Final Report

Research Into Use Programme

July 2006 – December 2012

University of Edinburgh

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Executive Summary

The RIU was commissioned in 2006 to address ways to scale up successful innovations from agricultural research. The intention of RIU was to deliver impact from the 11-year (1995 to 2006) DFID-funded suite of programmes on Renewable Natural Resources (RNRRS). This change in direction - to focus upon funding research on uptake rather than on the generation of new technologies - was a new approach for DFID (and the research community) in agricultural research, but is one that is arguably even more pressing now than at the time the programme was designed.

Ensuring that the predicted global population of 9 billion in 2050[1] can be fed sustainably and equitably in an era of climate change is an unprecedented challenge that will require the global food system to change radically. Delivering a step-change in agricultural innovation will require new approaches to developing technologies and to getting them into the hands of farmers. It will require revitalised funding, new institutional arrangements and evidence-based approaches to delivery and scaling up.

RIU has been a large and complex programme, a challenge to manage and, indeed, evaluate. It underwent a substantive change in management and direction following the 2009 Mid-Term Review (MTR) which was critical and rightly so.

The new project management team was asked to turn around a programme, which was clearly not delivering. This was done effectively, leading to some significant outcomes and achievements. These have included: communication outreach work with youth through Shujaaz, which won a Digital Emmy award in April 2012; development and market testing of an innovative social bond for sleeping sickness control; developing new social business models including warehouse receipting (warrantage) in Rwanda; scaling-up provision of village based advisers for farm input provision; and advisory services in Kenya and piloting an approach to establish sustainable social enterprises.

Not everything the programme tested has worked well, but there are important lessons that can be learnt from the RIU experience, from the periods both before and after the 2009 review. These lessons have considerable relevance not just to DFID but also to other funders interested in designing new programmes and initiatives to stimulate the uptake of research and putting it into productive use for the benefit of the poor

For decision makers in the international development community who really want to ensure that research delivers developmental impact, there are valuable lessons. In many respects RIU has adopted a very innovative approach - moving individuals, teams and organisations out of their 'comfort' zone into new disciplinary areas, partnerships and ways of working, without many good overall templates to follow. Crucially RIU support came through innovation brokerage as well as finance. The team learnt the value of being flexible within different investment programmes and the danger of imposing theoretical models on the teams on the ground.

Innovation involves taking risks, but this is essential to meet the challenges of development. Learning the lessons of how to manage those risks will ensure faster progress.

[1] http://www.un.org/esa/population/publications/wpp2008/pressrelease.pdf

Box 1 Comment on the Independent Review

The Independent Review concluded:

That the RIU had broadly achieved its targets with the ultimate conclusion that emerges is of a difficult and complicated programme that has produced some striking results at the field level despite an uneven trajectory and both conceptual and management challenges. There have been missed opportunities, especially in the learning area, but lessons have been learned from this programme both about getting agricultural research into use and about running multi-country programmes. These should form a strong basis for future similar project.

From a management perspective, a number of additional comments can be made:

- Time was the real constraining factor post MTR; financial resources were never a constraining factor for the RIU.
- The geographical focus of the RIU post MTR was primarily Africa. The portfolio of work in Asia was continued albeit a collection of disjointed projects. That said it provided some useful insights into agricultural innovation many of which would also be seen in the RIU work in Africa. The lesson learning and indeed the production of knowledge outputs, from the RIU work has been considerable (Annex 1a and 1b);
- The success of some of the work under the country programmes was due to some very dedicated and charismatic individuals with whom it has been a pleasure to work. Finding the personnel for the country offices was not easy and implementing the process of innovation platforms took much time and effort; much longer than originally thought.
- At the time of the MTR the RIU was seen as a failing programme. This had to be turned around effectively and efficiently. This was done. The RIU has turned out to be a very successful programme and it is hoped that this report provides evidence that the RIU did far more than just broadly achieve and deliver against logframe targets.
- There were some mistakes made and some missed opportunities.
- The implied criticism in the review that reducing the RIU portfolio by cutting projects that were not delivering reduced lesson learning opportunities is contested; this was simply good commercial management practice;
- After the MTR there was a need to get the RIU moving and delivering. The drive behind the private sector push and the Best Bets initiative was to make things happen. It was very encouraging to see this dynamic happening across the programme, making some significant achievements in a short space of time. This enabled the thinking to develop behind appropriate commercialisation options to get research into use at scale and ensuring the key social return.

Attainment of targets at Purpose Level

As concluded by the Independent Review it is probably too early to judge the RIU properly against attainment of the logframe targets at Purpose Level (see Annex 2) particularly given the programme was extended and only completed activities less than two months ago. But it is important to make an assessment at this stage, not least for the sake of reporting, and it is hoped that subsequent evaluations will be able to verify these claims.

Table 1 summarises attainment towards the target of 3 million poor farmers who would benefit directly as a result of the RIU activities[2]. The table indicates each of the RIU interventions along with the cost of the investment[3], the numbers of indirect beneficiaries and the number of direct beneficiaries; the latter being disaggregated by gender (where possible). The data is derived from RIU reports, discussions with RIU project staff and where possible from the independent evaluations.

Inevitably some caution needs to be used when assessing these figures - an assessment of direct beneficiaries is problematic. The RIU undertook a significant investment in building capacity at all levels over the duration of the programme. Training and raising awareness is of paramount importance but it was essential to try and estimate the numbers of people who actually responded as a result of such training. This estimate plus those directly involved in the project work provide the numbers presented here for direct beneficiaries. This is the number to be measured against the target of 3 million. If there was any doubt over the numbers then they were not included in the assessment; hence the numbers presented here are probably conservative.

The scale of benefit beyond direct involvement with RIU activities was huge and this is estimated by the numbers of indirect beneficiaries. This covered all those exposed to RIU work via training, awareness raising etc. and in addition reasonable multipliers have been applied to convert data from household level to numbers of individuals.

Table 2 shows a summary of influence on policies and actions of key donor organisations based upon the RIU experience. Whilst the real policy influence of the RIU to date has been at national, district and local levels within the countries worked (e.g. development of national action plans etc.) it is anticipated that the RIU experience will influence the policies and operations of donor organisations; it is accepted that the true scale of this influence may not be seen for some time. Evidence of influence at national level and below are summarised in the tables within the main report.

[2] Further details of the RIU activities are provided in the following narrative of the final report and in the annexes accompanying the report.

[3] This relates to specific expenditure against any particular RIU intervention but this does not include any specific management and other RIU staff inputs, coordination, communication. See Table 3 for summary overview of RIU expenditure and Annex 4 for a more detailed breakdown of expenditure.

Table 1: Summary table of direct beneficiaries under RIU activities

RIU Activity Area	RIU Investment (£)	No. indirect beneficiaries	No. direct beneficiaries	% direct beneficiaries (Male)	% direct beneficiaries (Female)
Asia Innovation Challenge Fund					
CLUSTER 1: Participatory Crop Improvement	£2,553,601 in total				
• India		> 1,000,000	600,000	67%	33%
• Bangladesh		48,000	20,000	Not clear	Not clear
• Nepal		720,000	258,000	66%	34%
CLUSTER 2: Value Chain Innovation					
• IDE project	£402,010	74,480	10,172	50%	50%
• ICUC project	£348,063	140,000	44,508	35%	65%
• RDRS project	£399,518	101,900	20,485	Not clear	Not clear
CLUSTER 3: Innovation in NRM					
• Forest Action project	£131,489	301,435	60,287	47%	53%
• BELA project	£403,689	300,800	18,718	50%	50%
CLUSTER 4: Other					
• AID-COMILLA project	£410,889	48,000,000	35,075	34%	66%
• BFRF project	£164,620	108,000	30,000	63%	37%
• GYA Ltd project	£440,529	218,700	50,800	3%	97%
Africa Country Programmes					
Nigeria					
• Aquaculture	£187,412	4,640,000	38,315	50%	50%
• Cassava flour	£181,465	1,105,124	23,705	44%	56%
• Cowpea storage	£263,898	16,000,000	380,188	40%	60%
Sierra Leone					
• PAID Platform	£211,606	2,560,000	200	39%	61%
• Solar drying	£181,742	1,120,000	15,000	46%	54%
• Poultry feed	£105,156	1,579,000	30,000	41%	59%
Rwanda					
• Maize warrantage	£450,245	500,000	31,940	60%	40%
• Cassava	£29,855	50,000	20,000	Not clear	Not clear
• Potato	£119,223	450,000	12,400	Not clear	Not clear
Malawi					
• Fish farming/aquaculture	£21,738	8,500	4,000	32%	68%
• Legumes	£35,741	1,600,000	1,785	56%	44%
• Livestock (pigs)	£86,497	98,000	28,600	45%	55%
Zambia					
• Conservation agriculture	£313,110	345,000	61,500	60%	40%
Tanzania					
• Indigenous poultry	£887,734	150,000	17,941	49%	51%
RIU Best Bets					
FIPS – Africa	£726,349	700,000	142,000	38%	62%
Shujaaz (Well Told Story)	£445,507	10,000,000	550,000	60%	40%
Stop Striga (Real IPM)	£403,391	250,000	107,000	51%	49%
BCAs Ghana (Real IPM)	£446,722	7,000	600	50%	50%
Aquashops (FARM Africa)	£447,973	20,268	4,779	73%	27%
Armyworm control (EcoAgri/CABI)	£713,639	2,100,000	105,000	50%	50%
NERICA (CABI)	£172,339	500,000	239	50%	50%
Control of Sleeping sickness (UoE)	£2,001,662	10,000,000	450,000	50%	50%
Clean yam seed (MSHR & IITA)	£130,000	200,000	25	50%	50%
TOTAL			**3,173,262**		

Table 2 Influence of policy and actions on key international organisations, as a result of RIU activities

RIU Activity	Donor influenced	Nature of influence
PCI work Asia	Rockefeller Foundation	Review currently being undertaken of RF Rice Biotech Programme where RIU work will be reviewed as part of this process
Research Into Use Programme	World Bank	Module 7 Assessing, Prioritising, Monitoring and Evaluating Agricultural Innovation Systems – Innovative Activity Profile 6 Research Into Use Programme. Agricultural Innovation Systems – An Investment Sourcebook (2011)
Research into use concept	DFID, BBSRC, ESRC	There is now an RIU component within the ESPA programme managed by a former senior member of the RIU management team and all new projects have to prepare a pathway to impact statement.
Cowpea storage, Nigeria	World Bank funded West African Agricultural Productivity Programme (WAAPP)	Innovation platform model scaled out for other crops under WAAPP – it is anticipated that this approach maybe expanded more broadly.
Integrated Floodplain Management (IFM) (BELA project)	World Bank	World Bank Integrated Fisheries Livelihoods Programme in Bangladesh (US$156m) now contains IFM component which was designed by RIU-funded BELA project staff
Yam pilot enterprises	BMGF	RIU provided proof of concept allowing the US$12m Yam Improvement for Income and Food Security in West Africa (YIIFSWA) programme to be commissioned through IITA via BMGF
FIPS Africa	GTZ, USAID and Rockefeller Foundation	FIPS VBA adopted and funding secured from other donors although this probably restricts development of commercial entities arising from FIPS activities.
Maize warrantage	DFID and WFP	TA support in discussion from DFID Rwanda and Sarura Commodities now trading with WFP; Sarura is the first ever commercial warrantage service to small-holder staple crop farmers.
Shujaaz[4]	DFID, USAID and GTZ	Powerful communication tool mass reach to youth audience now being financed by other donors
Innovative financing mechanism for control of sleeping sickness	DFID and other donors as well as financial institutions in UK and USA	Still work in progress but this novel approach being trail blazed by RIU could also impact more widely on funding disease control in Africa moving away from dependence on unsustainable publicly funded programmes towards private investment in disease elimination.
RIU final presentations (December 2012 and January 2013)	USAID and AGRA – New G8 alliance on agricultural development	Presentations on RIU findings and follow-up activities planned.
A number of RIU publications including: Technology Development Assistance to Low Income Country Agriculture: Putting Research Into Use. Clark, N., Frost, A., Maudlin, I. and Ward, A. (in press)	Policy makers, practitioners and students alike. Publication due out in March but the following endorsements have been made: "This book provides an excellent analysis of an attempt on the part of British overseas aid to deal with a major issue confronting the small farmer in low income countries; viz. how best to translate good science into sustainable innovation and development. It should be essential reading for those involved in development policy." Sir Gordon Conway. Other RIU publications which will have policy influence are provided in Annex 1 List of knowledge outputs and Annex 7 List and abstracts of the CRT discussion papers.	

[4] Shujaaz comic is playing a crucial role, being used as a medium, to prevent violence during the current elections in Kenya

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Acronyms

ACP	Africa Country Programme
ACTS	African Centre for Technology Studies
ADP	Agricultural Development Programme
AGRA	Alliance for a Green Revolution in Africa
AID-COMILLA	Association for Integrated Development - COMILLA
ARCN	Agricultural Research Council of Nigeria
AWEPA	Association of Western European Parliamentarians for Africa
BARI	Bangladesh Agriculture Research Institute
BB	Best Bet
BCA	Biological Control Agent
BDMs	Business Development Managers
BELA	Bangladesh Environmental Lawyers Association
BFRF	Bangladesh Fisheries Research Forum
CA	Conservation Agriculture
CAADP	Comprehensive Africa Agriculture Development Programme
CAZS	Centre for Arid Zone Studies
CBAF	Community-Based Armyworm Forecasting
CBO	Community Based Organisation
CBS	Crop Bioscience Solutions (Tanzania)
CEPA	Cambridge Economic Policy Associates
CFUG	Community Forest User Groups
CGIAR	Consultative Group on International Agricultural Research
CMD	Cassava Mosaic Disease
COB	Client Oriented Breeding
CRT	Central Research Team
CSR	Corporate Social Responsibility

DALY	Disability-Adjusted Life Year
DECD	Donor Committee of Enterprise and Development
DIB	Development Impact Bond
DIP	Development Impact Partnership
DFID	Department for International Development
DoA	Department of Agriculture
DSP	Decentralised (fish) Seed Production
EBRM	Ecologically-Based Rat Management
FFS	Farm Field School
FIPS	Farm Input Promotions Africa Ltd
FORWARD	Forum for Rural Welfare and Agricultural Reform for Development
GAVI	Global Alliance for Vaccines and Immunisation
HAT	Human African Trypanosomiasis
HHs	Households
I4D	Innovation for Development
ICF	Innovation Challenge Fund
ICUC	International Centre for Underutilised Crops
IDE	International Development Enterprises
IE	Impact Evaluation
IFM	Integrated Floodplain Management
IFFM	International Finance Facility for Immunisation
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
IOD PARC	International Organisation Development Ltd (Trading name)
IP	Innovation Platform
IPM	Integrated Pest Management
IRD	informal research and development

KIT	Royal Tropical Institute, the Netherlands
LI-BIRD	Local Initiatives for Biodiversity Research and Development
M&E	Monitoring and Evaluation
MIL	Monitoring, Impact and Learning
MINTRACS	Makerere In-training Community Services
MoA	Ministry of Agriculture
MoU	Memorandum of Understanding
MSHR	Missionary Sisters of the Holy Rosary
MTR	Mid Term Review
NEFORD	Nand Educational Foundation for Development
NGO	Non-Governmental Organisation
NIC	National Innovation Coalition
NIDA	Nkoola Institutional Development Associates (Uganda)
NRI	Natural Resources Institute
NYAMIG	Nyagatare Maize Investment Group (Rwanda)
OPR	Output to Purpose Review
PAB	Programme Advisory Board
PAID	Partnership in Agricultural Innovation for Development (Sierra Leone)
PCI	Participatory Crop Improvement
PIAD	Presidential Initiative for Aquaculture Development (Malawi)
PMCA	Participatory Market Chain Analysis
RAP	Restricted Application Protocol
RDRS	Rangpur Dinajpur Rural Services
RIU	Research Into Use
RGCC	Rwanda Grains and Cereals Corporation (Rwanda)
RNRRS	Renewable Natural Resources Research Strategy
SHGs	Self Help Groups

SME	Small Medium Enterprise
SOS	Stamp Out Sleeping sickness
TL	truthfully labelled
TTOs	Technology Transfer Offices
VBAs	Village Based Advisers (related to FIPS)
VCs	Village Consolidators
VFM	Value For Money
WTS	Well Told Story

1. Introduction

The Research Into Use programme (RIU) began in July 2006 as a follow-up to the DFID Renewable Natural Resources Research Strategy (RNRRS), a global 11-year programme, which ended in March 2006.

