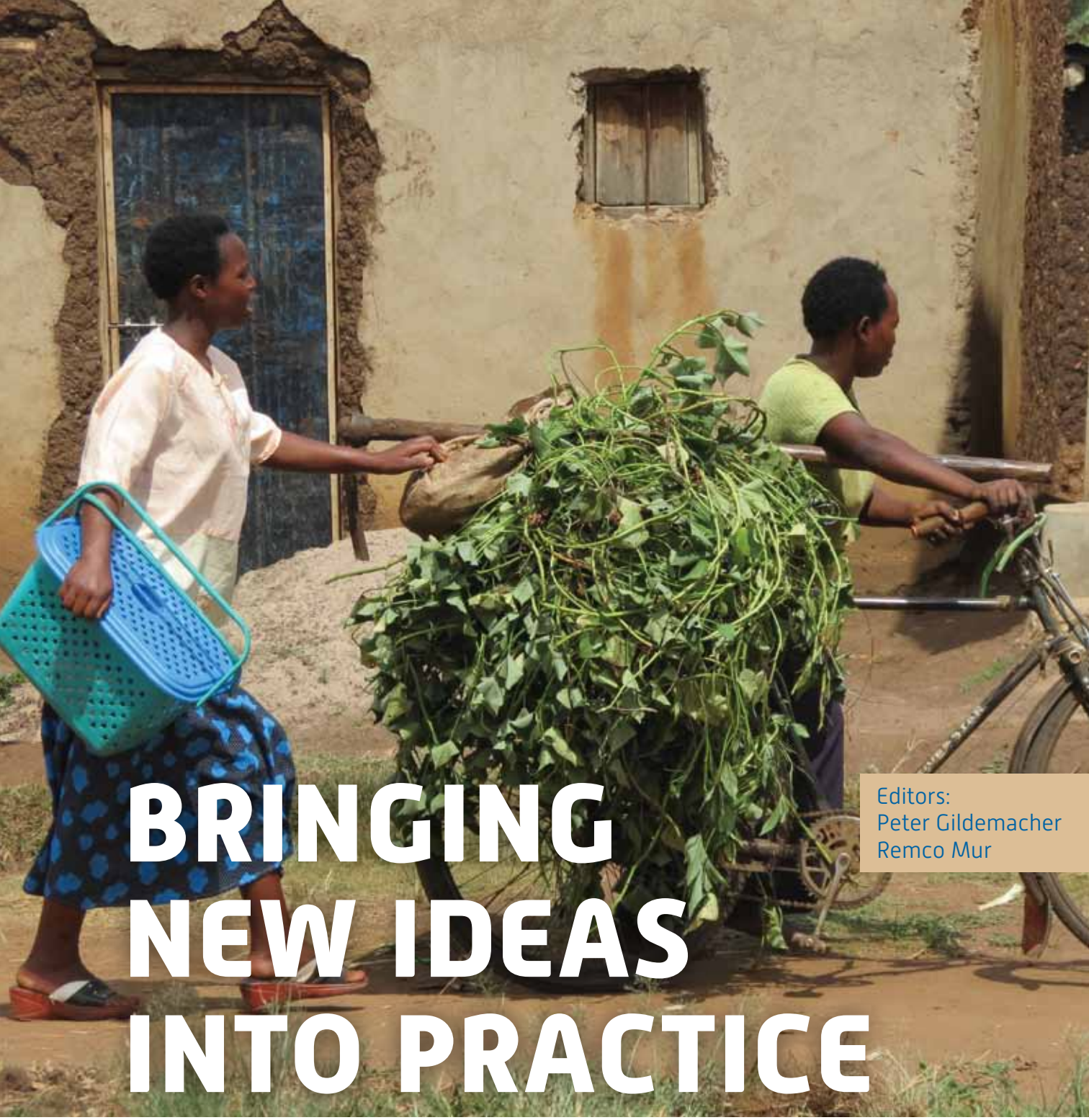

BRINGING NEW IDEAS INTO PRACTICE

Editors:
Peter Gildemacher
Remco Mur

Experiments with agricultural innovation

Royal Tropical Institute

Research Into Use

LEARNING FROM RESEARCH INTO USE IN AFRICA (OVERVIEW)

FOREWORD

The DFID-funded Research into Use (RIU) Programme investigated ways to scale up successful innovations in agricultural research. Considering the ever increasing challenge of assuring food security and income from agriculture, it is imperative that all available knowledge and know-how be put to sustainable and meaningful use. The programme sought to experiment with modes of technology development and agricultural innovation. The Royal Tropical Institute (KIT) has evaluated five cases from the RIU portfolio in a pragmatic manner. It attempts to isolate the results attributable to RIU and estimate where possible the net value added.

It is very gratifying to see that there have been sizeable successes and the foundations were laid for increasing impact in the future. This publication analyses both the positive and negative RIU experiences and derives insights on how to bring new ideas into routine use. It is hoped that this publication provides food for thought and assists in the design of future programmes and their respective evaluations, so that sustainable and meaningful change for the benefit of the world's poor can be realised.

Dr Andy Frost
Deputy Director
Research into Use Programme

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SUMMARY

To enhance food security and income African farming requires continuous innovation in response to changes in the agro-ecological and marketing environment. Research Into Use (RIU), funded by DFID, explored different approaches of promoting innovation in agriculture. This publication analyses a selection of five projects from its Africa portfolio, the maize platform in Nyagatare, Rwanda, the cowpea platform in Kano state, Nigeria, the pork platform in Malawi, the Farm Input Promotions (FIPS) best-bet in Kenya, and the Armyworm best-bet in Kenya and Tanzania. Based on the realised changes in the capacity to innovate and household level poverty impact the value for money and main lessons learned were documented.

Current and Future Impact

The results obtained, and the prospects of accumulating future impact are overall positive. In the case of cowpea in Nigeria and FIPS in Kenya, there is a clear current impact on household income and food security, while in the case of the maize platform in Rwanda, and to a lesser extend the armyworm best-bet, there is the promise of future impact on the basis of the work done. FIPS in Kenya and the Rwanda maize platform improved the capacity to innovate, the cowpea platform to some extent, while the armyworm best-bet and pork platform did not have an effect on the capacity to innovate.

The Process of Agricultural Innovation

Innovation system theory emphasizes that innovation is context specific and usually involves a re-ordering of relationships and interactions between stakeholders. As a consequence successes cannot simply be 'copied'. What is lacking is a vision of how to use promising practices that have been proven in one environment in an effective manner to realize change on a larger scale. We conclude from the five case studies that it makes sense, without resorting back to linear 'transfer of technology' thinking, to distinguish three different processes in agricultural innovation:

1. Needs and opportunity identification;
2. Experimentation;
3. Bringing into routine use.

The objective of a needs and opportunity assessment is to identify entry points for innovation, which can originate from multiple sources, who may be farmers, private entrepreneurs, researchers or others. The interaction of different, converging opinions and experiences of stakeholders can result in new ideas that would not have developed autonomously.

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Maize, post harvest

Experimentation can focus on farming technologies, but also on new market relations, services or collaboration models. The objective is to arrive at tried and tested promising new practices. Compared to 'bringing into routine use' the process of experimentation is often 'pre-competitive', in the public interest, and provides information and experience to a wider audience. It requires room for failure and consequently carries higher risk.

'Bringing into routine use' aims at moving from promising new practices to impact at scale. This also requires experimentation, risk-taking and local adaptation, but differs from the experimentation phase in the levels of risks and the room for failure. The focus is on assuring sustainable and lasting, often competitive, cost-effective or profitable service delivery and production.

Implications for Policy and Practice

An intervention aiming at agricultural innovation would do well to invest in assuring impact at scale in the short run, while simultaneously investing in the capacity to innovate. Research has an important role to play in innovation, but is not the only source, nor the essential driver of the process. Therefore, a distinction needs to be made between funding research initiatives, which aim at enriching our knowledge through developing and testing theory, and initiatives promoting agricultural innovation.

With respect to the process of agricultural innovation it is important to acknowledge the above three interrelated processes that underlie agricultural innovation. Only focusing on one or two of these processes does not necessarily mean no impact can be achieved; however, this would assume that the other processes are well taken care of.

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Vegetable market in Nyagatare, Rwanda

1 INTRODUCTION

1.1 Background

To meet the increasing demand for food, feed and fuel farmers need to intensify their production systems and adapt to continuous, often unforeseen and sudden changes in their environment, which requires continuous innovation (Nederlof et al., 2011, p.16; World Bank, 2012, p. 7). Over the last two decades, the emphasis in agricultural innovation has shifted from the linear transfer of technology, with research as the major driver, to innovation systems thinking, which recognises the importance of interaction between stakeholders and the context specificity of solutions. It is now widely accepted that in order to bring about change in agricultural practices, experimentation and learning are required and need to be stimulated. An important question for policymakers, managers and practitioners in the field of agricultural development is how to best invest resources to support agricultural innovation. Here we provide lessons from Research Into Use (RIU) experiences in Africa. RIU was a United Kingdom Department for International Development (DFID) funded programme aimed at stimulating rural economic development by enhancing agricultural innovation.

1.2 Research Into Use

The RIU programme began in July 2006 as a follow-up to DFID's Renewable Natural Resources Research Strategy (RNRRS). The RNRRS ran from 1995 to 2006 and sought to "remove researchable constraints to the sustainable development and/or management of natural resources". The assessment of the results achieved by the programmes implemented under RNRRS showed that much of the potential of the research outcomes to contribute to development impact remained unrealised, in part because of the difficulties of scaling up the research results. RIU was initiated as a response to this lack of impact at scale.

The first idea was to identify 30 promising research outcomes from the RNRRS portfolio for scaling-up and to support their breakthrough (www.researchintouse.com). It was quickly realised that adoption was not merely the next step in a linear research and diffusion process and that a better contribution to development impact required a systems approach to innovation. What ultimately resulted was the current RIU programme, which was the subject of this study and had two main objectives:

1 To attain sustainable economic development by supporting efforts to make better use of existing insights in agriculture, with a bias towards insights obtained through the RNRRS programmes;
2 To understand how to catalyse innovation and improve the contribution of agricultural research to development at scale.

RIU explored variations of promoting innovation in a way that was deliberately experimental. Three distinct categories of interventions constituted RIU's operations to promote the use of research to achieve pro-poor impacts:

- Six Africa Country Programmes focused on promoting innovation related to specific themes or sub-sectors;
- Best Bet facility: An Innovation for Development fund to support the private sector in putting RNRRS research outcomes into use.
- A cluster of projects in Asia designed to answer specific research questions;

Africa Country Programmes

RIU established Country Programmes in Rwanda, Tanzania, Malawi, Zambia, Nigeria and Sierra Leone. The country programmes experimented with a variety of networking approaches to establish better links between the research, agri-business, policy and farming communities with a view to strengthening innovation capacity. The building blocks for an innovation network can be thought of as individual innovation platforms. Such platforms are defined by a common theme, around which a network of partners operates. The premise of the innovation platform approach is that platforms deliberately enhance interactions between stakeholders, which results in better information exchange and more ideas and opportunities for agricultural innovation and development. This study assesses three innovation platforms:

Cowpea Value Chain Innovation Platform, Nigeria. RIU initiated and established three value chain innovation platforms in Nigeria, focusing on aquaculture, cassava and cowpea/soybean. The aim of the cowpea platform selected for this study was to increase cowpea production and improve productivity in target communities, to improve storage of cowpea grains and reduce post-harvest losses, and to improve the commercial management and utilisation of cowpea fodder.

Maize Innovation Platform, Rwanda. In Rwanda, three commodity platforms were established - a cassava platform in Gatsibu district, a potato platform in Gicumbi district, and a maize platform in Nyagatare district. The Maize Innovation Platform selected for this study was the first attempt at organising maize chain actors around an integrated value chain approach, emphasising farmer entrepreneurship. This represented a different way of thinking for many development actors in Rwanda, where interventions and policies are generally developed and implemented in a top-down manner.

