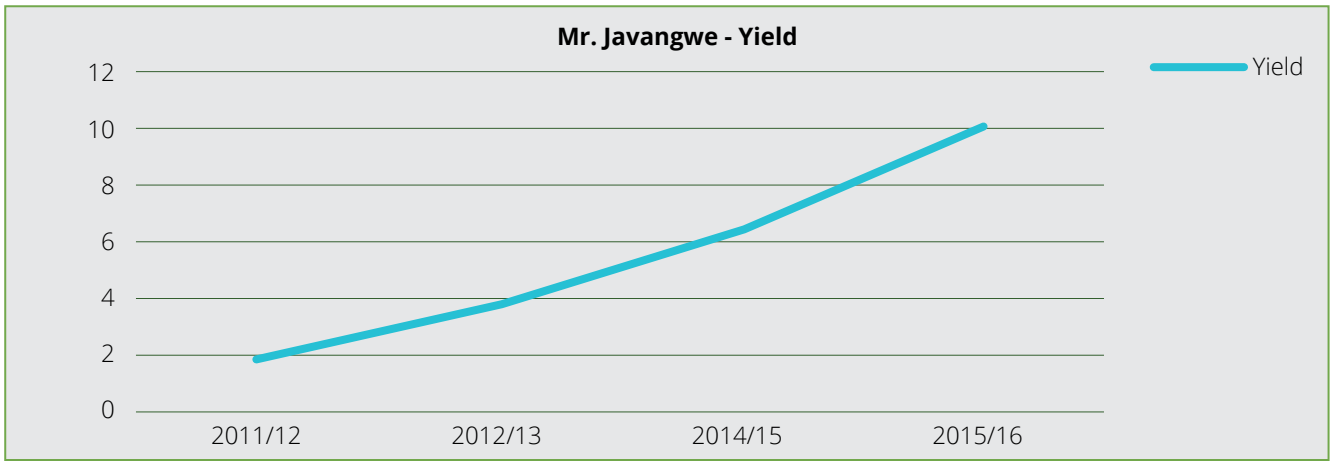


Figure 5: A graph showing the changes in crop yield with time (Agricultural Seasons):

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