The RNRRS[5] had seen a significant evolution over its life. This included a shift in focus from generating research and producing scientific publications to emphasizing the impact of research on poverty – a shift from supply to demand-driven research. The focus also moved from outputs to outcomes and long-term impacts. At the same time, interdisciplinary research, the policy environment and the livelihoods of the poor began to receive greater attention. One of the most influential legacies of the RNRRS was the use of innovation system[6] principles in the development of new partnerships, products, processes, markets, institutions and organisations that are better equipped to put research into use.

The RNRRS yielded a vast array of research outcomes. However, the assessment of the results achieved by the programmes under the RNRRS[7] showed that much of the potential of the research outcomes to contribute to development impact remained unrealised, in part this was because of the difficulties of scaling up the research results. The RIU was initiated as a response to this lack of impact at scale under the research portfolio within the new DFID Strategy for Research on Sustainable Agriculture (SRSA, 2006). It is pertinent to note here that the evaluation of the RNRRS was one of several reviews of donor-funded agricultural research programmes where disappointing rates of adoption of research products were observed with relatively modest impact. This does not mean the agricultural research has failed rather it has not been delivered to its full transformative potential[8]. Studies of agricultural innovation point to the fact that research has rarely been a driver; rather innovation has been driven by entrepreneurs pursuing market opportunities[9] - a key point that would play a major bearing on the focus of the RIU in its latter years.

In short, DFID determined that research targeted at development was necessary but not sufficient – what was required was additional effort aimed at putting the knowledge into use. Accordingly a call was launched for consortia whose remit was to precisely fill this gap with a budget allocation of £37.5m from within the SRSA. The original thinking behind the design of the RIU was to continue with the innovation systems approach (with DFID thinking influenced at the time by Rogers[10] (2003)),

[5] The RNRRS covered ten thematic programmes – Crop Protection, Plant Sciences, Forestry, Crop Post-Harvest, Natural Resources Systems, Animal Health, Livestock Production, Fisheries Management, Aquaculture (incl. Fish Genetics) and Post-Harvest Fisheries. See http://www.dfid.gov.uk/r4d/Project/60568/Default.aspx for further details.

[6] An innovation system can be defined as networks of organisations or actors, together with the institutions and policies that affect their innovative behaviour and performance, being new products, new processes and new forms of organisation into economic use. As an evolutionary model, the focus is on interaction between actors and their embeddedness in an institutional and policy context that influences their innovative behaviour and performance

[7] Evaluation of DFID Renewable Natural Resources Research Strategy 1995-2005 (June 2005)
LTS International. DFID Report EVD 659

[8] Hall, A, Dijkman, J. and Sulaiman, R. (2010) Research Into Use: Investigating the relationship between agricultural research and innovation. RIU Discussion Paper No. 1

[9] World Bank (2006) Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems. Economic Sector Work Report. The World Bank: Washington DC pp149

[10] Rogers, E.M. (2003). Diffusion of Innovations 5th Edition. Free Press. ISBN 0-7432-2209-1

envisaging the programme would take between 2 and 4 high potential outputs from each of the ten RNRRS programmes (with a figure of 30 being commonly cited), targeting scaling up in up to 15 PSA[11] countries working with initially around 60 research clusters. The programme was expected to undergo a 6 month inception period to finalise the approach for implementation over the next four and half years to June 2011. This was presented diagrammatically within the DFID Project Memorandum (2006) as shown in Figure 1 below.

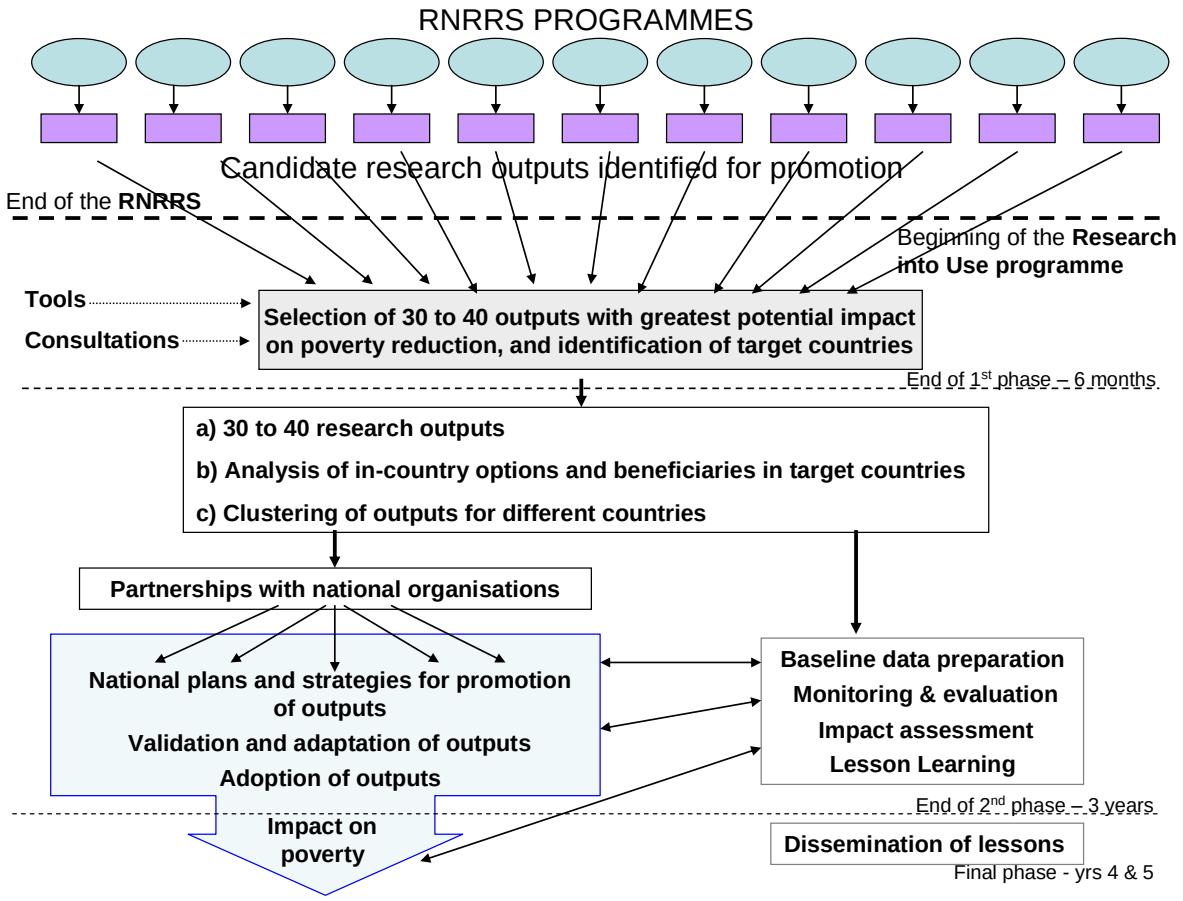


Figure 1 *Tasks of the Research Into Use Programme, taken from DFID Project Memorandum for Research Into Use Programme (2006)*

In July 2006, following a competitive tender a contract for delivery of the RIU was awarded to Natural Resources International Limited, in the UK, heading a consortium comprising Nkoola Institutional Development Associates (NIDA) Ltd in Uganda, and Michael Flint (and the Performance Assessment Resource Centre), also in the UK.

The following section (Section 2) describes the evolution of the RIU in relation to the critical event timeline (shown in Figure 2 below) in terms of the approaches it took and the issues encountered.

Section 3 covers the approaches it took, the results subsequently obtained, the issues it faced and what lessons did it learn along the way. This takes a chronological approach covering the original RIU

[11] Public Sector Agreement (PSA)

timeframe (to June 2011) and then the extension period (until December 2012). Given the change management process that took place within the RIU this report will focus primarily on the period after the MTR.

The fourth section covers a second evaluation exercise undertaken in 2012 but with a focus solely on case studies from Africa which sought to demonstrate whether the RIU was value for money and to take forward the thinking on agricultural innovation.

The final section attempts to summarise the findings of the RIU with the wider context of agricultural development.

2. Research Into Use - background and critical event timeline

2.1 Research Into Use Programme – background

Part of the originality of the programme and the challenge of implementing it, was that its design explicitly combined some unfamiliar bedfellows. The first unusual pairing was that the programme was given an objective (the purpose statement in logframe terminology) that combined (i) the impact at scale ambitions of a development programme with (ii) a learning lessons remit that itself combined research, monitoring and impact assessment perspectives. The second area of mismatch concerned the underlying assumption about how RIU would achieve impact. The rationale of the programme rested on the rapid and wide scale promotion of high impact-potential research products – classic technology transfer. But the RIU's implementation used the rationale of an innovation system with its emphasis on strengthening long-term capacity for learning and change.

The RIU approach was to shift the focus away from the important tasks involved in the generation of new knowledge to the ways in which that knowledge can be put to productive use. An innovation system is usually seen as a network of organisations and individuals involved in generating, modifying, and using new knowledge. The networks might be national, sub-national, regional or international. They comprise not only the users of the knowledge (farmers, consumers, artisans, labourers and traders) and the producers of new knowledge (researchers) but a host of intermediary organisations including extension workers, NGOs, enterprises in the supply chain, credit agencies and government. This systems approach considers not only the totality of the entire research, development and extension spectrum, but also the institutions, systems of production, and social relations in which these activities take place.[12]

This unusual pairing of ideas was not necessarily incorrect but without any precedent showing how to operate this hybrid programme and because of the inevitable tensions involved in trying to reconcile conceptually opposing perspectives, the programme was very slow to start.

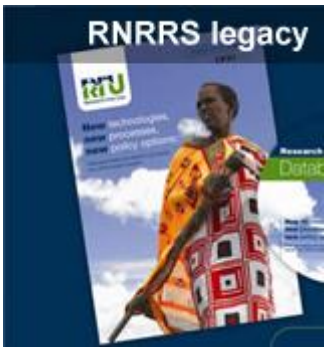
Inception Phase (July 2006 – June 2007)

The Inception Phase saw a number of key activities delivered along with the establishment of management and governance. This phase also saw a series of country assessments undertaken to match local demand (in the six selected countries: Sierra Leone, Nigeria, Rwanda, Tanzania, Malawi and Bangladesh) to the supply of RNRRS derived technologies. These assessments included diagnoses of the natural resource innovation systems in each and identified other specific opportunities for RIU engagement and led to the establishment of interventions designed to promote three[13] linked objectives to be operated under the implementation phase.

[12] There is now an enormous literature on the idea of an innovation system as applied to agriculture in poor countries. A good summary account is contained in Hall, A.J. (2006). Public-Private Sector Partnerships in a System of Agricultural Innovation: Concepts and Challenges *International Journal of Technology Management and Sustainable Development* Vol. 5, No 1 pp 3-20 and more recently in Putting heads together. Agricultural innovation platforms in practice (2011) KIT Bulletin 396 Nederlof, S., Wongtschowski, M. and van der Lee, F. (Eds) ISBN 978 94 6022 1835 which features work from RIU in Rwanda, Tanzania, Nigeria and Zambia

[13] This expanded upon the original two objectives. The new third objective separated out components on policy and partnerships and, on communication.

During this phase RIU made considerable efforts to engage with the past managers of the DFID RNRRS programmes to ascertain their perspectives on research which had yet to reach its potential. This yielded a list of around 300 research areas and following engagement with the associated project teams information was collated using an output proforma (see Annex 3 for format and list of proformas). Each proforma was independently reviewed to validate the outputs before compilation into a database of 274 research products. Effectively this became the shop window for the RNRRS legacy to be scanned for candidates for transfer into use – whether that was via the RIU[14] or another mechanism[15]. The database was widely circulated and was available on the RIU website until 2012. Many of the individual output proformas remain available on the DFID R4D website. However, there was increasing concern that the portfolio of research outputs available from the RNRRS was not best placed to meet the demands coming from the country assessments. In short, there was a mismatch between supply and demand; this meant that *one of the key assumptions behind the RIU proposal was flawed* – as a result research from other domains was also considered.



The management team also drafted a number of strategies e.g. on partnerships, communication and information markets, capacity strengthening and monitoring, impact assessment and learning. In addition, a range of publicity materials was also developed.

However, the management team was having difficulties in conceptualising what the RIU was and how this would be implemented. This was evidenced by the fact that four reiterations of the Inception Report were required before DFID accepted it. There was also considerable pressure to get something up and running following the prolonged Inception Phase and increasing tension within the managing institution and between the various aspects of the programme.