Interview with a maize producer

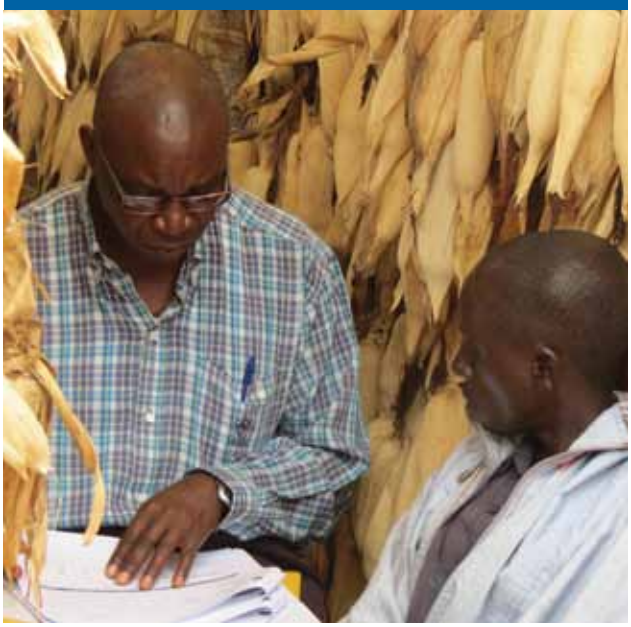


PHOTO: GENEVIÈVE AUDET-BÉLANGER

Pig Production Innovation Platform, Malawi. Four innovation platforms were operational in Malawi for fish farming, cotton, legumes and pork. The aim of the selected pork platform was to improve market arrangements.

Best Bets

RIU Best Bets tested an innovative competitive funding mechanism in which grants were awarded to initiatives aimed at reaching the potential at scale of promising technological developments through market mechanisms. Through a competitive mechanism 7 projects were funded, of which 2 were selected for this study.

Armyworm, Tanzania and Kenya. The aim of the Armyworm Best Bet was to reduce the devastating effect of the African Armyworm, a migratory pest that can cause severe damage to rangeland and cereal crops, particularly maize, sorghum, rice and millet.

Village Based Advisors (VBAs), Kenya. Farm Inputs Promotions Africa (FIPS), Kenya aimed to broaden farmers' access to and proper use of higher-yielding farming methods and agricultural inputs. Its main approach was the establishment of Village Based Advisors (VBAs) who provided agricultural advisory services and commercialised the inputs required for intensification of production.

1.3 Assessment Method

This study draws lessons from these selected cases and presents evidence at outcome and impact level. Lessons from RIU were gained through a combination of quantitative and qualitative methods. The study aimed to provide an indication of the value obtained for the resources invested. Generic insights were documented to inform future programmes addressing rural economic development through enhancing innovation.

The study was largely focused on the following overarching research questions, in order to gain an understanding of how the impact of agricultural research and innovation interventions can be optimised:

- How did the innovation platform approach, accelerate and improve agricultural innovation for poverty reduction?
- How did the commercialisation of research results and services through Best Bets make a sustainable contribution to agricultural innovation for poverty reduction?
- What are the outcomes and the current and potential future impacts of the interventions?
- What was the value for money of the interventions?
- What were the relevant lessons learned with regard to future initiatives?

Impact Pathways

Impact pathway evaluation is a suitable method for assessing change in complex processes. It shows how interventions have been realised and have contributed (or not) to certain results and to current and potential future impacts on people's lives. Impact pathways are useful for assessing the attribution of impact and outcomes to the intervention and can also show how critical events may have contributed to accelerated innovation. Based on a document review, the team of evaluators reconstructed the impact pathways of the different cases. The impact pathways were validated during a workshop with stakeholders from the different cases. Questionnaires for qualitative and quantitative analysis were prepared based on the validated pathways.

PHOTO: FEMKE VAN DER LEE

Calf, Kenya

Household Surveys

Household surveys were conducted to assess the changes in practices and the impacts on households resulting from RIU activities. The surveys aimed to quantify the changes identified through the impact pathway exercise. For each case, a random sample was taken from the RIU beneficiaries. The sample size differed according to the case study. The surveys compared RIU beneficiaries with control groups. In most cases, useful baseline data was lacking. As a result, the evaluations aimed to collect data for both the current (end-of-intervention) situation and, in retrospect, the baseline situation.

Qualitative Research

Interviews, focus group discussions and mini-workshops involving key informants were conducted. The focus of these activities was on the processes through which change and innovation occurred. Important elements included:

- Critical events and decisions that influenced the innovation process;
- Interaction among stakeholders within the innovation networks;
- The sustainability of changes;
- Spin-off effects;
- The capacity to innovate: the sustained capacity of stakeholders to interact and to identify and address opportunities for agricultural innovation.

Various participatory tools were used during data collection, including the Actor Interaction Analysis (matrix and maps), timelines, and priority and pair-wise ranking.

1.4 This Report

In the five chapters that follow, the results, discussion and conclusions of the selected cases are presented in summarised form. In the last chapter, a cross case analysis of the cases is provided and lessons are drawn, providing valuable recommendations for policy- and decision- makers involved in promoting agricultural developme

PHOTO: RIU

Training on use of triple bagging, Nigeria

2 COWPEA VALUE CHAIN INNOVATION PLATFORM, NIGERIA

2.1 Description

RIU established three innovation platforms in Nigeria, for cassava, aquaculture, and soybean/cowpea. Cowpea was selected because:

1. It is an important component of the integrated crop-livestock production system dominant in Nigeria;
2. It is a crop produced by the poor and its value chain activities are carried out predominantly by women – hence it is regarded as a woman's crop in northern Nigeria;
3. Cowpea is a legume that fixes atmospheric nitrogen into the soil to restore soil fertility.

RIU's specific intervention strategy for the cowpea sector in Nigeria was to establish and support the Cowpea Innovation Platform, to promote certain technologies to address sector constraints, and to encourage private sector participation in agricultural development. The platform brought together various actors from six states. This assessment relates only to Kano State.

The Cowpea Innovation Platform aimed to: (1) increase farm production through the introduction of Striga-resistant varieties; (2) reduce post-harvest losses resulting from weevil infestation through the introduction of triple bagging storage; (3) bring about improved efficiency in the management and use of cowpea fodder as a livestock feed through the introduction of fodder compactor; and (4) initiate sustainable institutional changes that support overall development of the cowpea value chain in Nigeria.

Inputs

A total of about £169,000 was invested by RIU to establish the Cowpea Innovation Platform and to support the development of innovation capacity in Kano State for cowpea production, post-harvest storage and the management and utilisation of cowpea fodder. Of this total, about 13% (£22,000) was invested in the setting up and facilitation of the Cowpea Value Chain Innovation Platform activities, and about 22% (£37,000) in increasing farm productivity of cowpea. About

45% (£76,000) was spent on promoting an improved method of cowpea storage (triple bagging) and about 20% (£34,000) on developing, field-testing and promoting improved management and use of cowpea fodder (Table 2.1).

Table 2.1 RIU-Nigeria's Financial Investment in the Cowpea Value Chain in Kano State

Cost Centre	FY2009-2010 (GB£)	FY2010-2011 (GB£)	FY2011-2012 (GB£)
Cowpea field operations	17,936	40,883	27,839
Travel & subsistence (staff and consultants)	5,394	6,302	6,607
Salaries & fees (staff & consultants)	10,772	13,058	14,271
Other overhead costs	8,646	8,646	8,646
Sub-totals	42,748	68,889	57,363
Total		**169,000**	

Evaluation Methodology

Kano State was selected for the evaluation for the following reasons: 1) it is the leading cowpea producing state in Nigeria; 2) it is the headquarters of the RIU-assisted Cowpea Innovation Platform; and 3) it is the location of the IITA Cowpea Station. Conclusions from the evaluation cannot be directly extrapolated to the other states, although the process and activities have been similar.

Within Kano State, 25 villages were randomly selected from among the group of 200 RIU-assisted communities, while 8 control villages were selected. Within the RIU-targeted villages, 200 households were randomly sampled for the household survey. In each of the 8 control villages, 100 households were randomly selected. A total of 23 men and 25 women participated in Focus Group Discussions in the project communities, while 17 men and 15 women participated in the control communities. A total of 31 representatives of organisations involved in the innovation platform were interviewed. The outcomes of the evaluation were compared with the baseline situation established in 2009.

2.2 Results and Discussion

RIU-Nigeria programme worked through key partner organisations at national, state and local levels as well as in the public, private and non-governmental sectors. The contributions of these partners appeared crucial to the success of the interventions. However, their inputs still had to be managed and coordinated by RIU. The approach adopted for the Cowpea Innovation Platform can be characterised as a multi-stakeholder approach for bringing to scale existing technologies and (partly RNRRS-created) research results. Although it was merely supply-driven, it has indeed led to high adoption rates.

Capacity enhancement focused on creating capabilities and mechanisms for disseminating new practices and technologies. This included capacity building through training and extension, new institutional arrangements to link input and service suppliers to producers, financial support and subsidies. For three years, the RIU Nigeria programme was embedded within ARCN, the national agency mandated to regulate agricultural research. The thematic affinity between ARCN and RIU encouraged ARCN to buy into the RIU programme and to use its nationwide influence to enable RIU to build important alliances across the sectors and states, thereby enabling the programme to achieve impact at scale with limited resources. Based on RIU experiences, ARCN directed all 18 national agricultural research institutes (NARIs) in Nigeria to integrate the agricultural research for development approach in performing their respective mandates.

At 86%, the increase in cowpea yields (kg/ha) among IP members was higher than among non-beneficiaries (54%) (see Table 2.2).

Table 2.2 Average pre-project baseline, target household and control household cowpea yields

	Average production per household (kg)	Average yield (kg/ha)	Fodder yield (kg/ha)
Control	579	463	233.5
IP targeted	808	561	269.0
Baseline	364	301	-

Specific perceived changes in the cowpea sector were related to the introduction of improved cowpea varieties. However, farmers also reported high incidences of field pests and diseases associated with the newly-adopted cowpea varieties, which were thought to be more susceptible to field pests and diseases, and thus required more frequent pesticide spraying to obtain the optimal yields.

The household survey revealed that, after the sensitisation and demonstrations, 14% and 94% of respondents in control and project communities, respectively, were aware of the triple bagging method of cowpea storage. None of the respondents in the control communities had acquired or used triple bags, while 71% in the project communities reported use of triple bags. The results also revealed that 62% of the project producers delayed the sale of their grains for 4-6 months

after harvest, thereby taking advantage of higher prices in the off-season. The selling price immediately after harvest was NGN 5,000 per 100 kg bag; 4-6 months after harvest the price was as high as NGN 12,000 per 100 kg bag (GBP 47).

All these changes occurred within the last three years and had an impact on over 50% of the households in the targeted communities. The extent of the impact, particularly on women, young people and the socially excluded was perceived as high. About 40% of the participants in the intervention communities were women.

The introduction of fodder compactors was carried out on a relatively small scale and is still at the experimental stage. Once their use has been proven to be effective, up-scaling to other villages and districts will become a priority. Two compactors were acquired by the Garko Local Government Council in Kano State for the purpose of sensitising, demonstrating and training the cowpea farmers and fodder merchants. 15% of respondents in the sampled project communities were aware of the technology, and 7% had benefited from it.

Cowpea

PHOTO: RIU

2.3 Conclusions

- The interventions in the cowpea sector in Kano State involved little experimentation.
- The platform functioned primarily as a mechanism for bringing to scale certain practices and technologies, rather than as a sustainable mechanism for addressing constraints and opportunities in the cowpea sector.
- Successful up-scaling and dissemination of new technologies require a multi-stakeholder approach, involving both public and private actors.
- The fodder management intervention involved more experimentation than the production or storage intervention; hence its scale was relatively limited (only 7% adoption rate). The design and testing of appropriate baling equipment, in combination with institutional arrangements and capacity building, was an inherent part of the process.
- Building partnerships between with existing private and public structures made it possible to upscale the adoption of research outputs that had proven their value in practice within a relatively short period of time.
- The role of farmers is restricted to being receivers of a specific extension service rather than active actors involved in experimentation or an exercising agency in an innovation process.
- Through their participation in the platforms, private sector actors were able to respond to business opportunities, which contributed to sustainable changes in the sector.
- Public resources were used to achieve impact at scale by investing in the dissemination of successful technologies, promoting public-private synergies, developing markets and ensuring the availability of effective technologies for mass adoption.
- Embedding the RIU programme within ARCN enabled faster institutional learning and change.
- It is debatable whether or not the approach has contributed to sustainable improvements in the capacity to innovate among the stakeholders of the cowpea sector in the targeted states.

PHOTO: RIU

3

^ *African Armyworm*

Geographical distribution of the African Armyworm >

ARMYWORM
BEST BET

3.1 Description

Objective

The Armyworm Best Bet was aimed at reducing the devastating effect of the African Armyworm (caterpillars of the migratory moth *Spodoptera exempta*), hereafter called simply armyworm, which is a migratory pest that can cause severe damage to rangeland and cereal crops, particularly maize, sorghum, rice and millet. Outbreaks tend to follow an annual pattern, but vary greatly in intensity from one year to another (Scott, 1991; Njuki et al., 2004). The occurrence of serious outbreaks is highly erratic and largely unpredictable (Haggis, 1984, 1986).