Key document: RIU Final Inception Report (July 2006-June 2007)
RIU Implementation Plan (July 2007 – June 2011)

Implementation Phase (July 2007 – January 2009)

The implementation phase of the RIU saw activities commence on three inter-linked outputs:

Output 1 Significant use of RNRRS and other natural resources research outputs for the benefit[16] (direct/indirect) of poor people in diverse contexts [original budget allocation £16.5m]

> **Component 1.1 Improved access to RNRRS and other research outputs**: The Asia Innovation Challenge Fund (ICF) was issued August- September 2007; this was the first of the three RIU experiments that would ultimately be tested. The rationale of the competitive challenge fund mechanism arose, primarily from the Bangladesh Country Assessment during the inception phase which indicated that there was greater potential for research uptake than was evident in Africa.

[14] In terms of matching demand from RIU activities e.g. country programmes
[15] For example, some of the RNRRS research was taken forward under research programmes of the CG centres
[16] Benefit was defined as poverty reduction as assessed using the sustainable livelihoods framework

Component 1.2 Enhanced demand for RNRRS and other research outputs: The RIU commenced six Africa Country Programmes following on from the country assessments – Nigeria and Sierra Leone in the west, Rwanda and Tanzania in east Africa and Malawi and Zambia[17] in southern Africa[18]. This was the second of the RIU experiments and specifically designed to increase the ability to demand research outputs. This component developed strategies and plans to bring about RIU (innovation) coalitions and networks, RIU partnerships and enhanced demand for information through 'information markets'.

Component 1.3 Enterprises developed using RNRRS and other research outputs: This covered the conceptualisation of Innovation for Development (I4D) where engagement with the private sector was considered a prerequisite as both a catalyst and facilitator in developing products and services. This component subsequently led to the third RIU experiment (Best Bets) although not until later in the programme.

***Output 2 Research into use evidence and lessons generated with evaluation partners [Original budget allocation £8.2m*]**

Component 2.1 Monitoring and evaluation support and synthesis: Designed to embed regular monitoring in the RIU operations and maximise learning across the programme.

Component 2.2 Impact evaluation: This component aimed to produce high quality evaluation evidence to significantly increase understanding on how existing research outputs could best contribute to poverty reduction and economic growth.

Output 3 Policy processes enabled by research into use principles, lessons and discourse. [Original budget allocation £4.1m].

Component 3.1 Influencing the agenda: This aimed to enhance both RIU's out-scaling and up-scaling activities working at multiple levels (national, regional and global) to strategically harmonise and partner RIU with similar efforts. From the outset there was a strong linkage with pillar 4 of the New Partnership for Africa's Development Comprehensive Africa Agriculture Development Programme (NEPAD -CAADP) initiative and the Framework for African Agriculture (FAAP).

Component 3.2 Communications with the global professional community: This component aimed to support and complement the work of the other work areas by providing continuous organised communication strategies necessary for any new development option to have a wide scale impact.

[17] The country assessment for Zambia was undertaken later than the others and the Country Programme became operational in November 2008

[18] It is noteworthy that two of the country assessments (Tanzania and Sierra Leone) were rejected by RIU management and both were subsequently revised although both resulted in delays in implementation and in the case of Tanzania, a significant loss of creditability for RIU.

Mid-term review (October 2008 – January 2009)

The Mid-Term Review (MTR) was instigated following the departure of the original Programme Director, the increasingly unfavourable environment within the managing institution, - which was impacting negatively on programme delivery and increasing dissatisfaction within DFID. The MTR was critical, and rightly so, but necessary in order to draw a line under what was considered to be failing programme. The MTR rightly concluded that the RIU was too diffuse and lacked focus. It made a number of recommendations and as a consequence the RIU was refocused by way of a substantial change management process which took place in the first half of 2009. This change effectively terminated the original consortia agreement and removed the previous top heavy, rigid management structures and replaced this with a lean and fleet of foot management team. Natural Resources International continued as the lead contractor to DFID but all the other partners in the original contract ceased to be involved with the programme. In the case of IOD-PARC their withdrawal was a result of irreconcilable differences with the lead contractor's senior management. The PAB was dissolved following heavy criticism within the MTR. The management contract with Natural Resources International was subsequently terminated at the end of December 2010 when the contract and remaining staff transferred to the University of Edinburgh.

Re-focussed RIU (April 2009 - June 2011)

Following critical reviews of the portfolios of work in Africa and Asia, undertaken after the MTR, this phase saw a major re-focus and down-sizing of the number of platform activities undertaken by each country programme and the country teams were given much greater autonomy and flexibility. The portfolio of the projects in Asia was also reduced at this point. The three outputs[19] operational prior to the MTR were taken back to the original two-fold aims:

1. How to better utilise outputs from agricultural research
2. How to 'nudge'[20] research funded by donors - who fund much of the agriculture-related research in the developing world - more directly towards the benefit of poor farmers.

Autumn 2009 saw the launch of the RIU Best Bets initiative which served as the third of the RIU experiments although its genesis had started under the component 1.3 in the inception phase. This third experiment epitomised the re-focussed RIU oriented towards involving the private sector. This was a key delivery phase within the RIU timeframe with all three experiments operational and a new Central Research Team (CRT) put in place to learn lessons across the programme; the main outputs from this team were a series of 27 discussion papers many of which are referenced in this report[21]. An independent review was commissioned by DFID in 2010 -2011 to ensure lessons from the RIU were learnt quickly.

June 2011 (being the original end date) was a natural break point in the RIU and a convenient point to bring closure to elements of the programme that had completed their original work activities and

[19] Whilst output 3 was not continued post MTR – communication activities became more integral to the management function rightly cross cutting the whole programme. One noteworthy activity which started discussion under the Influencing policy component was supported post MTR, a collaborative study with AWEPA and AGRA working with parliamentarians on establishing agricultural select committees (See Annex 12 for report on follow-on study).

[20] 'nudge' here relates to how we address policy accepting that the world of agricultural research is not going to dramatically change because of the RIU but influencing how such research is commissioned and ultimately used is a realistic ambition.

[21] A full list of the discussion paper series and abstracts in available in Annex 7 along with a link to the full text.

delivered, in management's opinion, as much as they were going to deliver. Accordingly, work of the projects in Asia under the Asia ICF and the country programmes in Sierra Leone, Malawi and Zambia ceased at this point. In other areas there were a number of very exciting activities on-going. A case was made to DFID for an extension based upon: the successful turnaround of the RIU and, exciting activities that just needed more time - time that was lost during the early stages of the programme.

Key document: **RIU Business Plan (July 2009 – June 2011) and new logframe (Annex 2)**
Independent Review[22] and Annexes[23]

RIU Extension Phase (June 2011 – December 2012)

Based on the successful turnaround and delivery over a two year period and on the understanding that some time had been lost during the inception phase and in the period surrounding the MTR, a further extension was granted. This phase allowed for three key areas of focus:

- **Commercialising high impact agriculture at scale in (East) Africa – a commercial mentoring and pilot programme**
  Opportunity to take the eight most promising areas from the RIU portfolio beyond the proof of concept stage and to pilot a mechanism for building a pipeline of commercialisation opportunities, and provide a model for bridging the funding gap between early, risk phase and investable, growth phase business, ensuring the potential to create and grow sustainable businesses that deliver long-term social benefits at scale. March 2012 was designed as a critical control point for a go/no-go decision for continuation through to the close of the RIU in December 2012.

- **Internalising social impact performance (Impact Evaluation)**
  The MTR was critical of the initial work programme under Impact Evaluation and brought about changes yet the subsequent Independent Review also failed to address the key question – Value For Money. The extension phase allowed for an additional activity to be designed to address this to fill the gap and to position the RIU and indeed DFID as a thought leader in this important field of private sector-delivered impact evaluation.

- **Financing and implementing neglected tropical disease control (GAVI-style Bonds)**
  This followed from additional work undertaken above (under the first bullet) where the body of evidence had been assembled to attract investment funding when proof of value is reached. In the case of the RIU work on control of Sleeping Sickness there is now a very compelling case for SOS[24].

There was also a strong emphasis on the preparation of a series of knowledge outputs to ensure the lessons from this additional portfolio were captured – a summary of the extensive outputs delivered are shown in Annex 1a and 1b.

[22] See http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Research_Into_Use_An_Independent_Review.pdf
[23] See http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Research_into_Use_Independent_Review_Complete_Annexes.pdf
[24] Stamp Out Sleeping sickness

Key document: **Request for additional funding (March 2011) and Bringing New Ideas into Practice: Experiments with agricultural innovation – Learning from Research into Use in Africa (KIT/RIU 2012)**

A final contract amendment in November 2012 saw additional monies assigned to a) Well Told Story to cover six nutritional based stories for DFID, in Shujaaz and b) to cover the feasibility study, undertaken for DFID by Social Finance, to underpin the concept of a Development Impact Bond[25] (DIB), an innovative financial model, based on the earlier RIU work on controlling sleeping sickness in Uganda. Whilst some mention of the DIB will be made in later sections, further detailed reporting on these two areas falls outside the scope of this report.

Figure 2 *The Critical timeline for the RIU*

The logframe for the refocused RIU and evaluated by the Independent Review is shown in Annex 2.

[25] See http://blogs.cgdev.org/globaldevelopment/2012/10/why-development-impact-bonds.php for generic overview of Development Impact Bonds

2.1.1 Financial Overview

The financial overview of the RIU Programme is provided in Table 3 below. The overview covers the entire programme from Inception in July 2006 through to closure on 31st December 2012.

The total expenditure for the RIU programme was £42,383,249

The Inception phase accounted for 13% of the total spend. Under the implementation phase 58% of the total programme was spent against Output 1, 19% against Output 2 and the remaining 10% on management costs.

Table 3 Research Into Use Programme actual expenditure by financial year

Figures in £	2006-2007 Actual	2007-2008 Actual	2008-2009 Actual	2009-2010 Actual	2010-2011 Actual	2011-2012 Actual	2012-2013 Actual	TOTAL
Inception Phase	4,819,384	607,280						**5,426,664**
Implementation Phase								
OUTPUT 1								
Africa Country Programmes		663,322	1,735,028	2,404,970	2,647,214	1,436,134	154,645	**9,041,313**
Asia ICF		315,791	1,236,739	1,802,093	763,560	290,989		**4,409,171**
Best Bets		156,412	177,239	1,813,653	4,362,429	3,834,454	-555,423	**9,788,764**
Other Phase 1 costs		59,311	151,640					**210,951**
Pilot Programme Rwanda						234,048	705,952	**940,000**
Development Impact Bond							157,981	**157,981**
OUTPUT 2								
MIL - IOD		259,843	735,680	86,478				**1,082,001**
Impact Evaluation -IOD		546,565	1,524,087	487,370				**2,558,022**
Independent Review					585,392	145,406	8,925	**739,722**
Impact Evaluation -KIT				0	0	23,136	296,869	**320,005**
Influencing the agenda		229,140	151,640	177,989	-23	0	100,000	**658,746**
Communications		378,363	417,844	358,561	330,030	119,843	4,810	**1,609,451**
Central Research Team				387,886	558,958	265,627	-9,675	**1,202,796**
Management								
NIDA		180,350	308,033	27,859				**516,242**
IOD		114,511	127,042	48,886				**290,439**
NRIL		581,217	572,189	582,829	476,678			**2,212,912**
UoE				176,845	485,982	385,355	168,889	**1,217,070**
TOTAL	**4,819,384**	**4,092,105**	**7,137,160**	**8,355,417**	**10,210,219**	**6,734,990**	**1,032,974**	**42,382,249**

A more detailed breakdown of expenditure is provided in Annex 4.

3. The Research Into Use Experiments

RIU explored various approaches for 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 namely:

- Asia Innovation Challenge Fund (Asia ICF) (active period July 2008 – June 2011)
- Africa Country Programmes (active period June 2008 – December 2012)
- Best Bets Initiative (active period January 2010 – December 2012)[26]

A summary of these experiments, the approach and process taken, the portfolio of work commissioned and the results obtained are provided in the section below. More detailed analysis and evidence by way of independent evaluations on case studies are detailed elsewhere[27].

3.1 Asia Innovation Challenge Fund (Asia ICF)

3.1.1 The approach

In Asia, the programme started with country assessment studies and a policy actor network analysis. However, these were not used to develop regionally-led activities. Instead RIU adopted a challenge fund approach to select projects targeted at up-scaling knowledge previously generated. The justification for this approach was that "considering the relatively large number of validated RNRRS research outputs that are considered not to be adequately being put into use" and the very large number of potential organisations who might be able to play a role, a challenge fund would be a legitimate mechanism for addressing this opportunity. In many regards the initiation of a challenge fund mechanism mimicked the RNRRS and the comfort zone of the management team but it did offer scope for wider geographical spread beyond one country.

3.1.2 The process

The process adopted a tried and tested approach along the same lines as the challenge fund calls made under the RNRRS. Advertised call for submission of concept notes followed by review then submission of project memoranda and further review. The call emphasised the use of an innovation systems approach giving importance to partnerships and networking among a wide range of stakeholders for horizontal and vertical scaling up and use of research results. In total 123 concept notes were received and 13 projects selected starting in July 2008 with modest-scale budgets.

As originally conceived there was no organising principle for the selection of projects or for lesson learning from the projects other than that they would put RNRRS research results into use. Following a review of the portfolio in June 2009 as part of the re-focussing of the RIU post MTR the portfolio was reduced to eleven. The two projects[28] that were dropped after one year were either too research-like with low potential for impact or they deployed implementation strategies that

[26] The funding to December 2012 for some work areas originating from the Africa Country Programmes and Best Bets were covered under the commercial mentoring component of the extension phase.

[27] http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Research_into_Use_Independent_Review_Complete_Annexes.pdf

[28] The two projects were the Rice Innovation Project in India led by Nand Educational Foundation for Development (NEFORD) and the Knowledge to Action: Enhancing traditional dairy value chains led by the International Livestock Research Institute (ILRI)

showed little promise in terms of informing the programme about how research could be used for innovation. The remaining projects were then clustered for lesson learning purposes along the following lines:

- Participatory Crop Improvement Innovation
    - Improving livelihoods in South Asia through sustained access to new technologies in rainfed agriculture (India) led by Centre for Arid Zone Studies (CAZS) Bangor, UK
    - Poverty reduction through crop intensification into rice fallows in Nepal led by Forum for Rural Welfare and Agricultural Reform for Development (FORWARD)
    - New rice and legume seed from client-oriented breeding (Nepal) led by Local Initiatives for Biodiversity Research and Development (Li-BIRD)
- Innovation in value chains
    - Linking farmers with markets for rural prosperity (Nepal, Vietnam and Cambodia) led by International Development Enterprises (IDE)
    - Coalition to diversify income through under-utilised crops (India and Vietnam) led by International Centre for Underutilised Crops (ICUC)
    - Developing fish seed value chain in Bangladesh led by Rangpur Dinajpur Rural Services (RDRS)
- Innovation in Natural Resource Management
    - Reducing poverty through innovation systems in forestry (Nepal) led by Forest Action
    - Scaling up integrated floodplain management through adaptive learning networks led by the Bangladesh Environmental Lawyers Association (BELA)

The three projects under the Participatory Crop Improvement theme were refocused in December 2009 and clustered together as a 'best bet' under the third of the RIU experiments which commenced in January 2010 – for the purposes of this report the work is summarised in this section given its importance to the portfolio. The DFID Annual Review in 2010 recommended that the Asia portfolio be reviewed on a number of criteria[29]. The review was not particularly favourable with many projects seeing themselves as a continuation of the research process – pushing RNRRS technologies with no assessment of market need. Another major criticism was that many projects had failed to explore the full value chain of the markets they were working within; as a consequence some of the projects had their time-scales shortened.