The aim of the Armyworm Best-Bet project was to establish a system for the production, supply, distribution and marketing of Safe and Affordable Armyworm Control (SAACO) tools, building on earlier experiences with community-based forecasting (CBAF) and biological control using Spex-NPV, a formula of NPV, a naturally occurring virus disease of armyworm.

Intervention Activities

Community Based Armyworm Forecasting (CBAF) was established in 40 villages in Tanzania and 80 villages in Kenya by the respective ministries of agriculture, with support from CABI, through the following activities:

1. Training of trainers from district agricultural offices in a national workshop;
2. Selection of farmers at village level to be trained as forecasters;
3. Training of forecasters and first season implementation of community-based forecasting under close monitoring and control;
4. Official registration of the armyworm pheromone in collaboration with the pharmaceutical industry;

5 Establishment of links between pharmaceutical industry, distributors, and government and international pest control bodies and the set-up of a durable pheromone lure and trap supply system.

To develop Spex-NPV as a routine crop protection method, a laboratory was set up with the capacity to produce Spex-NPV, to be managed as a private company by Eco-Agri Consultancy Services Ltd. The following activities were envisaged:

1 Mass harvesting of Spex-NPV from field outbreaks to build raw material stock;
2 Procurement of equipment and consumables for Spex-NPV production;
3 Establishment of a Spex-NPV production plant, including staff recruitment and training;
4 Processing and production of Spex-NPV;
5 Training and demonstration for farmers on the use of Spex-NPV.

However, due to a lack of major armyworm outbreaks during the project lifespan, the facilities that were set up were never used for the massive production of Spex-NPV.

Inputs

The resources invested by RIU in the CBAF system and Spex-NPV production were fairly modest, especially in the CBAF system development, given that the investment was meant to ensure the establishment of the system in 80 sub-locations in Kenya and 40 sub-locations in Tanzania, including other activities such as creating a supply system and promoting the system at national level.

Table 3.1 Inputs into the Armyworm Best Bet Programme (GB£)

Item	Investment Tanzania	Investment Kenya
CBAF	83,900	170,600
Spex-NPV	257,860	

Assessment Methodology

CBAF villages were sampled from those that had reported armyworm outbreaks in 2011. Close to each CBAF village, a non-CBAF village that had also suffered from recent armyworm attacks was selected to serve as a control. Thirty households in each village in Tanzania and 45 households in each selected sub-location in Kenya were sampled randomly and interviewed. 262 CBAF village and 255 control household interviews were carried out in Kenya, compared to 167 and 172 in Tanzania. Key resource persons who were involved in the project were also interviewed. In each of the sample districts, short stakeholder workshops were organised in which forecasters, local extension staff, input dealers, local administrators and maize farmers participated.

3.2 Results and Discussion

No improvement in yields could be measured in the CBAF villages compared to the non-CBAF villages. Although the potential damage as a result of armyworm is high, the damage is highly erratic in terms of time and location, with total damage figures hard to estimate. This is further exacerbated by the fact that farmers tend to replant after an armyworm attack, which means that yield losses occur as a result of lack of moisture at the end of the season, rather than directly as a result of armyworm. The stakeholder workshops showed that, especially in Kenya, few serious armyworm outbreaks had been recorded since the CBAF had been installed, making it much less likely that differences would have occurred as a result of the project intervention. At the same time it was noticed that much confusion existed among farmers with regard to the distinction between armyworm and other caterpillars damaging their crops. Nevertheless, farmers indicated that they suffered from armyworm attacks to varying degrees and estimated their losses based on these attacks.

The forecasting system was working well from a technical and organizational point of view. Armyworm alerts measurably improved the awareness of imminent armyworm attacks among the farming population in the CBAF village samples compared to the non-CBAF villages. In Kenya, the system has been fully adopted and is run routinely by the Ministry of Agriculture in armyworm hotspots. In Tanzania, the adoption of the forecasting system by the public agricultural services was less well developed.

The involvement of community members in the provision of public crop protection services is the most interesting innovation within the armyworm best-bet. The forecasters did their job to great effect and collaborated well with the public extension officers and local administration. It was observed that their role was kept very modest, as it was limited to counting moths in the pheromone traps. Spreading the message of an impending armyworm attack was left to the village administration and public agricultural extension officer. Consequently, the community-based forecasters were barely known to the community. As a result, the forecasters could not develop into a resource person for dealing with armyworm in the locality and as liaison to the crop protection services. Such a role would have opened further opportunities for the community-based forecaster to develop into a resource and liaison person on wider crop protection issues.

Armyworm forecasting was promoted with the assumption that the timely preparedness of farmers would allow them the time to take adequate measures against armyworm. However, this implies that farmers are in the habit of acting to control armyworm. The survey revealed that few farmers respond at all to armyworm attacks, let alone took any preventive measures against an imminent armyworm attack. Farmers seemed largely unaware of the different stages of the pest and were not able to recognize the early stages as they appeared in their fields. The project did not have a deliberate extension component to improve the knowledge of farmers in relation to the pest, which appears to be essential to changing the response of farmers to the pest. Considering the combination of limited knowledge and a low level of readiness to take action, it is not likely that a forecasting and warning system alone would deliver much success in reducing damage.

The armyworm project relied entirely on the Spec-NPV component for the improvement of armyworm control. Unfortunately, Spex-NPV is a slow killer of armyworm, and it takes up to 72 hours to have any effect on an 'army' devouring a maize crop. At the same time, chemical control options, which are much faster, are available from input dealers in larger towns. Even these chemical options are currently not used much. The project claimed that Spex-NPV could become more accessible at village level and be cheaper than chemical control options when produced routinely. However, these claims are not substantiated and remain dubious to the reviewers, as the process of Spex-NPV production is rather elaborate, while distribution would have to deal with exactly the same dealer network as that for chemical control products. Spex-NPV has the disadvantage of being specifically targeted at a highly erratic pest. Chemical control options are used for a broader spectrum of pest, thus making them more attractive for a dealer to maintain in stock. Finally, Spex-NPV was not tested in the hands of producers, nor was it tested for its effectiveness under field circumstances compared to other chemical and local control options. The choice for Spex-NPV as the single control option to be promoted under the project seems pre-mature.

The work on armyworm has resulted in a change in the registration of semio-chemicals in Kenya, which is an important spin-off effect for the horticulture and floriculture industries in the country. Commercial management of armyworm forecasting and control tools has not worked out as planned, as the volumes of traps and pheromone that are required, even on a country scale, are of a magnitude that makes it unappealing to commercial companies.

The fairly exceptional low damage as a result of armyworm in the two years since the best-bet started could be given as the main reason for the lack of a measurable impact arising from the effort. However, even in case of higher infestations, it is far from sure whether a major effect can be achieved as a result of better armyworm forecasting. Crops can be protected using chemicals against the pest, also in the stages where armies have started to create damage. Farmers do not fully understand the pest and are unlikely to respond more adequately based on a forecast alone. Finally, the damage is also patchy and scattered during years with higher infestations, meaning that armyworm, although potentially very severe locally, is only one of, and not the major, many yield determining factors. As such, armyworm forecasting and control does merit a place in wider efforts to assist farmers in reducing damage to crops by pests and diseases, but a major specialized effort focusing on armyworm alone is not likely to lead to any high impact on poverty.

3.3 Conclusions

- Community-based armyworm forecasters were established and did their work effectively in collaboration with the ministries of agriculture and local administrators.
- The supply of materials for the traps functioned well in Kenya, and less well in Tanzania.
- Access to information on armyworm was measurably higher in CBAF villages than in non-CBAF villages.
- No effect could be measured for the difference in access to information on maize yields.
- This can be attributed to the fact that armyworm incidence was low
- Spex-NPV could not be produced as a result of these low incidences.
- CBAF focus on forecasting alone is unlikely to reduce armyworm damage without an accompanying extension campaign.
- Considering the irregular and patchy occurrence of the pest, it would seem more logical to embed armyworm forecasting and control services in a larger community-based crop protection service linked to public services.
- Spex-NPV is not yet a mature technology; its field performance, preference of farmers and costs and benefits vis-à-vis other control options have not been adequately documented.
- The project facilitated the acceptance of an easy registration process for semio-chemicals in Kenya.

PHOTO: FRED ZAAL

Farmer in his field with maize and sweet potato varieties

4 BEST-BET VILLAGE BASED ADVISORS (VBA), KENYA

4.1 Description

Objective

FIPS-Africa has been working in the agricultural sector in Kenya since 2003. It has focused on the parallel provision of agricultural advice and inputs, and has tried to do this in a commercially viable, and at the same time inclusive, manner, aiming to provide access to both less- and better-endowed farmers. The objectives that guide the work of FIPS-Africa are:

1. Develop and implement an innovative methodology for putting research into use to improve the food security of smallholder farmer families.
2. Establish, in co-operation with private sector companies, networks of village-based agricultural advisors (VBAs) to deliver, on a sustainable basis, new fertilizer blends and crop varieties and information on improved crop and livestock management practices to smallholder farmers.

Intervention Activities

The principal aim of FIPS-Africa is to broaden farmers' knowledge and improve their access to and use of higher-yielding farming methods and inputs. The approach adopted can be described as a private agricultural extension system. VBAs deliver advisory services through visits to individual farmers and through field days and demonstration plots, and they also sell agricultural inputs. VBAs seek fees for their advisory service and obtain margins on the sale of inputs. In addition, VBAs facilitate local experimentation with new technology to promote local adaptation and adoption.

PHOTO: FEMKE VAN DER LEE

Farmer inspecting her field

FIPS-Africa headquarters supports the VBAs by identifying and training VBAs on new promising technologies, creating links to the input supply industry and, where needed, re-packaging and distributing agricultural inputs in small quantities appropriate for smallholder producers. The VBAs thus serve as intermediaries between smallholder farms and the agricultural input industry and agricultural research, with the FIPS-Africa office playing a strong coordinating role.

Inputs

In addition to the time input by the VBAs, RIU also invested resources in the development of VBA, which were put to use by the FIPS headquarters. A total sum of £554,349 was made available to FIPS through the best-bet funding facility.

Assessment Methodology

From all the RIU intervention areas, Siaya, Vihiga and Kakamega districts in Western province were selected for this study based on maturity of the intervention, the RIU support that was received and because the area was considered representative of most of Kenya. Household interviews, stakeholder workshops, resource person interviews and documentation review were used to verify the assumed impact pathway constructed at the start of the study in collaboration with FIPS. The household survey was implemented among randomly selected farmers in three villages in their fourth FIPS intervention season, one in its 9th season since intervention and one non-FIPS control village.

4.2 Results and Discussion

Agricultural Production and Marketing

In the FIPS villages, the use of improved varieties was strikingly higher than in the non-FIPS villages. In the case of maize, for example, 94% of the farmers in the FIPS villages planted improved varieties, compared to 19% in the control village, while similar figures were recorded for sweet potato, cassava, beans, soy beans and cowpeas. Maize productivity was higher in the FIPS villages than in the control village (See Figure 4.1). For cassava and sweet potato, only total production per household before and after FIPS was estimated so as to reduce the length of the interviews. The estimated production was much higher after the intervention, and also much higher compared to the control village production (Figure 4.2 and Figure 4.3), indicating a major improvement in household food security.

Maize

Figure 4.1 Average Household Maize Productivity, in kg per acre

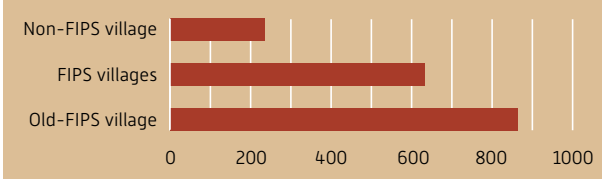


Figure 4.2 Average Cassava Production per Household, in kg

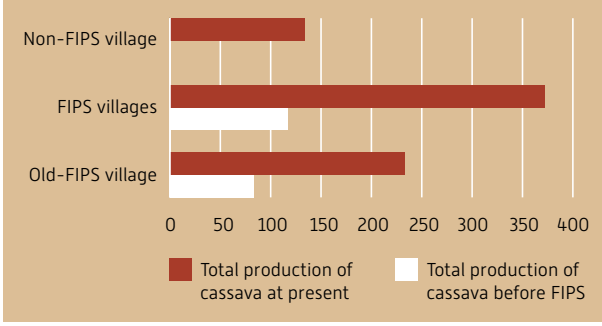
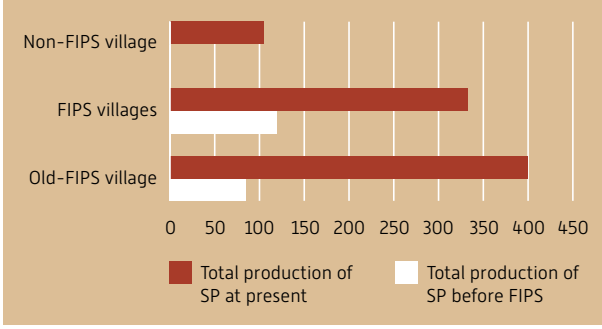


Figure 4.3 Average Sweet Potato Production per Household, in kg



The combined data show that in the FIPS villages farmers have been able to transform from food insecure subsistence producers into food secure producers who are marketing a surplus for cash income (Table 1 and Table 2).

Table 4.1 Numbers of Months of Food Self-sufficiency per Type of Village

	non-FIPS	FIPS	old-FIPS
At present	6	12	10
Before FIPS		7	5

Table 4.2 Average Income from Sales of Three Main Crops, in Three Types of Village (in Kshs, one season)

	non-FIPS	FIPS		old-FIPS	
	At present	At present	Before FIPS	At present	Before FIPS
Maize	142	1914	315	1335	614
Sweet potato	89	932	134	1786	150
Cassava	77	1058	185	1218	71
Total income	308	3904	634	4339	835

Sustainable Agricultural Service Provision

In addition to improving productivity, VBA has also had an influence on the willingness of farmers to experiment with, adapt and adopt new farming practices. Although farmers in non-FIPS villages also indicated that they had experimented with new technologies, this was much less pronounced compared to the FIPS villages where FIPS Africa promoted experimentation by providing farmers with small test packages of farm inputs and support services at a reasonable cost to assist them in their experimentation.

As a go-between, FIPS promotes newly developed technology, such as new varieties and agricultural practices developed by the Kenyan Agricultural Research Institute (KARI), and provides feedback from the intended users. Similarly, FIPS functions as a relay between the agro-input industry and their end-clients and this contributed to the diversification of the product range to better respond to the demands of smallholder producers by reducing package size and producing compound fertilisers.

The VBA approach was intended to become self-sustainable as a result of the income generated by the VBAs through the sale of inputs and services. Interviews with 14 VBAs on their activities from February 2011 to March 2012 showed that they had earned 40,000 Ksh. on average during the year, which is quite modest and may not be enough to ensure sustained service delivery. The margins obtained on seed and fertiliser sales and the associated services of demonstration were low compared to the livestock services, which may indicate a risk that VBAs might drop crop-related activities in favour of the more profitable livestock-related services.

Before the introduction of VBAs, an agricultural input dealer system already existed in the study area. However, interviewed farmers indicated that the input dealers were found only in the larger towns, had only large packages of inputs available, and generally were not providing seed for the farmers' preferred varieties, nor did these input suppliers provide any advisory services. Compared to the public agricultural extension system, the VBAs seem better able to reach farmers at grassroots level. Collaboration between FIPS and the public extension service was minimal and may be an area worthy of improvement in the future.

Current and Future Impact

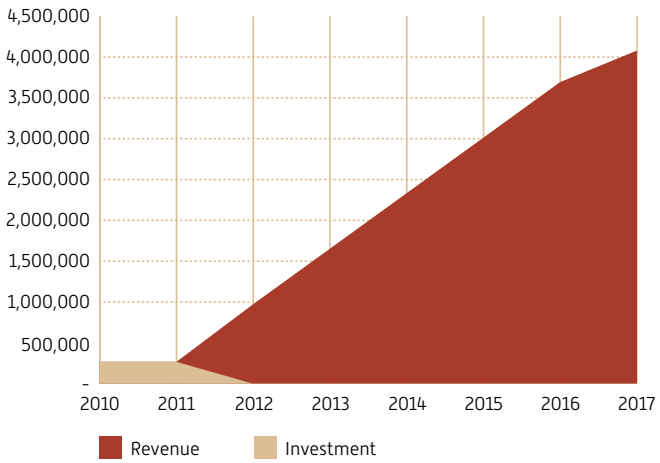
A rough estimate was made of the return on the RIU investment in VBA, based on the value of the measured yield increases presented earlier for the years 2010-2012, and a conservative growth scenario based on the assumption that each VBA can ultimately provide services to 350 farmers, adding 50 new clients each year and an assumed price for maize equivalent of production of 35 Ksh per kg.

VBA providing extension service

PHOTO: FEMKE VAN DER LEE

Figure 4.4 shows a strong positive return on the investment made, corresponding to an annual IRR of 182%. A major prerequisite for this continued accumulation of impact is the continued efforts made by the VBAs. Their continued commitment will most likely require continued support, especially for the crop-related activities on which the impact calculation is based. This support is provided by FIPS, and FIPS is not running on a cost recovery basis but does need to leverage resources to play its role.

Figure 4.4 Investment and Annual Development Impact: Actual Figures for 2010-2012, Predictions for 2012-2017*



** Increase of client base per VBA = 50 per year, with a maximum of 350*

Maize and beans

Village Based Advisor showing chicken vaccin

4.3 Conclusions

- Local facilitation of agricultural intensification by demonstrating and providing access to improved crop husbandry, improved varieties and agricultural inputs can result in the transformation of food insecure subsistence farming to food secure farming for a marketable surplus.
- The system of VBAs is a cost-effective manner of spending public (donor) resources for local economic development and improving food security.
- The self-sustainability of the VBA system has not been convincingly demonstrated, as revenues obtained by the VBAs are relatively low.
- Benefits arising from the VBAs accrue largely from livestock-related services and not from crop-related services.
- VBAs may require indefinite additional incentives to allow them to continue to carry out their crop-related activities.
- Considering the positive impact of the VBA system on agricultural production and innovation, continued investment of public resources in the functioning of the system seems justified.
- FIPS-Africa has contributed effectively to adoption and use of promising agricultural technologies, and as such has shown that it can play a vital role between agricultural producers and both agro-input industry and agricultural research.
- FIPS-Africa has been able to demonstrate that a better response to the input and agricultural services needs of smallholder producers can lead to effective intensification of farming.

PHOTO: ROGER BYMOLT

Pig producer, Malawi

5 THE MALAWI PIG SECTOR INNOVATION PLATFORM

5.1 Description

Objectives

The RIU Malawi programme began in 2008 as one of the Africa country programmes aimed at making better use of agricultural research outputs to achieve improved productivity and profitability for smallholder farming. A National Innovation Coalition (NIC) was formed to foster national level coordination in order to improve the innovative capacity of the Malawian agricultural sector. Innovation platforms were initiated for specific commodity sectors (cotton, legumes, horticulture, livestock and fish farming).

In this study, the pork sector innovation platform was investigated. The platform's objective was to make the existing local pig farming systems more competitive, thus delivering better quality products and higher incomes.

Intervention Activities

The activities of the pork innovation platform were two-fold:

1. The exchange of ideas and other interaction aimed at enhancing the functioning of the pig sector.
2. Providing grants for the construction of the slaughter and market facilities and training of pig farmers from the associations and cooperatives involved.

The key constraint identified by the innovation platform was the poor communication and business interaction between supply and demand in the sector. The innovation platform decided to tackle this by investing in local physical slaughtering and marketing infrastructure. Facilities were constructed in Mulanje, Mzuzu, Balaka and Dowa districts to

handle and sell live pigs and dressed carcasses as well as processed meat, and to create a market link to large processing companies.

Table 5.1: Selected Costs of the RIU Malawi Pork Platform

Item	GB£	US$
Livestock Innovation Platform meeting costs	30,963	48,395
Pig cooperative training	5,759	9,001
Marketplace – Mzuzu	23,966	37,459
Marketplace – Mulanje	13,049	20,396
Marketplace – Balaka	12,698	19,847
Marketplace – Dowa	12,845	20,077
Total	99,280	155,175

Source: RIU Malawi

Assessment Methodology

For the impact study in Malawi, the districts of Mzuzu (northern Malawi) and Mulanje (southern Malawi) were selected because the intervention there had been completed earlier than in the other districts. Data was collected through:

- A household survey in which 79 and 91 pig farming households were sampled randomly in Mzuzu and Mulanje respectively from the participating cooperatives. A control group of 20 pig farming households that did not participate in the RIU project were sampled in each district.
- 6 focus group discussions with pig farmers per district.
- Key informants were interviewed individually.
- Examination of RIU project documentation.
- A validation workshop in both districts to present emerging findings to farmer organisation members and leaders and solicit feedback.

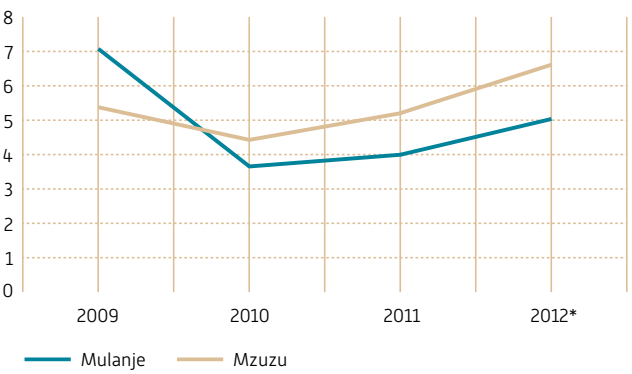
5.2 Results and Discussion

The Livestock Innovation Platform was created and consisted of a range of stakeholders active in the livestock sector, such as NGOs, livestock processors, feed producers, research organisations (Bunda College), MOA&FS, and a representative from the Department of Animal Health and Livestock Development. A baseline study revealed how the pork industry has been greatly hampered by the unavailability of formal slaughter and cold chain facilities that are willing to handle pigs because of their religious beliefs. In response, a plan was prepared for the construction of four slaughter and market facilities to be operated by farmer associations (later cooperatives).

As a result of budget constraints, many accompanying actions had to be abandoned and planned facilities were downsized. The designs, made with the help of experts, for the slaughter and market facilities were similar for all four sites; i.e. pens for holding pigs before slaughter, a slaughtering slab with a capacity of one or two pigs, a kitchen for cutting meat, a storage room with freezers and an outlet for selling meat to customers. The associations were given responsibility for overseeing and coordinating the construction.

An underlying assumption was that prior work by NGOs and district agricultural offices meant that production capacity on the supply side was not a major constraint and that marketing was the weakest link in the chain. While marketing was a weak link, the majority of cooperative members (as well as non-members) also suffered from poor production skills, reflected in the relatively low average pig sales per household (Figure 5.1). A large proportion (70% and 83%) of the respondents in Mzuzu and Mulanje said they had been rearing pigs for less than five years. In the focus group discussions, farmers expressed in particular a lack of basic knowledge on improved feeding, improved breeds and quality control through pig health management. Clearly, an opportunity was missed by RIU Malawi by not integrating capacity building on improved pig husbandry to answer market demand in the activities.

Figure 5.1 Average Number of Pigs Sold by Respondent Households 2009–2012



* 2012 figures were only available for the first six months of the year, and so have been doubled to give a projected estimate.

The slaughter and market facilities have a maximum slaughtering capacity of two or three pigs per day. This is sufficient for local retail, but well short of the 20 to 30 slaughtered pigs that large processing companies such as Kapani wanted to collect at a time. Attracting larger buyers to the cooperative-run slaughter and market facilities was the primary objective of the entire effort. In addition, the facility locations were largely determined by the provision of a site by

the local government, rather than convenience with regard to marketing. In Mzuzu, this led to the conversion of an old chicken slaughterhouse, about 6 km from the town centre, which poses a great challenge in terms of logistics and cost of transport for pig farmers as well as for retail customers. In Mulanje, the facility is located only about 2 km from the centre of the town, which makes it much more accessible.

The RIU Malawi target was for 19,600 pig farmers to use the four local slaughter and market facilities by 2011. At present, this appears to have been a considerable over-estimate, as only 12% of the interviewed households in Mzuzu and 19% in Mulanje use the facilities. The Mulanje facility records show the facility was used to slaughter 70 pigs, while, in addition, 190 weaners were sold over the period of one year and five months since opening. Those members close to town, with some capital and a good knowledge of pig husbandry, are using the facility. Those living further away, with less cash and less pig husbandry skills, are at present unlikely to benefit from the facilities and require different interventions such as access to advisory services, credit and access to the market, the latter not being resolved by the facilities that have been constructed.