3.1.3 Asia ICF project portfolio

The projects within the three clusters have been listed above. There were three other projects which the CRT could not cluster and these continued as stand-alone projects:

- Promoting sustainable livelihood development (Roji Roti) (India) led by GY Associates (GYA) Ltd, UK
- Rat management for rural communities (Bangladesh) led by the Association for Integrated Development – Comilla (AID-COMILLA)
- Promoting sustainable coastal aquaculture in Bangladesh (ProSCAB) led by the Bangladesh Fisheries Research Forum (BFRF)

[29] The basis of the review was to assess what lessons had been learnt to date, were credible plans in place for addressing sustainability and were new organisational systems in place to support expansion and was there sufficient capacity and resources to contribute to the RIU purpose and objectives.

It is not the intention here to report on each individual project but to focus on key achievements and lesson learnt. However, brief description of the projects within the Asia ICF portfolio are provided in Annex 5 and a summary reports of the projects' findings are provided in Annex 6.

Table 4 below summarises the major achievements and lessons learnt.

The Independent Review selected two case studies from the Asia ICF portfolio for review:

- Participatory Crop Improvement led by FORWARD in Nepal – the focus here was on supply response; high quality seed produced locally and promoted through distribution of samples.

- Rat management for rural communities led by AID-COMILLA in Bangladesh – the focus here was on demand response; effective trapping systems and advice provided for controlling rats in rice fields.

Table 4 *Details of Asia ICF Projects highlighting key achievements for funding period to June 2011*

Asia ICF Project, Lead institution and actual expenditure (£)	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Participatory Crop Improvement in Asia				
Improving livelihoods in South Asia through sustained access to new technologies in rainfed agriculture in India and Bangladesh Led by CAZS, Bangor	16 RNRRS from Plant Sciences Programme	Nearly 18,000 farmers trained on RRC technology, seed priming and seed treatment through demonstration plots, awareness campaigns; 1,636 members of all 95 GCS Banks trained on RRC and business planning; Seed distribution of Kharif/Rabi to over 1,000 and 1,500 farmers respectively in 2010-2011	Several meetings and consultations were organized with the officials of DAE and Bangladesh, Rice Research Institute and Bangladesh Agriculture Research Institute (BARI). These meetings were very helpful in smoothing out the field implementation of project activities but did not meet with any significant changes in seed policy or variety testing and release and registration policies of Bangladesh. This would have been overly ambitious given the project resources. However, the project did manage to distribute seed of non-released varieties without government interference which was a significant deviation from official policy. The policy change was limited to trying to achieve changes at the State Agricultural University in Chhattisgarh. However, the traditional approaches of the breeders proved too entrenched to make any changes.	Farmers are still looking for shorter duration rice varieties for *boro* season, i.e. nearly 10 days earlier with a similar yield to that of Barkhe 3004; an important breeding objective for *boro* rice in Bangladesh. Involvement of various DAE offices and Block level employees, a number of NGOs and private company contributed in implementing RIU activities smoothly and help create more impact in a short period. The involvement of DAE in particular in the distribution of IRDs was helpful in the institutionalization of superior varieties. For similar initiatives in future quantity of seed per informal research and development (IRD) kit should be 2 kg instead of 5 or 10 kg to increase the coverage of the projects to more farmers, and putting a nominal charge on IRDs would create a feeling of ownership and ensures that those kits reach in the hands of needy farmers. Government seed policy and seed Acts are not favourable for the NGOs. At times project experienced difficulty in promoting unreleased COB rice

				varieties. Farmers in Odisha state have realized the importance of growing new rice varieties Ashoka, PY-84 and Barkhe 3010. There needs to be a reliable source for producing and delivering quality seeds of them to farmers and the JCPCL may be a route if it proves to be a sustainable enterprise. Trust-building among company directors, shareholder farmers, employees and facilitating organization is vital for the successful establishment of any new seed producer company. This needs to be built up over a period of longer than two years.
New rice and legume seed from Client Oriented Breeding (COB) in Nepal Led by LI-BIRD	7 RNRRS from Plant Sciences Programme	1,015 metric tonnes of truthfully labelled rice seed produced of which 148t was of COB varieties; The sales of rice, lentil, kidney bean and mung bean was £368,000 in 2010/2011 season CBSP groups; Some CBSP groups in process of changing into cooperatives; Working capital of 17 CBSP has increased from 9% to 600% Anamolbiu Private Limited, a seed company established and working independently.	Of the three countries, Nepal is the one where the project had significant influence on policy. It clearly contributed in influencing policy related to seed system development and marketing. The project promoted the BDS approach to strengthen CBSPs with an emphasis on business skill development. High-level government officials were invited in the project review and planning meetings, and joint monitoring visits. During these visits CBSP members highlighted the points related to strengthening CBSPs along business lines. This had considerable influence over Department of Agriculture (DoA) in	The project demonstrated the value of a business-oriented approach to strengthening food crop seed systems. This needs to be internalized by the national system. Producing and marketing truthfully labelled seed is very vital for grassroots-level seed production and marketing. This approach is now being gradually internalized by other institutions in Nepal. PVS identified and promoted varieties very quickly. Now there is a growing demand for these varieties that are being scaled up through networks of farmers' groups, DADOs, Agrovets, Cooperatives, local *Hat bazaars* and by farmer-to-farmer seed flow.
Poverty reduction through crop intensification into rice fallows in Nepal Led by FORWARD	7 RNRRS from Plant Sciences Programme	Over 440 metric tonnes of rice including 108mt of COB varieties; Over 860 mt of seeds from various crops produced by 523 members of 17 CBSPs valued at £199,000; Nearly 8,000 farmers trained through		

Case Study for Independent Review		demonstration of RRC technologies; 50 on farm demonstrations to promotion garlic zero tillage technology (using land normally fallow in winter) - farmers harvest 2 times higher bulb yields when compared to conventional practices Private seed company, GATE, established with responsibility for maintenance of breeders and source seeds of COB varieties and legumes	re-orienting the District Seed Self Sufficiency Programme (DISSPRO). The recently developed Seed Vision 2025 also incorporated considerable learning from RIU projects. A new seed project implemented in 26 districts of Nepal by NARC -Seed Safety Nets Project (SSNP) has also adopted the CBSP approach. Although it does not have a full understanding of the business perspectives needed, they have promoted truthfully labelled (TL) seed.	The IRD of the rice and legume varieties will produce a large spill-over effect to many farmers in the project area and beyond. IRD is also a very powerful tool for promoting faster dissemination. These results were shown in an end-of-project workshop to NARC scientists and Department of Agriculture officials and they have begun discussions on utilising this approach to make the official varietal promotion system more effective.
Cluster 2 Value Chain Innovation[30]				
Linking farmers with structured markets for rural prosperity Nepal, Cambodia and Vietnam Led by International Development Enterprises (IDE)	3 RNRRS	In Cambodia, 4,200 farmers exposed to the programme and 80% expressed satisfaction $30K of quality assured inputs were sold by the FBAs to their farmer-clients, with good quality extension advice. 30 traders and FBAs trained to use Market Information system which used SMS to disseminate market prices and enable contact between actors. In Vietnam, 723 poor smallholder pig raisers participated in PMCA activities, with 100% of them being women. Business collaborations formed leading to farmers increasing their annual income by $219/year In Nepal, 5,219 vegetable producers have benefited from marketing and production services.	The Government of Nepal advised on adopting PMCA.	Need to learn to understand when to let the new systems go and develop organically, entrepreneurially, and at the same time to know what areas need close attention e.g. quality control. PMCA is more effective when thematic groups have specific resources for which they can design and implement activities. To be a component of project implementation, PMCA planning needs to be done within about 4 months. PMCA is best suited for use in mature value chains where substantial commodity consolidation takes place, where most actors along the chain

[30] Discussed further in Reddy, V., Sulaiman, R., and Hall, A. (2011) Exploring mechanisms for putting research into use: Evidence from RIU's value chain oriented projects in South Asia. RIU Discussion Paper No. 23

				both know and trade with each other, face profit erosion pressures and realize individually that 'something needs to be done' (and, so, are inherently receptive to the collaboration process PMCA entails).
Coalition to diversify income through underutilised crops Led by International Centre for Underutilised Crops (ICUC) India and Vietnam	9 RNRRS plus other international and local research	Overall increase in income across project sites, with some dramatic increases e.g. a fivefold increase. This has been brought about through: (i) improved germplasm, (ii) improved capacities (skills, knowledge and technique), (iii) better processing facilities, (iv) increase in sale opportunities, (v) access to better market and (vi) increase in sale price of underutilised crops; Farmers have increased the area for planting underutilised crops Increased number of farmers growing Hoa Vang Sticky Rice and a three-fold increase in the number of farmers cultivating millet in Karnataka. Nurseries established by the project have proved to be an additional income generating activity which have the potential to develop into fully fledged retail or wholesale nurseries Newspaper, TV, radio and website articles have indirectly benefitted over 140,000 people	Influenced agricultural bodies, for example the National Agricultural Extension Centre and Provincial Department of Agriculture and Rural Development for Hanoi and Thua Thien Hue provided supplementary funds for training courses. The Provincial Departments for Science and Technology of the two provinces provided funds for the establishment of geographical indicators.	It takes time for farmers to adopt innovations in agriculture; that linking knowledge transfer with acute problems (such as pest outbreak) will enhance the learning experience; use of appropriate printed material is important to improve knowledge; providing farmers with (non-cash) incentives to increase their interest works well; it is important to have a base onto which to build when promoting new technologies and it is important to be situation specific, i.e. suited to the location. In the more specific case of underutilized crops, the fact was highlighted that the stakeholders need to have basic knowledge of the 'new' crops, otherwise their interest in adopting a new technology is weak. Similarly, the need to build upon a clear demand rather than a production-led approach is a prerequisite for successful introduction of underutilized crops or new products of existing crops. It was also realised that developing a market-based approach with underused crops is challenging, because the volumes of produce are low (by nature of the crops being 'underused') and thus the

				quantities required for a sustainable market are difficult to reach.
Enhancing the impact of decentralised fish seed production (Bangladesh and Nepal) Led by RDRS	3 RNRRS	23% of rice-fish farmers have increased their land holdings and income from fish has increased significantly due to re-stocking of quality fingerling from rice field to ponds and application of improve management practices for food fish production. Households increased their social standing by participating in more social events and community meetings and 25% of them distributed fish as gifts which strengthened their social relations to a great extent. 17,899 farmers produced approximately 20 million large size fingerlings from their ricefields and 2586 farmers have produced approximately, 6 million fingerlings in their seasonal ponds. 54% farmers completely ceased pesticides application in rice fields used for fingerling production, and further, RF based DSP reduced cost of pesticide use by Taka 179 (51% of the earlier cost) per plot. 100% of the DSP households increased their level of knowledge on fish seed production in rice fields. 81% respondents gained knowledge about more than 50% technological know-how on fish seed production in ricefields. Fingerling traders selling DSP fingerlings increased in number from 5, to an average of 515 in 2009 and 1015 in 2010.	The Department of Fisheries, local NGOs, and partner institutions are all taking forward the DSP approach for up-scaling within their own initiatives.	Adoption of DSP technologies by secondary adopters was slow and below target. There are five key indicators of whether a household is likely to adopt decentralised seed production, those where rice cultivation is the main activity, those who have the rice plot located close to their home, those where the rice plot usually holds water during the boro season and finally those where at least two existing rice plot dykes are already raised

Cluster 3 Innovation in natural resource management				
Reducing poverty through innovation systems in forestry (Nepal) Led by Forest Action	8 RNRRS	More than 80% of the CFUGs[31] used their training to commence micro-enterprises; Approximately 61,000 rural people are directly benefiting from RPISF/RIU projects; 60 Local Resource People (LRPs) were trained in facilitation skills; 63 cluster based discussions held every 3 months and 4 enterprise development workshops held; 198 community based radio programmes broadcast from 3 project sites and 3 TV episodes	Assisted with a consultation organised by the Ministry of Environment (MOE) that led to the National Adaptation Plan of Action (NAPA) using experiences directly gained from the RIU project; Forest management and governance training carried out resulting in 2 year strategic plans and 10 year visioning plans drawn up for 60 CFUGs; Project members are called on to be advisors to various organisations including at government level.	Stakeholder platforms needed extensive planning and organisation in order to make them work. This was time consuming given range of stakeholders and different ways of working.
Integrated floodplain management in Bangladesh Led by BELA	8 RNRRS used and/or made available to beneficiaries	252 Community-Based Organisations established comprising 50,148 households; 90% of CBOs adopted some components of IFM; 75% of CBOs now operating their own saving schemes and 62% now involved in revolving fund schemes	Six policy briefs prepared	Need flexible approach to get research into use. Field based demonstrations are effective and necessary

[31] Community Forest User Groups

Other projects				
Rat Management for rural communities, Bangladesh Led by AID-COMILLA **Case Study for Independent Review**	5 RNRRS	15,000 communities trained in EBRM[32] at a cost of around £18/head 20,000 benefiting from improved traps Local traps now made in Bangladesh at a third of the price of imported traps from US; 48 million people made aware of the issue via project awareness campaigns using range of media types.	Donors and local government now increasingly aware of EBRM	Increased awareness of the problem and that control measures need to be undertaken together. Clear evidence that improved traps decrease the rat population and hence reduces loss of grain. But lack of sustainable community structures make communities reliant on outside help
Promoting sustainable coastal aquaculture in Bangladesh Led by BFRF	4 RNRRS relevant to work	Reached more than 5000 households, all trained on the new technologies and linked to local service providers, marketing and knowledge agents; An additional 15,000-18,000 households adopted these new technologies through awareness raising; Production per household increased in all technologies leading to a significant increase in income Two crab hatcheries were established which should support the expansion of the crab fattening and ex-port industry in Bangladesh.	NGOs, policy makers and the government of Bangladesh were interested in the project and adopted aspects of it. Project technologies have been included in the course curricula of three Bangladeshi Universities Banking policy changed allowing first examples of funding to crab hatcheries.	Adoption of research technologies very much linked to where individuals can see a commercial return
Promoting sustainable livelihood development Roji Roti (India) Led by GY Associates Ltd	5 RNRRS	50,880 members in 912 villages, 3 states and 16 districts; 62% of members were scheduled caste/scheduled tribe; 80% landless/marginal landholdings, 5% widows, and 1% (bonded) labour; 98% women: 95% have accessed loans: All members can transfer remittances, either through CPSL or their own bank accounts as Canara Bank opened 1,200 bank accounts for group members with as little as Rs25 each. Small-stock poultry ownership rose by 173%	Elements of the Rojiroti approach have been adopted by 17 NGOs, government programmes and influenced high level ministers such as the Deputy Chief Minister in Bihar.	Rojiroti model worked as a scaleable, cost effective and highly effective at reaching and engaging with very poor people. Sharing approach with NGOs has been effective means of scaling up with development programmes Investment in agriculture (as well as other income-generating activities) by poor people does take place once they reach a degree of financial and livelihood stability.