The farmers did indicate that the prices offered through the cooperative for the meat were better, and the business dealings more transparent, than when dealing with farm-gate traders. Still, transport costs and delayed rather than on the spot payment, and the deduction of a levy for the cooperative, together mean that the facilities are not attractive enough to farmers located further away. In addition, veterinary control at the facility poses a perceived risk of rejection, and a resulting loss of capital.

PHOTO: ROGER BYMOLT

Pig raising in Malawi

Pig shed

PHOTO: ROGER BYMOLT

The cooperative members expected easier marketing as a result of the slaughter and market facility. However, the facilities are not actively promoted as outlets to new customers. They are not based in shopping areas, there are no advertisements to invite customers, no hours of operation published outside, no price lists. The cooperatives have received little advice on how to operate a retail outlet and, considering that this is a primary source of business, it is an area where they require support. The building of the facilities has improved the visibility of the cooperative and was an activity around which the members united. With the end of the project however, the cooperatives are once more left with a lack of resources, as the markets do not bring in the expected revenue from small levies, while the expectations of the members had been raised considerably. In short, the cooperatives require working capital to deliver services to their members. Without such services, farmers are not able to improve their production for marketing through the new facility.

The major constraint remains the logistics of the collection of pigs from many smallholders and transport to a central point to attract larger buyers. However, it is evident that the cooperatives do not yet have the capacity to coordinate the timing of collection, slaughtering and sale. The pig clubs, lower level farmer groups within the cooperative structure, were not given specific attention in the RIU Malawi programme; however, it is evident that strengthening the clubs is fundamental to supporting the cooperative structure for marketing, knowledge sharing and pig husbandry capacity building. Attention should have been focused on building up these supply chain links in the programme. As this did not occur, the cooperatives need to focus on building these links locally (e.g. with hotels and wholesalers) and to learn from this experience at a lower level first.

PHOTO: ROGER BYMOLT

Pig production and marketing cooperative, Malawi

5.3 Conclusions

- The project has not achieved the objective of improved functioning of the pork sector through improved coordination and market innovation.
- Parallel investment in market chain organization and the efficiency and quality of smallholder pork production is required to realize pork sector development in Malawi.
- Slaughter and market facilities alone are not enough to remove market constraints, facilitate market actor interactions and develop functioning market logistics for an essential component of market chain innovation.
- Resources were stretched too thin to be able to implement a meaningful pilot intervention aimed at market chain innovation.
- Infrastructure design should be such that it responds to the real market need, and involvement of private agri-business entrepreneurs in the design process can help avoid a mismatch between facilities and market need.
- The facilitation of interaction between sector stakeholders, for the sake of faster sector innovation, should not be simply transformed into implementation of project activities.
- The availability of market-oriented advisory services to support smallholders in improving the efficiency and quality of their production process is essential.

Meet inspection at a slaughter house

PHOTOS: ROGER BYMOLT

Slaughter house

PHOTO: GENEVIÈVE AUDET-BÉLANGER

6

Maize

NYAGATARE MAIZE INNOVATION PLATFORM

6.1 Description

Objective

The RIU-funded Nyagatare maize platform was the first attempt to organise maize value chain actors into a multi-stakeholder interaction forum in Rwanda. The objective of the Maize Innovation Platform was:

> *"Building a network of actors in the maize value chain with an aim of improving the livelihoods of maize producers and other stakeholders through using new knowledge to increase production, enhance access to credit and to improve maize trade in Nyagatare District".*

Through the platform, RIU aimed to introduce value chain and market-oriented thinking and to promote farmer entrepreneurship. In its strategic plan for 2011-2015 (October 2010), the platform describes itself as a network that represents and lobbies on behalf of maize value chain actors.

Intervention Activities

The platform initially focused on increasing productivity, in line with the objectives of the Crop Intensification Programme (CIP). Individual producers and members of maize-producing cooperatives were assisted through the platform in accessing high quality maize seed and fertilizer. In addition, they received technical training in good crop husbandry and post-harvest practices. The attention then shifted towards storage and marketing of maize. A series of platform meetings was organised and facilitated. The main focus of these meetings was to:

1. critically assess remaining bottlenecks across the maize value chain;
2. understand and agree on the roles of platform members in removing these bottlenecks;
3. identify new opportunities for innovations;
4. redefine membership, including identifying and recruiting new members.

Access to credit, marketing and profitability of maize production were raised as important challenges during the meetings. The platform initiated a set of activities, through capacity building, facilitation, networking, exchanges of information and advocacy, in order to:

- Enhance post-harvest management and handling;
- Ensure the quality of the product and access to market;
- Improve access to finance among smallholders through an Inventory Credit System (ICS).

Inputs

The annual investments made by RIU in the Nyagatare Maize Innovation Platform are provided in Table 6.1. Total investments from 2008 to 2012 were GBP 313,391. Investments included the facilitation of the platform and its activities, the services provided by different consultants and local organisations, mainly RDO, as well as investments in hardware and the purchase of maize during the first season of operation of NYAMIG (see 6.4.).

Table 6.1 RIU investments in the Nyagatare Maize Innovation Platform, 2008-2012

Year	2008	2009	2010	2011	2012
FRw	104,252,990	51,609,966	98,642,237	37,562,154	5,653,986
GBP	109,740	54,326	103,834	39,539	5,952
Cumulative (GBP)	109,740	164,066	267,900	307,439	313,391

PHOTO: REMCO MUR

Members of the maize innovation platform

Assessment Methodology

The study was conducted between 14 March and 5 April 2012. Because of the broad range of objectives of the Maize Innovation Platform, the methodology sub-divided the effort into three questions:

1. How has the RIU effort affected the capacity of the maize sector to innovate?
2. Has the maize platform contributed to increasing income and food security as a result of higher productivity, improved storage and better post-harvest handling?
3. Have the creation of the maize trading company NYAMIG and the introduction of an Inventory Credit System (ICS)[1] contributed to increased income and food security?

For the assessment, a team of four experts, supported by local facilitators and enumerators, conducted the following activities in order to answer the above questions:

- A start-up workshop at district level with representatives from maize sector stakeholder groups;
- A household survey, targeting beneficiaries and non-beneficiaries of the platform;
- An assessment of stakeholder perceptions on the capacity of the platform to innovate;
- Mini-workshops/focus group discussions in villages, involving local stakeholders (both beneficiaries and non-beneficiaries);
- Key-informant interviews (semi-structured) and focus group discussions at district and sector levels;
- A final validation workshop with representatives from local stakeholder groups.

6.2 Results and Discussion

Between 2009 and 2012, maize production increased in Nyagatare district, both for households affiliated with the platform as well as for those not affiliated. The increase in production by platform members was a result of increases in the production area as well as increases in productivity. The increase in production by non-platform members was mainly due to increases in productivity. Increases in productivity resulted from improved cultivation practices and the adoption of new varieties and use of fertilizers. These practices were promoted under the powerful, government-initiated CIP, which probably had the most influence on production levels. Over time, the platform's focus shifted from improving productivity to marketing and access to financial services. NYAMIG and the Inventory Credit System were launched.

[1] An Inventory Credit System provides producers with credit, using their stored production as collateral.

NYAMIG was created as a new enterprise to address market imperfections in the maize value chain, rather than looking for alternatives involving existing traders. As a result, NYAMIG and the ICS became the principal focus of the platform, with limited energy being dedicated to the piloting of other new practices in the maize sector.

The ICS is based on the idea that prices increase after harvest and that farmers do not have sufficient storage capacity themselves. NYAMIG takes on the risks for the stored product. The price margin realised by speculating on market price increase should cover the all costs made by NYAMIG, including a profit margin for NYAMIG. There are doubts whether NYAMIG and the ICS are, under the current set-up, viable and sustainable mechanisms for helping farmers obtain better prices and improve access to markets. Currently, the number of smallholder producers directly benefiting from the system is still limited and benefits are relatively small. Especially for smallholders, the ICS does not seem to be a major opportunity to improve their livelihoods, and for larger producers there is also little evidence of impact.

Irrespective of the ICS, smallholder prices for maize have increased. Whether this is a result of their inclusion in the platform remains questionable. The difference in prices received by platform members compared with non-platform members is limited and there was a regional trend of increasing prices.

The major premise for investing in innovation platforms is that agricultural innovation results from stakeholder interaction, and that it comprises technical, organisational and institutional components. The major question of this impact assessment was whether innovation platforms are useful mechanisms for promoting agricultural sector development. Some positive changes have been observed, related to the different impact pathways; there are also clearly certain flaws in the design of the particular interventions. Some of these flaws are probably inherent to the experimental nature of the approach. Others are serious problems and weaknesses in the analysis, design or implementation phase.

PHOTO: REMCO MUR

Maize cooperative

6.3 Conclusions

- Capacities of cooperatives and farmers' organisations are inadequate to effectively engage in the innovation platform and represent smallholder farmers. Organisational capacity building was not addressed sufficiently by the programme.
- The CIP seems the major force behind the increased production. It is not possible to quantify the contributions of the Platform in terms of increased crop production, but it is likely that the platform has had a positive impact on CIP.
- The Crop Intensification Programme provided a good entry point for the Research Into Use initiated Innovation Platform.
- The principal focus on a small number of activities (NYAMIG and ICS), involving a limited number of actors, limited energy dedicated to the piloting of other new practices in the maize sector.
- The risks related to certain interventions are fully covered by RIU, which raises questions about the viability and sustainability of the interventions at the end of the project.
- The ICS intervention is based on a number of doubtful assumptions with regard to farmers' preparedness to join the system. Expert knowledge and reality checks are required during design and implementation.
- There is also a need for adaptive management capacity in order to redirect interventions if required.
- Before up-scaling an intervention like ICS, experimentation with and adaptation of the system is required.
- The Nyagatare maize platform was able to identify the right issues and has initiated, coordinated and implemented experimentation with technological and market options.
- The future of the platform as a largely self-organising forum of maize sector stakeholders has not entirely been ensured. Further outside support would be required to improve the self-governing capacity of the platform.
- RIU has not established sufficient local brokering capacity to ensure the continuation of Platform activities.

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Mini workshop with platform coopertaive members in Rwanda

7 SYNTHESIS

A major question at the basis of the impact assessment was whether the Africa component of the RIU programme made a measurable contribution to agricultural development that could be considered value for money. The RIU programme aimed for two parallel goals: first, realizing impact at scale through agricultural development; and second, learning how to improve the contribution of research to agricultural development. In line with these goals, the value of the programme is assessed here for two types of results:

1. Direct and expected future results realised in agriculture as a result of the RIU investments;
2. Generic insights on how to realise sustainable change in agricultural systems, gained with regard to effective contributions of research to agricultural development.

RIU was not a conventional programme that simply aimed to maximise the development return on public investment. In addition to its contribution to household level impact, the contribution to innovation capacity of these RIU cases has also been assessed in order to determine whether they contributed to improving the speed and efficiency of emergence of improved practices in agriculture.

This synthesis will first focus on the currently realised and expected future results. Then, generic lessons about agricultural development in practice will be drawn from the five cases.

7.1 Current and Future Household Level Impact

Looking at the results obtained in the five cases, one can be cautiously optimistic about the overall results obtained thus far and the prospects of accumulating future impact. The interventions together have cost £1.78 million, invested over a period of roughly two years, in six countries. In the case of cowpea in Nigeria and VBA in Kenya, there is a clear positive return on the investments made by RIU. The value created far outweighs the investment made by RIU and continued value creation is expected. In the other cases, however, such a direct relationship between RIU investment and value created could not be demonstrated (Table 7.1).

Table 7.1 Summary of Results of the Five Cases

Case	RIU Investment (GB£)	Major Results	Current household impact	Future household impact	Capacity to innovate
VBA Best Bet	554,349	• Measurable income improvement • Food security improvement • Improved research extension famer linkages • Alternative agricultural service provision system at scale • Better access of producers to improved technology	+	+	+
Armyworm Best Bet	289,360 (Spex-NPV) 227,913 (CBAF)	• Community-based forecasting adopted within ministries • Public extension/local government linkages improved • Change in perception of role of producers in agricultural services • Private biotech laboratory initiated	-	+/-	-
Pig Platform Malawi	86,497	• Farmer-run pig slaughtering and marketing facilities built	-	-	-
Maize Platform Rwanda	313,391	• Multi-stakeholder platform functional • Farmer-run maize trading company built • Inventory credit system piloted • Improved maize production popularised	-	+/-	+
Cowpea Platform Nigeria	310,000	• National Agricultural Research Council adopted platform approach • Triple bagging technology popularised and commercialised • Multi-purpose, Striga-resistant varieties popularised • Improved fodder bailing technology developed and promoted	+	+	+/-

For the Maize Innovation Platform in Rwanda, any impact resulting from intensified production was obscured by the strong general trend towards intensified maize production as a result of Rwanda's Crop Intensification Programme. The Inventory Credit System shows promise, having had positive household level impact in one of the two years considered. Future household level impact depends largely on improvement in the capacity of the maize trading company NYAMIG to realise price premiums as a result of storage and speculation on price trends and the confidence farmers show in this capacity and the subsequent premium they expect to obtain for their maize. For the Armyworm Best Bet, no household level impact could be demonstrated. In the first place, there had not been major outbreaks of armyworm since the initiation of the Best Bet and, more importantly, no change could be detected in decision-making by producers with regard to armyworm control. Still, there are indications that the capacity to be aware of and respond to armyworm infestations has improved, especially in Kenya, which holds the promise of future household level impact. The Pig Innovation Platform in Malawi rightly identified pig farming as an important opportunity for local economic development, but it has failed to effectively take advantage of this opportunity; it has not delivered household impact to date, and appears unlikely to deliver this impact in the future.

It has to be kept in mind, however, that the selection of cases was not random but focused on drawing lessons regarding impact as a result of promoting agricultural innovation. The five cases form a small subset of the RIU programme in sub-Saharan Africa and the results cannot be considered representative of the entire programme.

7.2 Validity of the Basic Assumption of the RIU Programme

The RIU programme has had a turbulent history, which had an effect on its results. RIU was born out of the desire to ensure the best possible use of research outputs that had been attained using DFID funds in the RNRRS programme. Behind this desire was the assumption that research results were being under-utilised generally and that results derived from the RNRRS programme, in particular, were not being used. In other words, it was assumed that there were RNRRS-derived research results lying 'on the shelf', which, given the right impetus, would deliver development results.

However, this manner of thinking with regard to the role of agricultural research in development does not coincide with the reality of the innovation process. Innovation is hardly ever sparked or driven by new research results becoming available from 'curiosity-driven science'. More often, innovation

is driven by a specific demand for the solution of a pressing problem, or the opening up of a new market opportunity or a service. Innovation processes are driven by need more than by the supply of research results. Once there is such a need, the reservoir of research-based knowledge forms one of the possible sources from which possible solutions can be drawn – an important source, but not the only one. Observing that there is no linear relationship between research and innovation should not be interpreted as discounting the importance of fundamental and applied research, but assists in downplaying the expectation of directly measurable development as a consequence of research.

Initially, rather than starting with the open question of needs and then engaging in a wide search for possible solutions from different sources, preconditions were set that reduced the chances of effective innovation. Instead of looking for solutions and options from multiple sources – e.g. existing practices, farmer knowledge or other scientific knowledge – the programme restricted consideration to a small sub-set of scientific knowledge, i.e. the insights developed through the RNRRS programme.

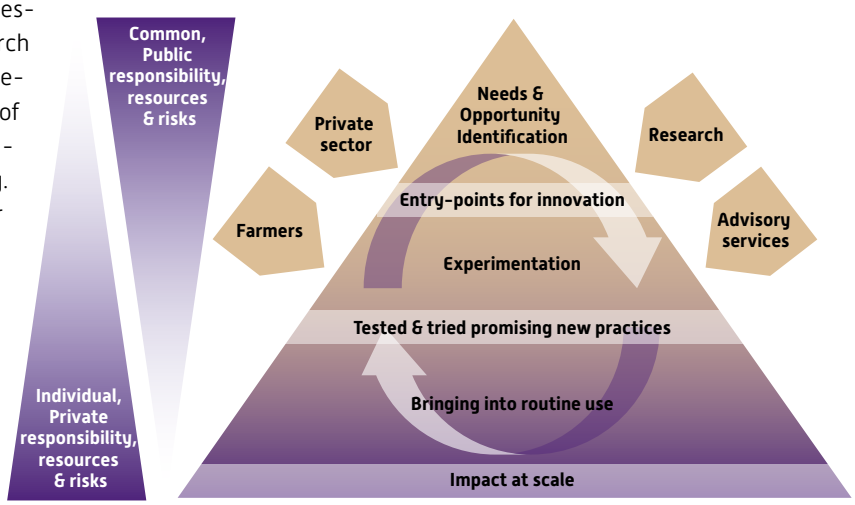
Fortunately, many of the initiatives under the RIU programme, including the Africa country programmes and the Best Bet project that received funding through RIU, did not persist in focusing exclusively on creating development value from RNRRS research results. In fact, this objective was entirely abandoned as a leading principle halfway through the RIU lifespan. Still, that original goal has had a major impact on decision-making in the programme. This may have contributed to some of the decision-making with regard to the Armyworm Best Bet. The focus was on how RNRRS research results could be of use, without giving due consideration to other intervention options.

Some components of the RIU programme, particularly the Best Bet projects, only began after the mid-term review, and consequently have had limited time to have any impact. After only about two years of effort, it is difficult to assess the household level impact that has been achieved by these initiatives. Therefore, results should be assessed with care, and the various initiatives described should be judged on what they have been able to achieve in spite of circumstances that were not always ideal.

The efforts by RIU to stimulate agricultural innovation through the Africa country programmes and the Best Bet initiatives do provide food for thought. Based on the experiences in the five cases studied here, a different model for agricultural innovation is proposed. The model does not capture the complex reality and dynamics of the innovation process, but aims to assist in decision-making with regard to the investment of public (donor and national government) funds to stimulate agricultural innovation for impact at scale.

7.3 Alternative Model to Support Agricultural Innovation

Figure 7.1 The Deliberate Process of Agricultural Innovation for Impact at Scale



Based on the analysis of the five cases studied, an alternative model for the process of agricultural innovation is proposed (see Figure 7.1). This figure is derived from, and serves to illustrate and analyse, the experiences of the five case studies. Depiction in a two-dimensional figure does carry the risk of oversimplifying but it may be helpful for distinguishing between components of the process of agricultural innovation. A number of principles need to be kept in mind when interpreting the figure:

1. Interaction between stakeholders can add quality to the components of the process. Interaction is more inclusive at the pre-competitive top level, and more specific and exclusive lower in the figure.
2. Although there is a general flow from identifying opportunities to bringing into routine use, there is no single possible direction for the process from the top to the bottom of the figure. Bringing into routine use may require renewed opportunity assessment and experimentation.
3. There is a trend of shifting from pre-competitive collaboration for the common interest, at the top of the figure, to a multitude of more competitive efforts during the process of bringing into routine use.

7.4 The Process of Agricultural Innovation

The linear 'transfer of technology' model of thinking about change in agriculture has been abandoned (Arnold and Bell, 2001; Leeuwis and Aarts, 2011) and many have lobbied for a shift towards innovation system thinking (Hall et al., 2001; Spielman et al., 2009), which focuses on the interaction between diverse actors, including the private sector (Biggs, 2007; Hall, 2006). An important core element in innovation system thinking is the understanding that innovation or change usually involves a re-ordering of relationships and interactions between stakeholders (Leeuwis and Aarts, 2011). An important consequence of this realisation is that what has worked in one place cannot simply be 'copied' to another environment. The description by Rogers (Rogers, 1995, 2003) of diffusion of innovation has been criticised for being over-simplistic, assuming that diffusion of innovation is an autonomous process that happens on its own. Still, it does present an idea about how innovation gets to scale. The current discussion on innovation focuses on how to facilitate the process of innovation, but what is missing is a vision on how to get to scale; it provides little insight on how to effectively use pilot experience in one environment in order to realise change on a larger scale.

We conclude from the five case studies that it makes sense, especially in response to the lack of vision for getting to scale, to distinguish three different processes in agricultural innovation:

1. Needs and opportunity identification;
2. Experimentation;
3. Bringing into routine use.

Needs and Opportunity Identification

The basis of the process of agriculture innovation is the identification of needs and opportunities, or entry points for innovation. These entry points can originate from multiple sources, farmers, private entrepreneurs, researchers or others and form the basis for the next step, experimentation.

In the Rwanda maize platform there was a two-step process: first, the RIU programme chose maize in Nyagatare as its subject; next, the platform served as the mechanism for needs and opportunity assessment. This was not a one-off exercise; throughout the life of the platform new opportunities were selected to pursue. This was perceived by the platform to be one of its mandates, to facilitate a continuous search for entry points for innovation to improve the maize sector. Through this process, production-related opportunities, such as improved varieties, fertilizer use and better husbandry practices, were identified. Improved market access and adapted financial products were also identified as needs for maize sector improvement in Nyagatare. After the end of the project, the maize platform still exists and can continue to fulfill the function of maize sector needs and opportunity assessment.

PHOTO: FEMKE VAN DER LEE

Smallholder producer, Kenya

The process was different for the pig platform in Malawi. First, livestock was selected as the main sector for intervention; next, the pork sector was selected as promising, with particular opportunities for improvement in the marketing system. The platform identified one activity, the development of local slaughtering and marketing facilities for pigs. Beyond that, the platform did not continue to play any function in relation to continued entry-point identification. In the case of the cowpea programme in Nigeria, the stakeholder platform limited itself largely to the promotion of promising research results from the RNRRS programme. An open needs and opportunity assessment was not carried out, and so did not form a specific component of the platform's mandate.

In the Best Bet cases, VBA Kenya and armyworm control, there were no needs and opportunity assessments as such. The opportunities were selected through a competitive process, with a panel of experts judging proposed innovations on the basis of a pitch by the leader of the consortium. In the case of VBA, however, within the mandate assumed by the organisation, there is an internal continuous search for

opportunities in the parallel marketing of agricultural inputs and provision of advisory services. The FIPS organisation carries on a continuous search for new inputs and farming practices from multiple sources – including traditional farming practices, the private input industry and research – to be tried by VBAs and farmers. However, there is no specific consultation mechanism for assessing needs of producers. What makes the VBA approach different to using a platform for opportunity assessment is that the responsibility of gathering ideas and opinions from multiple sources rests unilaterally with FIPS, and there is no direct cross-fertilisation of ideas from different stakeholders.

There is a pronounced difference between the platform approach of finding opportunities for further experimentation and the Best Bet approach. A platform can, as seen in the Rwanda maize platform, provide an arena for stakeholder interaction, with the specific objective of bringing together different views and opinions, aimed at the identification of opportunities from multiple sources, which provides room for cross-fertilisation of ideas. The Best Bet facility provides less deliberate space for cross-fertilisation of ideas and relies on a selection process based on convincing proposals and presentations of ideas. The experience of RIU shows that both pathways can result in the selection of relevant initiatives for further experimentation. However, the cases of the armyworm Best Bet and the pig platform demonstrate that there is no guarantee of success with either approach.

Experimentation

The second process of agricultural innovation is experimentation. During this process, entry points are tested and adapted under real circumstances. This experimentation can focus on farming technologies, but also on new market relations, services or collaboration models. The objective is to arrive at tried and tested promising new practices that can be brought into routine use. The distinction between experimentation and 'bringing into routine use' is not clear-cut.

One characteristic that distinguishes experimentation from 'bringing into routine use' is that the process of experimentation is more 'pre-competitive'. Experimentation largely takes place in the public arena, with the input of a multitude of different actors interacting. Impartial process facilitation and public resources are important, and only partial investment by the private sector – whether producers or agribusiness – can be expected, as the results do not exclusively benefit a few but are of public benefit to many. A second important characteristic is that experimentation includes room for failure and consequently carries higher risk. In experimentation, risks must be taken to put untested assumptions and ideas to the test of reality. Without the willingness

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Interview with platform member in Rwanda

to recognise and accept the possible failure of practices and approaches being tested, no adaptation and selection can take place. High risk and failure are easier to accept in a pre-competitive setting, in which risks are shared among stakeholders, which offers an important role for public funding.

In the Rwanda maize platform, experimentation was initiated from a variety of entry points. New farming practices and maize varieties were put to the test. Different financial services were also tested and introduced. In the VBA case, two levels of experimentation can be identified. First, there has been experimentation with the combined advisory service provision and input supply through the Village-Based Advisors as an alternative for the poorly functioning input supply and extension services. Secondly, within VBA, experimentation with new agricultural practices and inputs is part of the ongoing activities.

In the other cases there was little focus on experimentation. The armyworm project focused on building laboratory facilities for Spex-NPV production and replicating the already tried and tested system of Community Based Armyworm Forecasting. The pig platform focused completely on building local slaughter and marketing facilities, while the Nigeria cowpea platform focused on 'bringing into use' tried and proven technology.