[32] Ecologically-Based Rat Management

Many of the RIU Asia ICF projects involved researchers from the earlier RNRRS – this was both positive (e.g. link back to original science and understanding) and negative (e.g. inability to see beyond the research and perspectives of other stakeholders). But with a mandate to scale-out promising research products for impact, a different type of approach needed to be taken from research-oriented RNRRS predecessors. The main features of the process of putting research into use are summarised by Sulaiman et. al. (2010)[33] as:

Networking – a need for partnerships was emphasised in the call and there were many good examples of this within the portfolio e.g. the NGO RDRS and partner, WorldFish Centre needed a partner with marketing experience so IDE were brought in to fill this gap. The PCI work developed a network with seed growers, local agro-dealers, millers and radio stations.

Diversity of organisations – many were evident in the Asia portfolio from international research institutes e.g. CAZS, ICUC; NGOs such as LI-BIRD and FORWARD; private consultancy firms like GYA Ltd; IDE as a specialist market broker; legal NGOs like BELA; policy think tanks – Forest Action and sector coordinating bodies e.g. BFRF

Innovation management – a wide range of functions, activities and tools are critical for enabling innovation and hence for putting research into use, collectively called innovation management tasks, Figure 3 below adapted from Sulaiman et. al. (2010) summarises these. Six key tasks are identified and these are presented in Table 5 below alongside operational tools observed in the Asia portfolio.

Table 5 *Innovation management tasks observed in the RIU projects in Asia*

Tasks	Actions	Tools used in RIU Asia projects to perform tasks
Networking and partnership building	Convening Brokering	Grain cash seed bank Community-based seed producer groups
Setting up/strengthening user groups	Facilitating	Community-based user groups Producer companies NGO-led private companies
Training	Coaching	Market chain analysis Market planning committees
Advocacy for institutional and policy change	Advocating Information	Community germplasm orchards Village crop fairs Food processing parks
Enhanced access to technology, expertise, markets, credit and inputs	Dissemination Negotiating	Use of lead entrepreneurs Participatory action plan development Community resource centres Policy working groups
Reflective learning	Mediating	Thematic committees RIU cluster-level sharing workshops Forest policy seminar series

[33] Sulaiman, R., Hall, A., Reddy, V. and Dorai, K, (2010) RIU Discussion Paper 11 Studying rural innovation management: A framework and early findings from RIU in South Asia

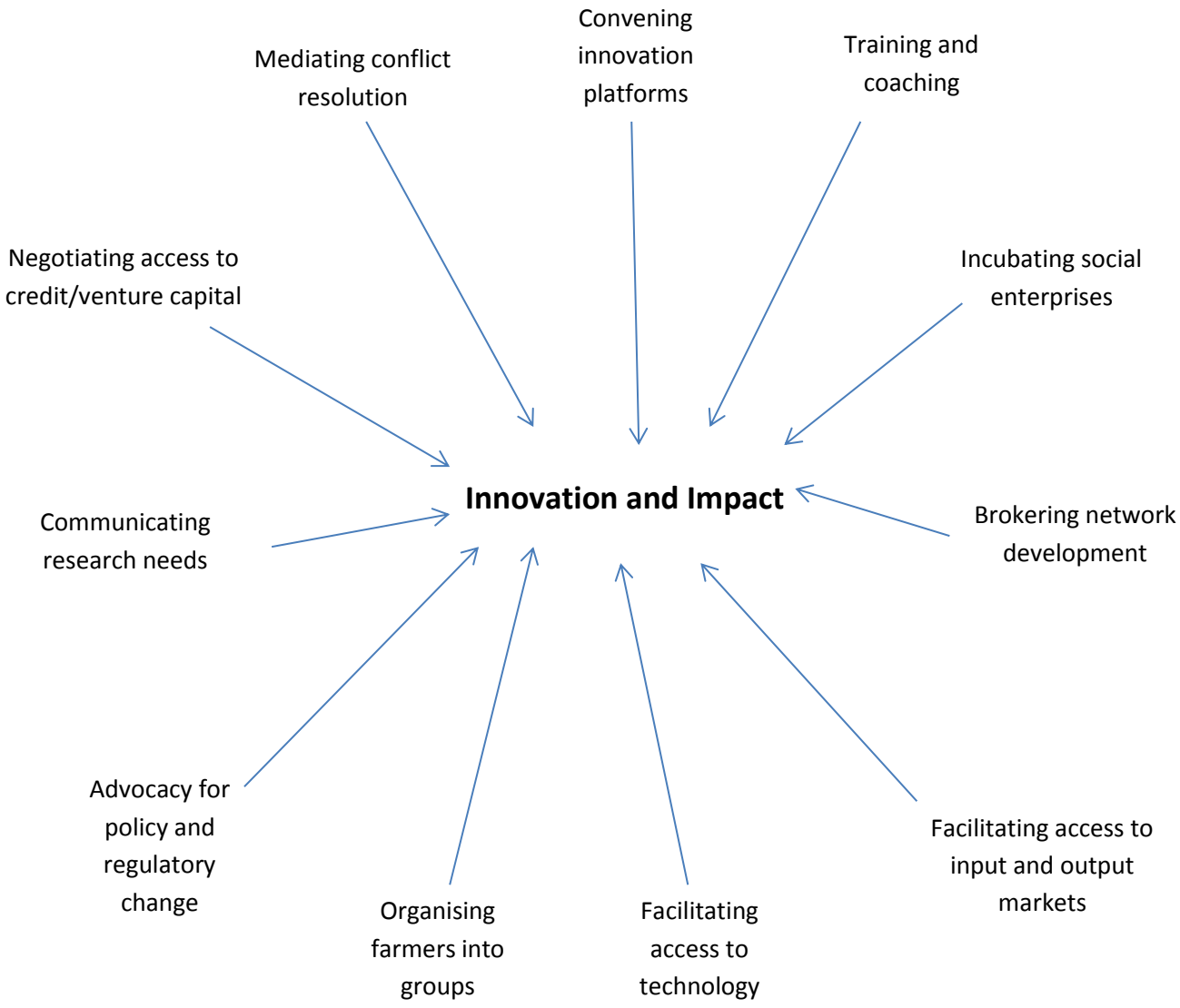


Figure 3 *Innovation management tasks – adapted from Sulaiman et. al. (2010)*

While researchers led many of the previous initiatives that focussed upon the generation of new technologies and approaches, in most cases they played a secondary or supporting role in the RIU projects[34]. Unfortunately, where a researcher could not accept their role was now not a leading one, they could be seen as a hindrance to the RIU project.

Whilst presenting Figure 3 as an analysis of the Asia portfolio there are some important points arising from the Asia work which were common to observations made under other RIU experiments namely:

- Putting research into use involves a range of tasks beyond ensuring access to technology and information;

[34] This is exactly how it was expected to be and this was a very strong message to the researchers during the inception phase when the RNRRS legacy database was being compiled - a shop window for their research, if such research was demanded then it was highly likely that they would be involved but probably in an advisory/mentoring role.

- These tasks do not work independently and innovation is usually only enabled when a cluster of these tasks are performed together;
- There is no set formula or blueprint for which tasks need to be deployed together – sometimes network development will be most important, sometimes advocacy for policy change. The history and context of where the innovation is on its course will dictate what task takes priority and when. In most cases the RIU was the continuation of events from the RNRRS or beyond – by way of example Figure 4 below shows the innovation trajectory of the PCI work in Nepal from the mid 1980's support from USAID through to current RIU support;
- Research continues to play an important role in supporting innovation by developing new information and integrating it with local knowledge and well as with ideas generated elsewhere e.g. the PCI work in Nepal;
- Research is an important entry point in the innovation process but not the only one;
- Entrepreneurs – those for-profit bottom line as well as those with a hybrid mandate of profit and social good – have emerged as an important group. By way of example from the Asia portfolio, work on the Bangladesh fish seed value chain focussed on changing rice farmers, table fish growers and fingerling traders into micro entrepreneurs, selecting and training some farmers as lead entrepreneurs to drive the value chain.

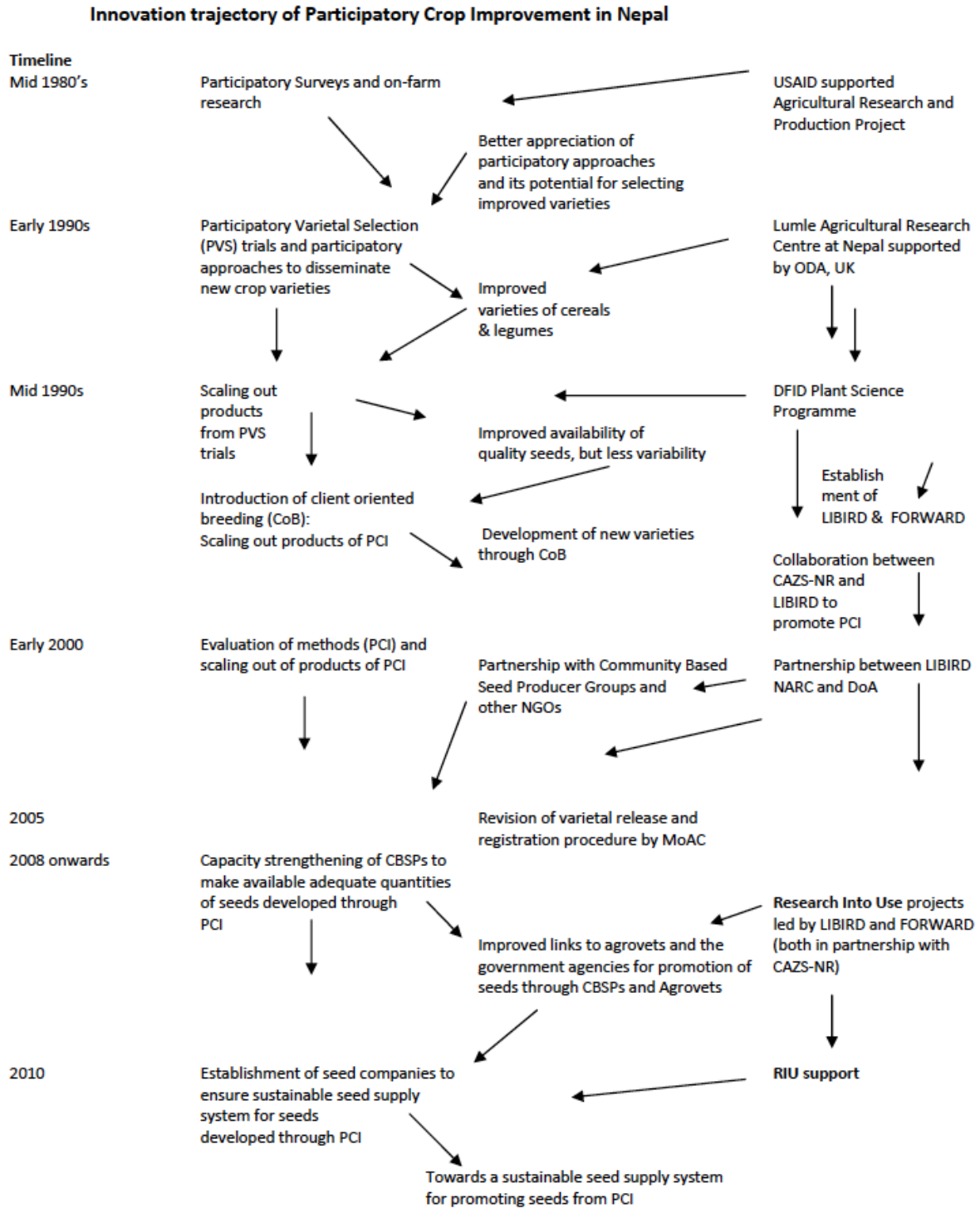
3.1.4 What have we learnt?

The challenge fund mechanism was a tried and tested approach and largely adopted the same systems as employed during the RNRRS. While the idea of innovation systems (which formed a component of the call itself) recognised the importance of the enabling environment for putting research into use, the programme did not provide sufficient attention to address this challenge. During the inception phase, even though it was stated that "it would not fund stand-alone research projects, but instead will link with, and add value to, existing national or regional programmes, processes and other initiatives undertaken by development partners", it ended up funding 13 disjointed projects in Asia — which has more of a 'transfer of technology' agenda than a policy influencing agenda[35].

RIU seemed to be aware in its initial days of the need to engage with policy if it was to achieve impact. For instance, it commissioned policy network mapping and opportunity analysis in Asia during the inception phase to identify strategic partners and policy champions in the region and also to understand policy windows and opportunities for direct engagement in the process of policy change. But the findings from these studies were not followed up once the innovation challenge fund programme was initiated. This was considered a missed opportunity[36] although not unsurprising, given that they were relatively small, short-term projects with no national level offices and considerably less visible than the RIU Africa Country Programmes (see next section) and with less opportunity to influence policy. That said projects did engage in policy advocacy where policy was a barrier to achievement of project objectives and have provide a basis for lesson learning as described above.