Bringing into Routine Use

The third process of agricultural innovation in Figure 7.1 is 'bringing into routine use'. This is the process of ensuring that tried and tested practices reach their full potential at scale. Underestimating the importance of this process has been a pitfall, hampering learning from and replicating successful experiences. It must be recognised that this process also requires experimentation, risk-taking and local

adaptation, much like the experimentation phase, but it differs in the levels of risks that are taken and the amount of room for failure. The 'bringing into routine use' process is characterised by competitiveness, which provides the pressure needed to ensure efficient use of resources and quality of production and service delivery. There is much less emphasis on developing new practices and approaches for the public good. The focus is on ensuring sustainable and lasting, cost-effective or profitable service delivery and production.

'Bringing into routine use' almost invariably requires local adaptation. This adaptation can take different forms, such as adapting the technology or practice ('hardware'), ensuring that users have the right knowledge and skills ('software'), changing institutions and ways of organisation, or restructuring relations and interactions of stakeholders ('orgware') (Leeuwis and Aarts, 2011). There may be a need for policy changes, training or organisation of producers, traders or service providers, or adaptation of the technology or practice itself, to ensure that it can exert its potential effect in an environment where it was not initially developed during the experimentation process. The process of 'bringing into routine use' may resemble the process of experimentation, with the major distinction that it is of lower risk and more pointedly focused on achieving the same result as experimentation, but at scale. As 'bringing into routine use' happens within a competitive arena, participation of all stakeholders in initiatives cannot be expected – especially if they are competing against each other.

The cowpea platform in Nigeria was committed to 'bringing into routine use' tested and proven technology. It successfully brought dual-purpose varieties and triple bagging into routine use, taking the pilot success from experimentation to scale and thus realising development impact at scale. Through the VBA Best Bet, FIPS specifically built a service provision system intended to bring tested and proven technologies into routine use. It contributed successfully to bringing soil tillage technology and improved varieties into routine use in Kenya. This required building an organisation purposely designed for service delivery and also adapting the technologies available, mainly by reducing the size of the packages. In the armyworm case, community-based forecasting was brought into routine use, although with more success in Kenya than in Uganda. The objective of the Spex-NPV component was to bring it into routine use, but the technology was immature and not yet suitable for promoting routine use. Even the choice of this technology as the best solution for armyworm control could be considered premature. In the case of the pig platform, it was decided too quickly that a physical slaughterhouse and marketplace would be the solution for marketing problems. It might have been more effective to assess marketing constraints with stakeholders and, if a slaughterhouse and marketplace was ultimately considered the best solution, to build one market initially, according to specifications determined by the private sector, farmers and experts, and test its functioning. The Rwanda platform focused mainly on experimentation, and some of the results of that experimentation have been 'brought into routine use'. Experiences with both the maize Inventory Credit System and the maize trading company NYAMIG are now being used as a basis for larger-scale similar interventions.

In order to bring promising new practices into routine use to achieve impact at scale, it is useful to build on experiences from the experimentation phase. The experimentation phase should not be seen only as a necessary step for moulding the promising practice into its final form. This phase can also provide essential information about the process required for successful adaptation in a different environment and the circumstances that are prerequisites for success. The experience with Community-Based Armyworm Forecasting in northern Tanzania provided information for a faster implementation of the same process elsewhere, although it may be argued whether enough was learned from this earlier experience. Similarly, the experience of the Inventory Credit System and NYAMIG, the maize trading company that spun off from the maize platform, provided important information to the larger-scale efforts to establish similar financial services elsewhere. Both earlier and current experiences in training community-based advisors in the VBA Best Bet have been useful in guiding and informing similar efforts in other countries.

7.5 The Role of Different Stakeholders in the Agricultural Innovation Process

The Role of Research Organisations

Research can play an important role in agricultural innovation. One contribution is providing entry points for innovation during the needs and opportunity assessment. This is not the same as providing solutions, as there are multiple possible entry points for innovation and while research is an important one, it is not the only one. Secondly, research can contribute to the process of experimentation, as researchers are trained to objectively assess the merits of different options, based on measurable performance. Knowledge of structured experimentation that brings a level of objectiveness into this process can assist decision-making in all types of experimentation. Finally, research can play a role in identifying which elements of the experimentation process led to a 'promising practice', as well as the specific circumstances in which success was possible, and thus facilitate the process of 'bringing into routine use'.

In none of the five cases studied did research fulfill a role in all three processes of agricultural innovation. Its main role was as a provider of entry points for innovation. In the case of armyworm, research was basically the sole provider of ideas, which was not very successful in terms of realising impact at scale. However, in the cowpea platform in Nigeria, research was also the main provider of 'promising new practices' with proven success, which did lead to impact at scale. In the pig platform in Malawi, research did not play a role, but it is possible that professional knowledge of the pig marketing system could have increased the success of the intervention. In the maize platform in Rwanda, the contribution of research was modest, through participation in meetings and by providing technical expertise. In the case of VBA in Kenya, research was one of the sources of promising new ideas to be promoted by the programme.

The Role of the Private Sector

The private sector is defined here as agri-business: trade, wholesale, processing and retail. The participation of the private sector is important in all three processes of agricultural innovation. The pig platform in Malawi lacked private sector involvement during a critical stage, resulting in an intervention that did not solve the major constraints of the sub-sector. For both VBA in Kenya and the cowpea platform in Nigeria, involvement of the private sector has contributed to success. In the case of armyworm, private sector involvement was instrumental in changing policies for semio-chemical registration in Kenya.

During the needs and opportunity assessment, the involvement of the private sector is important in order to avoid placing too much emphasis on production constraints. Other problems may be just as – or even more – critical, but may not be identified as such by producers and their organisations. During the process of experimentation, the private sector participation is of similar importance, especially for ensuring that experimentation takes place under realistic circumstances. For example, the participation of the private sector was lacking in the Rwanda maize platform when new varieties were being tested for their agronomic traits, even though testing of the desired qualities by the industry is essential.

Furthermore, the participation of the private sector takes experimentation from being exclusively production-focused to being focused on production, quality and deal-making. However, it cannot be expected that private sector partners will invest significant resources during the experimentation phase. Given that this phase is characterised by discovery for the public interest, it is difficult for the private sector to take on the role of principle contributor. Contribution is more likely when the required investments are co-funded by different private sector partners and complemented with resources from other stakeholders, such as producers and government or donor funding.

An essential role for the private sector is ensuring the sustainability of a practice put into routine use. Private enterprises seeking profit from promising new practices can be an important driver for bringing them into durable routine practice, thus sustaining their impact over time. It must be kept in mind, however, that private delivery of services or products is not the only possible sustainable mechanism, nor is it always an option. Continued armyworm monitoring, for example, seems to have been ensured through the public extension in Kenya, in collaboration with producers. In the case of VBA, one could consider the organisation to be a not-for-profit company, while the financial sustainability of the VBA service provision is also doubtful; the success of the VBA model depends to a large extent on public resources, which can be justified as it is providing services in the public interest.

The Role of the Public Sector

The role of the public sector is more prominent in the needs and opportunity identification and experimentation processes than in the process of bringing into routine use. These more pre-competitive steps require independent coordination and arbitration for the public interest. It is helpful if public institutions can take on responsibilities, provide resources and take risks. They can be more credible as impartial coordinators, as well as advocates for collective action, than either producer organisations, which represent a specific stakeholder group, or agri-business, whose first objective is economic self-interest.

Public institutions, however, are not known for their capacity for ensuring cost-effective and quality routine services, which are the basis for impact at scale. Therefore, the role of public institutions in bringing promising new practices into routine use is more limited and tends to be related to creating circumstances under which the private sector, farmer organisations and NGOs can provide quality services and products.

This can be illustrated by the cowpea platform in Nigeria. Promotion of the promising new practices of triple bagging and use of improved cowpea varieties was strongly publicly driven, using RIU resources and public extension services (ADP). This created awareness and a resulting demand for triple cowpea storage bags and seeds of improved cowpea varieties that is met by commercial companies on a for-profit basis. In the case of Rwanda, in response to the first pilot successes of the Inventory Credit System in Nyagatare, the government adapted its legislation to accommodate the development of similar warehouse receipt systems coun-

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Maize cooperative – post harvest

try-wide, including for other crops, by commercial financial service providers. An exception is the Community Based Armyworm Forecasting, in which the public sector does play a leading role in routine implementation and is likely to continue to perform this role.

The case of VBA may be the clearest example of the limited responsibility of the public sector in bringing into routine use. The role of the public sector (in this case the international donor community) is largely that of providing resources to FIPS to perform its function on a not-for-profit basis. Furthermore, public research contributes to the search for new ideas to test and develop within VBA. It remains important, however, to monitor whether and how services that do not provide the advisors with a direct income can and will be sustained over time.

The Role of Producers

Producers are the prime stakeholders, as well as essential participants in the entire innovation process. During the needs and opportunity identification process, high quality farmer participation is essential for assisting in prioritisation and as a reality check. For example, it could be hypothesised that, with a more pronounced farmer participation in decision-making, the armyworm Best Bet would have not have focused on a single technology-based solution for a single pest and would instead have focused on effective control of a number of pests threatening maize and possibly other crops as well. The VBA Best Bet provides for continuous interaction with producers to test newly emerging technological opportunities. In Rwanda, the maize platform provides producers with a deliberate mechanism for needs and opportunity identification.

During experimentation, producers are automatically the main implementers when the opportunity for innovation being tested is production-related. For bringing into routine use of innovations, less input of opinion is required than during experimentation. Still, considering that bringing into routine use often requires a repetition of steps that were essential during experimentation, producer participation is still critical.

However, strong producer participation can also lead to strong producer-dominated decision-making at the expense of the decision-making power of other economic stakeholders, such as laborers, traders, processors and retailers, or chain support actors, such as advisory services, researchers and financial service providers. Producer representatives naturally defend the interests of those they immediately represent and, consequently, they make decisions to benefit their own organisations before considering the wider interests of the entire sub-sector. Secondly, producers or their representatives, as single stakeholders, will not always be able to accurately identify all the needs and opportunities that the sub-sector may have. The pig platform in Malawi could be seen as an example of flawed decision-making in which farmer domination played a role. In Rwanda, the platform was also producer-dominated, which also led to a producer-dominated view of

intervention needs. This resulted, for example, in the establishment of a farmer-owned maize trading company. However, it does appear that in Rwanda the producer domination in the platform was counterbalanced to some extent by the representation of other actors and by intensive facilitation.

7.6 Facilitation of Stakeholder Interaction

Stakeholder interaction is an important element in the process of agricultural innovation. High quality interaction can contribute to improving the capacity to innovate. The interaction of different, converging opinions and experiences can result in new ideas that would not have developed autonomously. Facilitation of such interaction should be considered during all three stages of the agricultural innovation process.

The innovation platforms were specifically aimed at cultivating this interaction. In the case of the Rwanda platform, the objective of blending multiple sources of experience for the purpose of coming up with new entry points for innovation, and putting these to the test under real circumstances, was explicit. In the case of the Nigeria cowpea platform(s), the overarching objective was coordinating interventions to bring promising tried and tested practices into routine use. The Malawi platform did identify an opportunity through stakeholder interaction, but abandoned the interaction in the course of pursuing this idea. In the VBA Best Bet, interaction is never between all actors but is channeled through FIPS.

When comparing the pig platform in Malawi and the maize platform in Rwanda, it becomes obvious that quality facilitation added value to the process of innovation. The challenge is to ensure quality, relatively impartial facilitation over time. Resources aimed at ensuring effective facilitation must be levied either through the direct beneficiaries of the interaction or through public channels, whether government or donor funding. Whatever the source of the resources, it puts some pressure on the objectives of the interaction, because any funder, public or private, will have an idea about what the resources are meant to achieve. Part of good facilitation would be to make these expectations explicit and to seek joint interests and compromise with the immediate interests of interacting stakeholders. To provide quality facilitation, a multidisciplinary approach, a system overview and an ability to understand and communicate the interests of different stakeholders are needed. It remains hard to see where to best find these skills. Research organisations may have the combined required expertise but may not see it as their mandate, while development organisations (NGOs, private consultancy firms or farmer organisations) may lack the full set of skills required.