[35] Sulaiman, R, Hall, A. and Reddy, V. (2011) RIU Discussion Paper 25 Missing the target: lessons from enabling innovation in South Asia
[36] Ibid; a view also endorsed by the Independent Review

Figure 4 *Innovation trajectory of Participatory Crop Improvement in Nepal (adapted from Sulaiman, Hall and Reddy, 2011)*



Another unhelpful factor was the dominance of the projects, which followed a simple development assistance mode, transferring resources and information to poor households e.g. the distribution of improved seed from the PCI projects. The anticipated outcome of this programme was changes in household well-being (yield, income, food security etc.). The anticipated impact of this work was that these changes in household well-being would be sustained beyond the programme. During the reviews (after the MTR) it was clear that projected household level outcomes were rather ambitious; in part this was due to the scale of the projects but also the limited time frame (as will be seen elsewhere in the RIU, time was a key constraint). The Asia portfolio had not begun with implicit institutional change agendas but most projects started, for pragmatic reasons, to tackle institutional environment within the immediate arena of their work. The projects were moving towards more sophisticated capacity development with the aim of stimulating the evolution and strengthening of the enabling environment with institutional changes, over time, improving the performance of the innovation system from a poverty reduction viewpoint. The anticipated outcome would then focus upon institutional change with the expected impact of these changes being improved household wellbeing beyond the life of the project.

An open challenge fund approach that focused on promoting research products also did not help. Identifying promising innovation trajectories and influencing its direction to specifically address the policy challenges would have been a better strategy in achieving the RIU agenda. In hindsight, it appears that a small number of projects with a specific institutional change agenda, more resources and a longer duration (minimum 5 years with possibilities for extension), would have been more appropriate to the RIU ambition of 'impact at scale'. Spreading resources thinly across a number of disconnected projects over three years did not help RIU in achieving its aims.

3.2 Africa Country Programmes

3.2.1 The approach

Initially the RIU were asked, by DFID, to work in 10-15 PSA countries covering at least three countries per sub-African region. This was considered over-ambitious and would spread programme resources too thinly and RIU eventually established programmes in six PSA countries classified according to the World Bank Country Policy and Institutional Assessment (CPIA) 2005 indicators in: Rwanda, Tanzania, Malawi, Zambia, Nigeria and Sierra Leone. The criteria used for selection was geographical division, post-conflict versus stable governments and land-locked versus coastal environments. This highlights the degree to which the African Country Programme (ACP) approach was designed to take a holistic approach to innovation starting with an assessment of the system and leading on to the identification of specific interventions. These programmes experimented with a variety of networking approaches to establish better links between 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[37]; such platforms were defined by a common theme[38] 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.

3.2.2 Process

A National Innovation Coalition (NIC) was established in each of the six RIU countries, convened by the RIU, which formed an umbrella under which the innovation (commodity) platforms operated and which acted as an interface between the informal platforms and policy makers.

Funding for the platforms from the RIU was relatively small in each country, especially when compared with the large and comprehensive agricultural modernisation programmes (e.g. CAADP) which were also starting to be operational in the RIU countries. The activities through the country programmes were limited to helping agricultural or rural development systems become more innovative; the starting points and rationales for the interventions differed in each country.

An RIU Country Coordinator, assisted by one or more officers with responsibility for the innovation platforms, staffed the ACPs. The recruitment process was extremely time consuming and problematic as it was difficult for a new programme, without a physical presence at that point, to find and recruit local staff experienced in getting research into use. However, the teams appointed largely stayed with the programme although there were varying competencies of personnel employed. Furthermore, some of the country teams proved more dynamic and charismatic and this impacted on the effectiveness of the programmes. The country teams were also located within different institutional frameworks: Tanzania and Rwanda in the private sector; Sierra Leone, in a government ministry; Nigeria in the agricultural research council; Malawi and Zambia in NGOs.

[37] Defined here as a network of actors working in a given value chain or problem area, who interact within that value chain or problem area. Each of the actors has a personal objective that can be evaluated in terms of problem solving, profitability or improved organisation. The more comprehensive the membership from the value chain or problem area the more effective the innovation platform will be in problem identification and solving.

[38] It was commonplace that such themes related to a commodity. There were earlier attempts at non commodity platforms e.g. youth platform in Sierra Leone or remoteness in Zambia but these were much less tangible than a commodity focus and they tended to fade away quickly.

During the phase prior to the MTR country teams were given little flexibility over the way they operated, the ACPs were made to work under a very prescriptive operational, theory-based framework which hindered progress. Post MTR the country teams were given greater autonomy and flexibility including a small fund under the control of the country coordinator so that exciting and innovative activities could be followed up quickly.

3.2.3 The Africa Country Programme Portfolio

It was also evident prior to the MTR that the country operations were trying to cover too many platforms, highlighting the diffuse nature of the RIU as a whole. There was some justification for this diffuse approach in the early stages when a number of platforms were being explored. However after the MTR there was sufficient knowledge of the different platforms to make informed choices with regard to best potential allowing the ACPs to reduce the number of platforms they were engaged with. This gave greater focus and concentration of resources.

The platforms that were operational following the re-focussing exercise are shown in Table 6.

Table 6: *Innovation platforms focus in RIU Africa country programmes from July 2009*

Country	Focus Innovation Platforms
Nigeria	Cassava, *cowpea/soybean*, **aquaculture**
Sierra Leone	**Poultry** and Solar drying
Rwanda	*Maize*, **Cassava** and **Potato**
Malawi	Fisheries, Legumes, *Livestock*
Zambia	Conservation farming and remote areas (isolation)
Tanzania	Indigenous poultry, Mechanisation

The four innovation platforms undertaken as case studies by the Independent Review are highlighted in bold in Table 6. In addition, three other innovation platforms were studied under the later Impact Evaluation undertaken by KIT in 2012; these are indicated in italics in the table.

The programme was keen to learn from the innovation platform approach and a series of broader write-shops were convened by KIT which sought to capture the institutional histories from some of the RIU country programmes – Rwanda, Tanzania, Nigeria and Zambia[39].

An overview of the activities under the Africa Country Programmes is provided on Tables 7 to 12 below with summary reports provided in Annex 8.

[39] Putting heads together. Agricultural innovation platforms in practice (2011) KIT Bulletin 396 Nederlof, S., Wongtschowski, M. and van der Lee, F. (Eds) ISBN 978 94 6022 1835 and now Mur, R. and Nederlof, E.S. (2012) Building innovation capacity: Experiences from the Research Into Use Programme in Africa (in press)

Table 7 Summary of activities in Nigeria up to June 2011 **RIU office housed in Agricultural Research Council of Nigeria, Abuja**

Platform	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Aquaculture *Case Study for Independent Review*	3 RNRRS plus local feed formulations	Capacity built for 2,000 households in producing fingerlings and disease management. 52% of fish farmers linked to reputable input/output markets.	Aided Federal Fisheries Dept to develop Criteria and Guidelines for certification of aquaculture products in Nigeria; this will form standard setting nationally	Need to ensure all IP stakeholders are involved in problem identification. Private sector is a major player in IP. Need for persistence and patience to try and change policy. Private sector not fully responded to its role in R&D probably due to over involvement of public sector. Need for independent broker in IP to build confidence and trust. Linkage between stakeholders and markets and credit is weak. IP create stronger voice but slow process. IP brokerage involves conflict resolution.
Cassava flour	3 RNRRS plus local hand held cassava peeling technologies	High yielding CMD resistant cassava varieties doubling yields from 10 to 20t/ha now available to 4,635 households – yielding higher quality flour.	Private sponsored cassava bill presented nationally in response to RIU IP stakeholder interests	
Cowpea/soybean	2 RNRRS plus new varieties of soybean and cowpea from IITA	570,000 farmers accessed dual purpose cowpea – doubling yields 600,000 farmers and marketers adopting hermetic cowpea storage. 218 tonnes of fodder produced.	Seven ADPs shifted from traditional top-down extension to multi-stakeholder IP approach	
Nigeria Country Programme	Partners included farmer associations; value chain stakeholders involved in production, processing, storage and marketing; Community-based organisations; NGOs; Private sector entities; Federal and State governments; Faith-based groups; Financial institutions; International and National Agricultural Research Institutes and Universities.		Agricultural Research Council of Nigeria (ARCN) adopted to replicate RIU IP approach in designated villages across the country. *This subsequently incorporated into all NARIs and the WB funded West African Agricultural Productivity Programme (WAAPP) (in 2012).* Two commercial banks joined RIU IP to help develop targeted financial packages for IP stakeholders.	

Table 8 Sierra Leone Funding period up to June 2011 **RIU Office was housed in Ministry of Agriculture, Freetown**

Platform	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
National Partnership in Agricultural Innovation for Development (PAID)	1 RNRRS	First nationwide platform attempting to bring research, public, private, NGO and farmers together. Over 200 associations (farmer. Research, academic etc. involved covering over 2.5m individuals with better access to pro-poor agriculture and shared dialogue on innovative partnerships	Paved way for CAADP compact in Sierra Leone. Efforts to influence the Ministry of Agriculture, Forestry and Food Security to treats disability as a cross cutting issue. **Key innovation has been policy rather than technology related.** New Smallholder Commercialisation Programme may involve establishing IP with aid of RIU personnel *[this subsequently did not materialise].*	Genuine willingness to engage around opportunities where benefit of capacity building is clear. Experience of PAID was mixed. Lack of incentives for long term engagement. Change of direction of RIU towards commercialisation was probably detrimental to Sierra Leone programme which was not yet ready for this. The programme needed a longer gestation period to identify the people it wanted to reach, identify partners with existing outreach and identify the risks and address them.
Solar drying	1 RNRRS	Increased dialogue with over 60 associations covering 1.12m individuals involved in overcoming persistent bottlenecks		
Poultry feed *Case Study for Independent Review*	Local research discussed	Increased dialogue between 70 maize producers and 75 poultry farmers addressing bottlenecks of improved protein intake and better access to quality chicken feed		
Sierra Leone Country Programme	Partners included farmers and other representatives of rural communities; Processors, wholesalers and retailers; Agricultural enterprises on machinery and finance; Communication services and media; Departments of Agriculture, Science and Technology and, Transport; Technical and business development sectors			

Table 9 Rwanda Funding period to June 2011 **RIU housed in private company and overseen by Private Sector Federation (PSF)**

Platform	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Maize warrantage (Warehouse receipts)	4 RNRRS	24 cooperatives, individual farmers and five regional organisations linked together covering 25,000 farmers. Those in Nyagatare now benefit from better markets and prices following start of RIU warrantage system. Nyagatare Maize Investment Group (NYAMIG Ltd) established as business arm of maize IP. 12,000 farmers informed on good agricultural practices by community facilitators	Clear evidence that IP approach was able to find solutions to bottlenecks. The Minister of Agriculture visited the RIU IP on 2010 World Food Day to demonstrate warrantage. This led to full support of warrantage approach by MoA; *this would create traction for significant developments later in the RIU*	The failure of NIC limited scope to influence at national level. IP approach worked, it gave greater voice for advocacy, gave greater visibility, gathered trust and recognition. Working with IP organised stakeholders much better. Farmer practices and mindsets have changed positively following involvement in IP. Private sector development is key to sustain innovation. Creation of MYAMIG indicates that IPs will and need to evolve in time as demands change. Community tailored innovations are more likely to bring about change and impact
Cassava *Case Study for Independent Review*	Appears all local varieties via national system	50,000 farmers informed on new varieties and good practice through development of community radio broadcasts allowing for distribution of clean cuttings	District development plan tackling marketing issues of cassava presented.	
Potato *Case Study for Independent Review*	2 RNRRS plus local innovations	10,000 farmers directly involved and able to access better quality seed with 2,400 being trained further at FFS. Improved relationships between input suppliers and potato producers	First engagement between farmers and Ministry on extending access to outputs of potato biotechnology via collaboration with ISAR on mini tuber production	
Rwanda Country Programme	Partners included MINAGRI (Ministry of Agriculture and Animal Resources); ISAR (National Agricultural Research Institute); RADA (Rwanda Agricultural Development Authority); Faculty of Agriculture of National University of Rwanda; ISAE BUSOGO (Higher Institute of Livestock and Agriculture); ORINFOR (Rwanda Bureau of Information and Broadcasting); WFP (World Food Programme), MINIMEX (Maize miller); ROPARWA (Farmer org.); Support Project to National Extension System (PASNVA); policy makers in RIU districts, NGOs CARITAS, RDO; IMPUYAKI (Farmer cooperative); faith based orgs e.g. NYINAWIMANA and, financial institutions e.g. Banque Populaire du Rwanda		National Innovation Coalition (NIC) established in February 2008 (the first for RIU) but lack of commitment by members saw NIC become non-active. MTR and RIU reviews suggested restructuring into policy dialogue platform but this did not happen.	

Table 10 Malawi Funding period up to June 2011 **RIU housed in African Institute of Corporate Citizenship (AICC) (NGO)**

Platform	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Fish farming/ Aquaculture	No RNRRS	Increased fish fingerlings multiplication and adoption of improved strain of *Orechromis shiranus* from four established decentralised hatcheries producing 3 million fingerlings. Some 4,000 fish farmer households using improved fish strains with potential of 60% increases returns. NAC now maintains a nucleus of around 3,000 brood stock of improved *O. shiranus* for 2011/2012 fingerlings production cycle. Development of standards and guidelines for tilapia hatchery operations	The Malawi programme established a National Innovation Coalition and the Permanent Secretary of the MoA became patron. This facilitated dialogue but impact was minimal.	For whatever reason the RIU encountered a complete mis-match between demand in country and the RNRRS. Programme started slowly and Country Coordinator was replaced mid-term. As with other country programmes, IP approach was welcome but this needed intense brokering which took much time. Revolving fund mechanisms were put in place for both fish farming and legume IPs
Legumes	No RNRRS	Engagement between farmers and private sector. 85 farmers engaged in multiplying from breeder to basic seed with a further 1,700 farmers multiplying from basic through to certified seed. Platform attracting interest from Irish Aid and IFAD.		
Livestock	No RNRRS	Around 28,000 pig farmers involved with potential to benefit from better marketing facilities		
Malawi Country Programme	Partners included National Agricultural Research Organisations; Government extension services; Commercial farmers; Farmer associations			

Table 11 Zambia Funding period to 30 June 2011 **RIU housed with PELUM (NGO)**

Platform	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Conservation Agriculture (CA)	15 RNRRS outputs plus System of Rice Intensification (SRI)	Six platforms created in which at least 80 stakeholder organisation participate. 54,000 CA farmer households reached via platform and radio programmes - providing pertinent information in developing alternative media like community radio which is helping farmers put CA technologies into use. 6 districts out of 72 in Zambia (8%) have platforms in which CA stakeholders share knowledge and resources needed for implementing CA interventions. 15 learning sites and demonstration plots established in Monze. One rice value chain platform comprising 15 stakeholder organisations established facilitating 2,500 more farmers to access rice seed and markets. Seed needs reduced by 95% from 80-100 Kg/ha to 5Kg/ha. 33,000 persons have enough food all year round.	RIU National Innovation Coalition established leading to Conservation Agriculture Association which has influenced national strategies on enhancing CA. Role played in development of the National Rice Development Strategy (NRDS) Much interest from CARE in replication of weed control (herbicide spraying) service provision by entrepreneurs. Private sector network developing from RIU NIC interaction with a view to getting services closer to farming communities.	External support from RIU was critical to establish NIC. Private sector members have enhanced the ability to identify business opportunities helping to address gaps and challenges identified by the IP. Formal linkage of IP to district level agriculture sub-committees enhanced stakeholder confidence and buy-in
Zambia Country Programme	Partners included Government officials driven by mandate to promote conservation farming; Private sector; NGOs; Research institutions and Farmers			

Table 12 Tanzania Funding period to June 2011 **RIU hosted by MUVEK Development Solutions Ltd (Private Sector)**

Platform	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Poultry Entrepreneurs	All local research	15,378 household members of farmers, hatchery owners, egg producers, feed producers, parent stock farm owner, household advisors, inputs providers, & transporters. Core activities have included building capacity of farmers providing support to local hatcheries and breeder farms, support to develop advisory services and mobilising market investors. Capacity built so smallholder rural farmers able to care for larger poultry flocks (100+) and produce at least three cycles per year. Rural farmers can now produce up to 200 chickens three times per year earning ~US$600 extra p.a. just from chicken enterprise. Developed specialised local hatcheries and breeder farms in order to boost the quality and quantity of production of indigenous day-old chicks	Demonstration at pilot scale of transformation of indigenous poultry industry into economically viable activity capable of boosting household incomes. National Strategic Plan to specifically develop the local poultry sector under consideration – one option may consider replication of the approach employed by RIU. Government now also in process of developing poultry feed policies and regulations. National Livestock Research Institute encouraged to submit proposal to Commission for Science and Technology to carry out study to characterise indigenous chicken breeds for first time at national level.	Successful pilot initiative became victim of its own success in trying to expand too far too quickly. Platforms and associated meetings were too expensive to maintain. Most challenges needed spontaneous and quick response and IP approach did not support this. IP approach worked best when there is high capacity and stakeholders are organised. Central broker role was essential facilitating innovation process. Flexibility in funding and operations were catalysing factor to ensure necessary solutions were explored and implemented.
Mechanisation (until June 2010)	6 RNRRS	Over 200 tractor owners mobilised. Farm machinery and dealers directory prepared. IP discontinued to concentrate on poultry.		
Tanzania Country Programme	Partners included Government departments, research institutions, public and private sectors		Tax exemption policy change at national level for purchase of milking and hatchery equipment.	

3.2.4 What have we learnt?

The Independent Review concluded:

The Africa Country Programmes had achieved considerable success by improving the functioning of commodity chains in different countries and much of the credit goes to dedicated individuals within the RIU country teams. This approach demonstrated that by (a) convening platforms bringing people within a specific commodity chain together and (b) facilitating the building of networks that develop trust and build social capital, the effectiveness and efficiency of a commodity chain can be substantially improved. Lessons were also learnt on how to intervene and the important role of the broker was recognised.

A major lesson from the first part of the RIU (pre MTR) was that the blueprint approach for IPs does not work; taking what is successful in one country will not necessarily be successful in another. Innovation platforms represent a set of principles that need to be tailored to, and evolve within, a specific context. In Tanzania, for example, the main approach was brokering to address constraints that prevent producers from taking advantage of an opportunity (developing a new local poultry sub-sector); according to the country coordinator from Tanzania, this is the bottleneck approach. In contrast, in Zambia the approach towards developing the use of conservation agriculture has been mostly technology-driven out-scaling, including harmonisation and dissemination of information. In Rwanda, the focus was on commodity development through building stakeholder capacity and enhancing interaction through formal coalitions.

Initially, there was a strong link with the African policy frames such as CAADP. However, those ties have not been fully pursued, partly because of a difference in horizon (RIU has a 5-year mandate and CAADP has a 20-year horizon).

There were a number of critical events for the Africa Country Programmes[40]:

Critical Event 1: Country assessments

The RIU started with country assessments, followed by establishment of the National Innovation Coalitions (NICs, see Critical Event 3) and the elaboration of a country strategy. In all cases, the country assessments were carried out by consultants who were not involved afterwards; this can be considered a poor decision, as in a number of countries the teams recruited did not produce a result that was relevant to further development of the country programmes. In both Rwanda and Zambia, the country assessment did have an influence on the programme design, and especially on the composition of the NIC, as a result of identifying of the important actors in the national innovation system. It is debatable, however, whether an extensive study was needed to achieve this result. In Tanzania and Sierra Leone, the country assessments were rejected at the central programme level, which resulted in a difficult start in both countries. Although the assessments resulted in comprehensive reports on opportunities and identification of the different stakeholders in the national innovation system, they did little to create buy-in of organisations active in the country, nor provide concrete entry points for action. In the RIU cases, most of the choices made through this first layer of studies did not lead to a narrowing down of the scope of the RIU intervention in those

[40] Mur, R. and Nederlof, E.S. (2012) Building innovation capacity: Experiences from the Research Into Use Programme in Africa (in press)

countries. The main result of the studies was that a decision was made on the representation of organisations in the NIC in each of the countries.

Narrowing down the scope of an intervention and making the right choice for an entry point are essential and need to be grounded in national priorities and interests. In Nigeria, the RIU programme deliberately looked for promising new practices (i.e. research results that proved to be successful in practice such as the triple bagging storage technique) as an entry point for action. This resulted in a multi-stakeholder approach for the dissemination of these practices, engaging different public and private stakeholders. This was not the case everywhere.

Critical Event 2: Design of innovation platforms

There was a concerted central effort to ensure a balanced design of the RIU pilot for the six countries. In addition, many experts visited the country teams, providing theoretical support in the field of innovation systems thinking. This initially left little room for manoeuvre that would allow the country programmes to adapt to local opportunities, constraints and realities. The country programmes designed stakeholder interaction at three levels: national, regional and local, mainly involving producers; these are clearly separated yet linked. This division was still evident in all cases and has influenced the design of mechanisms for enabling innovation.

Critical Event 3: National Innovation Coalition introduced

NIDA[41] introduced the National Innovation Coalition (NIC) concept for the specific purpose of embedding the programme in the national system. Rwanda was the first country to initiate an NIC, as it was the first country to begin programme implementation. The NIC played a role in further narrowing down decisions and identifying innovation opportunities by advising the RIU staff. This provided focus in terms of where to start with the programme. Choices were made regarding both subject and geographical focus. From this experience, it appears that for initial decision-making it is important to build as much as possible on existing local and national insights, knowledge and priorities in order to identify concrete entry points for action.

Box 2 provides an overview of the history of the NIC in Rwanda; the role of the NIC in the delimitation of the intervention theme was important initially but lost some of its relevance and was eventually dissolved.

Box 2. The role of the National Innovation Coalition in initial decision-making

The RIU programme in Rwanda started in earnest at the end of 2007, after Rwanda was selected as an RIU country, and a study of the Rwanda national agricultural innovation system was carried out by the country assessment team. This was followed by the creation of the National Innovation Coalition (NIC) in early 2008, which included representatives of various stakeholders in the agricultural innovation system. The creation of the NIC was accompanied by the signing of MoUs by the various participating organisations. At its inception, the NIC had 11 members and its role was to identify opportunities for intervention.

[41] Nkoola Institutional Development Associates, a private consultancy firm based in Uganda and one of the implementing organisations of RIU during the first years of the RIU programme.

The first activity of the NIC was to hold brainstorming meetings with the RIU country coordinator to develop a national action plan for the Research Into Use programme. Responsibility for the implementation of the national action plan was placed on the RIU country coordinator.

Ultimately, the RIU programme undertook several initiatives. The most important initiative was the launch of a number of district level IPs. The first three sub-sector IPs were initiated in May 2008: cassava in Gatsibo, potato in Gicumbi and maize in Nyagatare. A fourth IP was added in November 2008, in Karongi district, on small irrigation technology (foot pumps) for horticulture. These IPs formed the core of RIU activities throughout the programme. The choice of these crops for intervention was made by following the district priority crops, determined by the crop intensification programme (CIP) of the Rwandan government. The results of the extensive consultation process prior to the establishment of the NIC had little influence on this decision.

From: RIU Rwanda institutional history, KIT, 2011

Critical Event 4: Mid-Term Review

The Mid-Term Review had major implications for activities throughout the RIU. The content and methodological support from the RIU programme level shifted from a number of partners providing advice and support to a Central Research Team (CRT) responsible for research and documentation of lessons. In terms of management of the country programmes, Country Programme Teams became directly accountable to the RIU management and not answerable to three separate overall executive organisations as was the case pre MTR. The innovation systems approach was initially used as a prescriptive framework for establishing a fixed menu of organisational and institutional arrangements for innovation, resulting in an over-designed programme, which unintentionally reduced the ability to adapt to needs and opportunities that presented themselves. After the MTR less emphasis was placed on a specific design and more on innovation systems thinking, as a tool to aid learning and capacity building for innovation.

After the MTR all of the countries were granted more autonomy in the use of programme resources and additional flexibility funds were made available. In terms of content, all of the countries were asked to focus on achieving impact at scale, both directly at the level of intended beneficiaries and as an impact through institutional change. This resulted in making choices based on which activities were to be continued and which ones terminated. The re-orientation of the country programmes towards an opportunity-led agenda indicated that investment in new and dynamic rural sector opportunities offered opportunities to increase the sector's contribution to economic growth and poverty reduction. While this does not imply that addressing some of the most intractable problems should no longer be on the development agenda but does indicate that alternative rural development options can and should be exploited. Rural development interventions and investment should not be solely about solving problems but also about pursuing exciting new options. This also applies to what are generally called 'unexpected outcomes', or opportunities that arise during implementation, or identified outside the original intended programme of activities. Flexibility in varying or adding to existing programmes — as well as a ready availability of funds that can be allocated to such unforeseen openings — has been shown to pay significant dividend in certain areas within the RIU (Dijkman, 2010[42]).

[42] Dijkman, J. (2010) Africa matters: Emerging lessons from the RIU country programmes. RIU Discussion Paper No. 10

Critical Event 5: Preparing a strategy for post-project continuation

The Mid-Term Review also led most countries to reduce their activities, focus on a few platforms and think about their strategies for post-project continuation of activities.

In general, it can be concluded that the RIU programme did experiment with enabling innovation; what hampered the programme in its development was the urge to over-design the pilot efforts from the outside. At the onset of the programme, the country offices had very little freedom to deviate from prescribed models and were over-advised by external consultants. This led, in some cases, to somewhat artificial IPs, of which a number were abandoned later. In addition, the activities on the agenda were too ambitious for the ultimately fairly modest resources and time frame of the programme in each of the countries. The RIU experience shows that there is no right or wrong choice when it comes to choosing a commodity or a theme as the starting point for IP building. What is essential, however, is the identification of a promising opportunity and then engaging the actors who have common objectives and are keen to engage.

Levels of Innovation Platforms

Platforms often operate at multiple levels (Nederlof et.al. (2011))[43]; local level platforms often look for practical solutions, while platforms at higher levels often target policy change. The RIU approach allowed important lessons to be learnt

In all countries, efforts were made to establish platforms at different levels, with mixed results as typified by the case in Zambia (Box 3) where RIU facilitated the establishment of platforms on three levels, each of them with their own distinct functions. In most other countries, however, platforms were established at two levels, i.e. national level and regional level. Local level stakeholder groups – for example, farmers, often organised into farmer groups or primary cooperatives – were represented by their leaders at the district level platforms.

Box 3. Three levels of platform

Platform mechanisms at national, district and local levels were identified as the mode of operation for RIU Zambia. At the local level, the RIU Zambia programme initiated local learning sites where producers and local agents interacted and experimented with conservation agriculture. At the district level, multi-stakeholder platforms were initiated. These platforms had a pivotal role in articulating the views of small-scale farmers represented in the study groups, helping them to influence policies through the national platform and to coordinate and plan action implemented at the local level.

At the national level the National Innovation Coalition (NIC) was initiated with the purpose of overseeing the whole innovation system and lobbying for policy change. Because the permanent secretary of the Ministry of Agriculture and Cooperatives (MACO) was a member of the NIC, there is a direct line for influencing national agricultural policies. Many of the NIC members were also members of the Conservation Agriculture Association, and some also members of the National Rice Development Task Force.
From: RIU Zambia institutional history, KIT, 2011.

[43] Putting heads together. Agricultural innovation platforms in practice (2011) KIT Bulletin 396 Nederlof, S., Wongtschowski, M. and van der Lee, F. (Eds) ISBN 978 94 6022 1835

The objectives, roles and responsibilities and activities of a platform are very much related to the level of the platform: the RIU programme supported and coordinated interaction at three different levels mentioned previously – national, middle (mainly district) and local.

The national level

At the inception of the RIU programme national level stakeholder platforms were formed, which were referred to as NICs; the first NIC was established in Rwanda and the concept was introduced in the other countries. Members of the NICs were selected to represent the main actors of importance in the national innovation system, based on the country assessment studies (discussed in the previous section).

One of the first functions envisaged for the national IPs was to serve as national think tanks. As a think tank, the national platform could provide direction to the RIU programme, spot trends and, in a broad manner, guide the initiative. The identification of promising entry points in the RIU programmes, as discussed above, is where the NIC played this role.

Engagement of the NIC at the national level provided the RIU programme with the mandate, through a wide array of stakeholders, to engage in the process of lower level consultation and platform initiation. However, beyond the initial decision-making in the programme, the role of the NIC as a think tank was limited and not all RIU country programmes developed NICs.

Other functions included that of a steering committee and that of coordinating technical support and advocating policy to leverage support for local innovation processes and scaling-up.

Box 4. National Innovation Coalition, Rwanda

In Rwanda, the NIC played an important role in initial decision-making from a national perspective, but was dissolved at a later stage. The Rwanda NIC had the role of overseeing the RIU project, although its decision-making influence was not felt to be great. It did receive progress reports and endorsed budgets & one of the NIC members (CAPMER) was chosen to be the RIU fund manager. The NIC met & discussed topics on how to put research into use. It also became involved in the information market idea, the main instrument for structuring the response to demands for services and knowledge from practice, by means of the platforms.