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Maize storage

7.7 Position of the Cases in the Process of Innovation

Figure 7.2 shows the reviewers' interpretation of the position of the five studied cases in the process of innovation. The cowpea platform in Nigeria was mainly focused on bringing tried and tested promising new practices into use. These practices had already proven their merits through experimentation under real circumstances outside of the RIU programme. For the new practices of triple bagging and improved varieties, sustainability has been ensured by creating a demand for commercial service supply and promoting private enterprises to provide these services on a commercial basis. The embedding of the platform into the ADPs at the state level provided a level of continuity to the platform, so that other

promising new practices of interest to the cowpea sub-sector can be identified and promoted bringing into routine use.

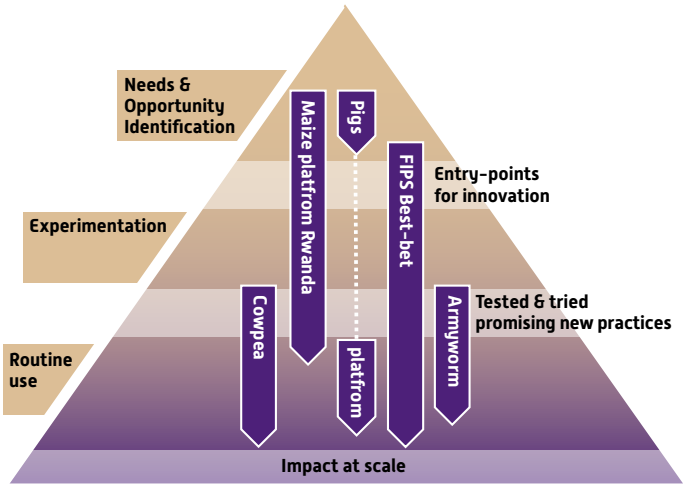
The maize platform provided the function of needs and opportunity identification, as well as the space for experimentation, during and also beyond the lifespan of the RIU programme. The maize platform facilitation did consider the bringing into routine use of promising new practices, such as the Inventory Control System and the farmer-owned maize trading company; however, this function was not fulfilled by the platform itself. Especially now that the RIU programme has ended, attention to the interests of the wider maize sub-sector may well become less pronounced, as this was largely safeguarded by the facilitation from RIU Rwanda.

The pig platform was not successful in achieving impact at scale. In hindsight, one of the contributing factors may have been the attempt to bring solutions into routine use without due consideration for experimentation before or during the building of the slaughterhouses and marketing outlets.

Two levels of innovation can be identified within the VBA Best Bet. The first of these was the service provision system through Village Based Advisors. This system had been the subject of experimentation before the RIU programme, and RIU supported bringing the approach into routine use. The second level was the technology-driven innovation of agricultural production, which is an objective of FIPS. Its approach incorporates specific attention to identification of entry points for innovation, experimentation and to bringing tried and tested promising new practices into routine use. FIPS does provide for a formal needs and opportunity assessment. It relies on the Village Based Advisors identifying needs through their advisory service practice and the identification of entry points for experimentation from research and private input suppliers.

The armyworm Best Bet relied on earlier experimentation work. A tried and tested new practice, Community Based Armyworm Forecasting, was brought into routine use in Kenya and Tanzania. This was realised – more successfully in Kenya than in Tanzania – but so far has not resulted in impact at scale. This is not because the forecasting does not work but because forecasting, as such, does not seem to result in the behavioural change in producers that would be required for a reduction in yield losses. The biological control of armyworm using the NPV formulation (Spex-NPV) was presented as a technology that would be brought into routine use. However, the technology was insufficiently mature and more experimentation with options of (biological) armyworm control would have been more appropriate than an effort to bring this single technology into routine use.

Figure 7.2 Position of the Five Cases in the Process of Agricultural Innovation



7.8 Capacity to Innovate

It is a common tendency to consider the process of innovation as a pipeline process: starting with a problem, performing research to solve the problem, and ending with the dissemination and adoption of the solution. The visual representation of the process, as shown in Figures 7.1 and 7.2, risks reinforcing this tendency. However, it is essential to understand that agricultural innovation is not a pipeline process but rather a continuous process in which needs and opportunity identification, experimentation and bringing into routine use can take place in parallel and repeatedly. The quality of the process of innovation is determined by the quality of the three underlying processes presented here.

The five cases of the RIU programme demonstrate that impact at scale can be achieved without specifically intervening to improve the quality of all three of the processes that together constitute the process of innovation. The cowpea platform in Nigeria realised impact at scale by focusing only on bringing tried and tested promising new practices into use. The Rwanda maize platform has contributed to improving relations between maize producers, small traders, advisory service providers, district administration and public extension officers. It has focused less on building mechanisms for more effective experimentation with new practices in the future. It concentrated successfully on the needs and opportunity assessment and experimentation. The continuation of the platform itself, however, is not guaranteed now that financial resources are no longer available. The Nigeria platform relied on earlier work that fulfilled the needs and opportunity identification and the experimentation processes, while the Rwanda platform made efforts to communicate its experiences and advocate considering their routine use.

PHOTO: GENEVIÈVE AUDET-BÉLANGER

Maize drying

The Cowpea Platform in Nigeria succeeded in embedding a stakeholder interaction approach in the ARCN strategy and has been effective in achieving technology transfer at scale.

A continuous impact beyond the lifespan of a project could best be obtained by not only considering the realisation of routine use of promising new practices for impact at scale, but at the same time aiming for a lasting improvement of the capacity to innovate. The maize platform in Rwanda can continue to ensure a quality needs and opportunity identification and to provide an environment for experimentation. An important challenge is to maintain a focus on the larger producer and public benefit, beyond the needs of the platform's direct members, and to continue to advocate bringing experiences into routine use outside the platform. The Nigeria platform can continue to promote the routine use of tried and tested promising new practices, but it will also continue to rely on needs and opportunity identification and experimentation carried out by others if it maintains its current way of operating. Venturing into these processes might further increase its impact and improve the capacity to innovate. The case of the VBA Best Bet shows evidence of an improved capacity to innovate. VBA has developed a mechanism that scouts for specific technical and marketable practices that could be useful to agricultural producers and puts these promising practices to the test of reality. It may contribute even more to improvement of the capacity to innovate if the needs and opportunity identification from multiple sources is given more consideration.

The cases of armyworm and the pig platform demonstrate that not considering the three processes can lead to disappointing results. For the Armyworm Best Bet there is less evidence of an improved capacity to innovate, but new relationships have been established between the public extension, local administration and farmers, which can form a framework for pursuing further improvements in pest and disease control. Furthermore, relationships have been built, specifically in Kenya, for pre-competitive collaboration between the pest control board, the national pest control services and the pharmaceutical industry. The Pig Innovation Platform in Malawi has not resulted in an improved capacity to innovate.

7.9 Implications for Policy and Practice

Seeking a direct linear relation between agricultural research results and agricultural development can easily lead to an unnecessary limitation of options being considered as entry points for innovation. Research is an important source of potential entry points, but not the only source. Therefore, a distinction needs to be made between funding research initiatives, which aim at enriching our knowledge through developing and testing theory, and promoting agricultural innovation. The first will ultimately help research to contribute to the innovation process, as it can propose new, formerly unavailable entry points for innovation. The latter process of agricultural innovation does not put research at its centre, but focuses on needs and opportunity identification, experimentation under realistic circumstances and bringing the insights gained into routine use. Research organisations have an important role to play in the latter process, but are not the essential drivers of the process.

With respect to the process of agricultural innovation, it is important to acknowledge the three processes that underlie agricultural innovation: needs and opportunity identification, experimentation and bringing into routine use. Focusing only on one or two of these processes does not necessarily mean no impact can be achieved; however, this would assume that the other functions are being taken care of.

Next to the immediate and measurable objective of realising impact at scale during the lifespan of a project, improving the capacity to innovate should be considered an objective of equal, or even greater, importance. The demand by funders to ensure a measurable result at household level by the end of a project is understandable, and also justified, as public resources need to be accounted for through development impact that can be felt by the targeted resource-poor beneficiaries. A singular focus on such impact at household level alone, however, does little to promote a sustainable improvement of the targeted agricultural systems.

The needs and opportunity identification and the experimentation are especially difficult to fund through direct economic actors, as they are pre-competitive tasks with an indirect and unsure return on investment. Funding from public sources, be they governments or international donors, can make an important difference here, as can be seen in the case of the maize platform in Rwanda, for example. Both of these processes require impartial facilitation, which is costly and requires the continuous use of public resources. Furthermore, the process of experimentation under real conditions contains high risks and is often for a public, rather than specific stakeholder, benefit. The high risks of this experimentation can be reduced by using public funding. Public resources can be invested in providing suitable incentives for the participation of private agri-business, and also of private service providers and producers, in the process of experimentation with identified entry points for innovation. The intended result of these investments is tried and tested, promising new practices with a 'beyond local' potential, as well as knowledge on how to promote these practices outside the environment in which they were tried. Ideally, the pre-competitive efforts should be funded jointly by the stakeholders in the system, i.e. farmers, traders and industry; such mechanisms for funding of pre-competitive collaboration are often considered more sustainable than public funding. It has to be recognised, however, that voluntary contribution to initiatives primarily in the common, public interest are hard to sustain, possibly even harder than investment of public resources.

For the third process, bringing into routine use, more attention must be paid to the financially sustainable and lasting delivery of products and services. This means that much more care has to be taken in deciding what to fund with public resources. Funding the routine services themselves is only justified if it provides a continuous public benefit and cannot be funded otherwise, such as through the users of the service. In the case of FIPS, for example, the continued service delivery by Village Based Advisors does not seem to be entirely guaranteed through their income from selling inputs. At the same time, however, FIPS is making a difference and is realising household level impact. It could be justifiable to seek avenues through which the Village Based Advisors receive incentives to continue to provide the services desired by producers, especially those that have no direct relation to generation of their own income. In the case of Nigeria, public resources were used to promote awareness about promising new practices, while at the same time ensuring a commercial service delivery, allowing for withdrawal of public resources.

References

- Arnold, E., and M. Bell. 2001. **Some new ideas about research for development**, p. 279-316, In DANIDA, ed. In: Partnership at the Leading Edge: A Danish Vision for Knowledge, Research and Development Danish Ministry of Foreign Affairs, Copenhagen.
- Biggs, S. 2007. **Building on the positive: An actor innovation systems approach to finding and promoting pro poor natural resources institutional and technical innovations.** International Journal of Agricultural Resources, Governance and Ecology 6:144-164.
- Hall, A. 2006. **Public-private sector partnerships in an agricultural system of innovation: Concepts and challenges.** International Journal of Technology Management 38; Sustainable Development 5:3-20.
- Hall, A., G. Bockett, S. Taylor, M.V.K. Sivamohan, and N. Clark. 2001. **Why research partnerships really matter: Innovation theory, institutional arrangements and implications for developing new technology for the poor.** World Development 29:783-797.
- Leeuwis, C., and N. Aarts. 2011. **Rethinking Communication in Innovation Processes: Creating Space for Change in Complex Systems.** The Journal of Agricultural Education and Extension 17:21-36.
- Nederlof, E.S., Wongtschowski, M. and Van der Lee, F., 2011. **Putting heads together: agricultural innovation platforms in practice.** KIT publishers, Amsterdam.
- Rogers, E. 1995, 2003. **Diffusion of innovations.** Free Press, New York.
- Spielman, D.J., J. Ekboir, and K. Davis. 2009. **The art and science of innovation systems inquiry: Applications to Sub-Saharan African agriculture.** Technology in Society 31:399-405.
- World Bank, 2012. **Agricultural innovation systems: an investment sourcebook.** The World Bank, Washington.

BRINGING NEW IDEAS INTO PRACTICE

Experiments with agricultural innovation

An important question for policy makers and managers in the field of agricultural development is how to best invest resources to support agricultural innovation. In this book, we document African lessons from Research Into Use (RIU), a United Kingdom Department for International Development (DFID) funded programme. The programme aimed at stimulating rural economic development by enhancing agricultural innovation.

RIU explored different approaches of promoting innovation in agriculture. This publication analyses the experiences of three RIU Africa Country Programmes, which used Innovation Platforms to facilitate innovation, and two Best Bet projects, which used a competitive funding mechanism to support private sector driven initiatives to get research outcomes into use.

The analysis of the five cases did allow for the development of an analytical model that can assist in decision-making on investments in agricultural innovation. Interventions aimed at agricultural development through innovation would do well to consider two types of results: household level impact at scale, and an improved capacity to innovate. Three interlinked components, needs and opportunity identification, experimentation and bringing into routine use, were distinguished to analyse the process of getting from new ideas to impact at scale. The roles of different stakeholders in these process components are discussed.

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