Maintaining momentum at the national level for specific NIC activities proved very difficult. The proof of the interest of the organisations participating in the NIC was their level of decision-making in their organisations. The NIC was initiated within the RIU project framework and was not an embedded part of the Rwandan administration. This made it difficult to obtain the desired leverage within government organisations and the buy-in for the RIU agenda that was envisioned.

The NIC was given a number of tasks. The task of being the channel for information from the participating organisations to the platforms was, in retrospect, not very useful. The platforms at district level can – at first through facilitators, and over time by themselves – source the services they require directly from research and other service providers. There is no need for a formal intermediate body at national level for this task. The NIC worked on a virtual information market system that would improve access to agricultural development information. These efforts were discontinued, however, after the MTR, when it was decided to focus on fewer activities and to provide more autonomy to the country programme in deciding how to use resources.

(*From: RIU Rwanda Institutional History, KIT, 2011)*

The experience of RIU suggests that a national stakeholder forum, such as RIU's NIC, could play a role at the beginning of a programme, to assist in the making of any initial decisions on the directions of the programme. Such a forum could provide a programme with a mandate to intervene and has the potential to create endorsement for the programme and to assure national level buy-in by relevant organisations. Functioning as a national think tank - on how to support innovation processes - could in theory be useful, but this was not achieved in the RIU programme. The combination of a functioning steering committee for the RIU programme may have hindered any development as a think tank. As a think tank, high-level acceptance of the platform would be required, and having a mixed mandate may have hampered recognition as an advisory body.

RIU experience shows that the role of a national platform is important for initial decision-making and potential institutionalisation; however, it requires sufficient buy-in from national level stakeholders to be successful.

The middle (sub-national) level

In all of the RIU countries studied the IPs around which most RIU activities were initiated was at the middle level and usually with a commodity focus. The IPs at this level achieved coordination of activities through different intervening organisations and the interaction between stakeholders that was envisioned by the programme to support innovation.

The maize platform in Nyagatare, Rwanda, is an example in which different types of service providers, as well as economic actors, such as farmers, their cooperatives and banks, collaborated for the benefit of maize value chain development at the district level. The approach of the IP resulted in a chain of improvements in the functioning of the maize sector: adoption of improved production technology; initiation of a warehouse receipt system with a local credit provider; and initiation of a maize trading company in response to marketing constraints.

In Rwanda, the platform participants identified middle level platform functions which could be found in the IPs in all four countries (Table 13). In addition, coordination between intervening organisations can be added to the functions of the middle level IPs. It is interesting to note the common ground between the RIU experience in Africa and that observed in Asia presented earlier.

The middle level platform is close to grassroots implementation while still allowing for a degree of system overview. It provides some distance from the local level, ensuring more systemic issues concerning joint interest can be addressed. At the same time, it is not so far removed from practicalities at ground level that discussions become abstract and of little consequence.

Table 13 *Functions of the middle level innovation platforms according to platform members*

Function	Examples
Advocacy for change	Lobbying for tax exemption for tractor spare parts by mechanisation platform in Tanzania; Making conservation agriculture part of national policy in Zambia
Demand articulation	Identification of labour as the main constraint for adoption of conservation farming by the Zambia platforms, leading to a change in approach by public and NGO support organisations
Access to financial services	The maize platform in Rwanda developed a credit scheme for maize farmers
Access to research and extension services	The potato platform in Rwanda developed collaboration with research to initiate commercial mini-tuber production; The local poultry network developed tailored household advisory services for new poultry farmers
Access to inputs	The cassava network in Rwanda ensured availability of mosaic virus-resistant cuttings
Access to markets	The rice platform in Zambia facilitated access to branded rice marketing; The maize platform in Rwanda initiated a maize trading company with farmers and local traders as shareholders
Farmer collaboration	Cassava farmers are seeking market opportunities and processing jointly; Farmers in Tanzania formed block farms to gain access to tractor services
Experimentation	***Testing and adapting new practices:*** Mini-tuber production by seed producers in Rwanda; Construction of a local poultry sub-sector in Tanzania; Development of commercial ripping services in Zambia
Communication	***Informing stakeholders on activities, decisions, new practices, etc.:*** Participatory radio broadcasts on conservation farming in Zambia; Local radio disseminating findings of the maize platform in Rwanda; Highlighting of the local chicken business opportunity on national TV in Tanzania
Coordination of action between support organisations	Different organisations in Zambia promoting conservation farming collaborating to communicate a similar message and provide coordinated services

The local level

Many types of formal and informal local organisation exist, especially at the farmer level. Grassroots forms of organisation may also exist at the level of local traders or processors. RIU selected representatives from these local organisations as entry points from the grassroots level for the IPs at the middle level. Most of the activities initiated by middle level IPs were implemented through local

level organisations. A potato cooperative formed the starting organisation for the commercial multiplication of mini-tubers in Rwanda. The learning sites in Zambia formed the structure used for experimentation and capacity building in conservation agriculture.

In Rwanda, existing cooperatives of producers were used as the main local level organisations to link with. In Tanzania, new local structures were developed deliberately by the mechanisation platform. Farmers were assisted to organise into 'block farms' and tractor owners into tractor owner associations, both examples of local 'platforms' – i.e. local forms of organisation. In Zambia, the local level organisation was created around the local learning sites.

'Champions' represented local level organisations or stakeholder groups at middle level IPs. A champion is a person that represents not himself or herself alone but a larger stakeholder group. These could be farmer leaders, cooperative board members, representatives of local traders or service providers, etc.

Strong linkages with stakeholder groups at the local level are essential for a platform to achieve implementation and links to higher levels. At the local and middle level it is helpful to use existing forms of local organisation, selecting champions from these organisations to reinforce the link between local level and middle level IPs. Ideally, stakeholder groups identify their own representatives.

Key achievements of the RIU programme

The main institutional change achieved by the RIU programme has been the building of platforms that improve the dialogue between stakeholders for innovation in a sustainable manner. Evidence of these changes was found mainly at district level, and in some cases also at the national level. Most middle level platforms appear likely to continue either as loose networks embedded in the district administration structures or as parts of the private sector. Table 14 summarises the key achievements observed.

At the national level in Zambia, policies on rice and conservation agriculture have been influenced through involvement of the district and national platforms, and national bodies for these two areas have been formed. RIU Tanzania, through its dairy platform and its chicken network, has secured tax breaks for milking and hatchery equipment.

At the district level, other achievements, in addition to the continued existence of the platforms as stakeholder interaction instruments, can be noted. In Zambia, RIU contributed to improved coordination of conservation agriculture efforts and the development of new services for soil preparation, which used to be a major bottleneck in the adoption of conservation agriculture practices.

In Rwanda, all three commodity platforms have contributed to improved collaboration between economic and support actors in the respective value chains. Joint needs and opportunity assessments are catered for and the results of pilots are communicated through local radio, in particular in the case of the maize platform. On the ground, the platforms have contributed to intensification of production of their subject commodities and to a durable improvement in the

availability and use of high-quality planting material. The maize platform piloted new financial arrangements based on a warehouse receipt system and a maize trading company with farmers as shareholders was created. The potato platform created a seed potato production association, producing mini-tubers that previously had only been produced by a research station. The cassava platform developed a system of multiplication and distribution of disease-free cuttings of improved mosaic-resistant varieties.

In Tanzania, the commodity platforms have, in a similar fashion, improved dialogue between actors at the district level. For example, the mechanisation platform successfully developed a system through which smallholders have access to tractor services, simultaneously increasing the volume of work for tractor owners. The dairy platform continues to serve as the forum in which disagreements in the chain are discussed. Using a somewhat different approach, RIU Tanzania initiated a local chicken value chain that did not exist at all before, and is solving problems in the chain as they emerge, while increasing the area covered.

In Zambia, RIU improved coordination of conservation agriculture interventions at the district level, and initiated small-scale ripping services and rice trading centres. An effective link was established with local radio stations in order to generate wider interest in conservation agriculture and to communicate the findings of the platforms.

Facilitation

Networks, platforms or other forms of interaction between stakeholders do not always happen by themselves. Often specific action is required. Together the various possible actions or roles that promote these forms of interaction can be taken up by individuals or organisations and are defined here as ‘facilitating innovation’.

Table 14: *Main institutional changes resulting from the various types of platforms*

Level	Zambia	Rwanda	Tanzania
National	▪ NIC influence on National Agricultural Development Strategy and Rice Development Strategy ▪ Integration of this role into national networks (Conservation Agriculture Association, Zambia Rice Federation and Rice Task Force)	▪ No national level innovation after the demise of the NIC	▪ No institutional change can be attributed to NIC (NIC has only met once) ▪ Tax exemption and policy change (milking and hatchery equipment) at national level attributed to regional platform
Regional or sub-national	▪ Gradual integration into district multi-stakeholder coordination structure ▪ Enhanced coordination outcome on effectiveness and efficiency; small-scale ripping services; Rice Trading Centres; ▪ Communication of results through local radio resulting in wider interest and interaction	▪ Improved chain collaboration (between economic actors) ▪ Improved service provision to the chain actors (research, financial, extension) ▪ Joint problem and opportunity identification ▪ Communication of results through local radio, resulting in wider interest	▪ Mechanisation activities integrated into district plans ▪ Tractor owners association established ▪ Hatchery owners meet and discuss issue of availability of local breed chicks ▪ Feed producers meet ▪ Bytrade linked to producers and hatchery owners ▪ RIU plays the role of matchmaker/broker between stakeholders; KuKuDeal created
Local	▪ Indirect attribution to RIU, but left to extension and radio stations (RFF) and the Conservation Farming Unit (Study Circles).	▪ Improved production and post-harvest practices ▪ Improved availability and use of quality seed ▪ Improved collaboration between producers	▪ Informal organisation of chicken producers ▪ Block farming; improved collaboration between rice and maize farmers and tractor owners

Roles in facilitating innovation platforms

When assessing the processes in the different RIU programmes, a number of roles to facilitate innovation can be distinguished. Different facilitation roles were played, either by the RIU ACP team or by a representative of a member stakeholder group in the platform. These roles are illustrated in Table 15, below.

Table 15 *Different roles in facilitating innovation*

Championing	Representing local stakeholders at a higher level and functioning as an example to others: ▪ Zambia's Conservation Farming Unit leaders ▪ Ward and district champions in Tanzania's poultry network ▪ Cooperative leaders and progressive farmers in the Rwanda innovation platforms
Brokering	Making connections between actors who can benefit from each other's services or roles. Brokering can be done between multiple actors by bringing them together in a network, either informally or more formally. Brokering can also be done between two actors, to ensure they start working together: ▪ Ensuring that ISAR (Rwanda research institute) starts working with the potato platform out of mutual interest ▪ Introducing cassava-producing cooperatives to a cassava processor in another province ▪ Linking private sector seed multipliers to research institutes and producers in the cowpea platform in Nigeria
Facilitation	Stimulating and assisting the interactive process between stakeholders with the objective of improved quality of interaction: ▪ Assisting in the organisation and guiding the process for innovation at platform meetings and other moments of stakeholder interaction ▪ Facilitating an IP self-assessment in Rwanda
Thematic leadership (thrust leadership in RIU)	Taking initiative on a certain topic (after a cluster of challenges is identified during first platform meeting): ▪ In Tanzania's dairy IP, different clusters of activities had thrust leaders ▪ In Rwanda, subcommittees were formed per topic, each chaired by a thematic leader
Mobilisation	Lobbying essential stakeholders to join a platform or local level organisation: ▪ Formation of farmer learning groups/circles by CFU facilitators in Zambia ▪ Identification of farmers who want to join in the poultry activities by ward champion in Tanzania ▪ Convincing local input dealers to join the potato innovation platform in Rwanda
Mediation	Resolving conflicts: ▪ Occasional role of the RIU team in IP conflict situations in Zambia ▪ Guiding the discussion between input suppliers and producers in Rwanda about the price and quality of inputs
Advocacy	Promoting the network and assuring support of and buy-in for the network by those individuals and organisations that matter: ▪ Local radios play this role to some extent, e.g. through discussion of the role of traditional and civic leaders in conservation agriculture in Zambia ▪ Platform members play this role by communicating their achievements to their peers ▪ Agricultural Research Council of Nigeria (ARCN)
Problem solving	Identifying, proposing and providing practical solutions for bottlenecks hindering progress of multi-stakeholder action: ▪ Promoting the importation of rippers by Zambian traders and connecting them to ripping service providers ▪ Suggesting piloting the use of cocoons for maize storage by the maize platform in Rwanda ▪ Finding suitable crates for the transport of live chickens

Technical backstopping	Providing technical advice and training to ensure that opportunities discussed are economically, technically and socially viable: ▪ Providing assistance with the development of a voucher scheme for inputs on credit for local chicken farmers ▪ Supporting local credit for providers and producers of maize in Rwanda in the development of a warehouse receipt system

Innovation platforms facilitate a variety of roles that can be played by different persons or organisations that are often, but not always, members of the platform. The majority of the tasks listed in Table 13 were taken on by an external organisation. In Rwanda and Zambia, they were done by an organisation set up for that purpose by RIU (ACP), and in Tanzania by a contracted organisation (MUVEK).

Brokering and facilitation are critical to innovation, as they enhance interaction and joint learning among stakeholders, which are central to innovation systems. One criterion to consider when selecting a facilitator is its organisational capacity, i.e. what type of organisation will have the capacity to sustain the facilitating role over time and to initiate new IPs where needed? The RIU programme did not pay much attention to this factor. In Zambia and Rwanda, personal innovation capacity was built within a temporary organisation that had ceased to exist by the end of the programme. In Tanzania, the organisation will continue to exist, but it requires external resources in order to maintain its role as facilitator of platforms or networks.

It is clear that building the capacity to facilitate innovation within an organisation with a long-term mandate and presence would be preferable. This could be a public sector organisation, such as a local government, extension service or research organisation, with all the associated limitations. Or it could be an NGO with a guaranteed long-term presence. Or, as in Tanzania, it could be a consultancy firm that can see a market for providing the specific service of facilitating innovation. In Gicumbi District in Rwanda, RIU delegated the facilitation role of the potato innovation platform to a local NGO (Caritas); its knowledge of the local context and its proximity were important criteria in the selection of Caritas. In most other cases, however, RIU remained the main facilitator and broker of innovation, which raises the question of how brokering and facilitation will take place after the end of the RIU programme.

In Tanzania, RIU brokered relations between different stakeholders for the development of the local chicken chain, leading to new business opportunities. A national drug company, formerly not involved in the local chicken chain, now supplies drugs to smallholders on a commercial basis.

Some other important points were raised by Dijkman[44] (2010):

The Role of Research in Innovation

While research and technology are, in one way or another, integral to all the country activities but nowhere has research or technology driven innovation. Even in the case of Nigeria, a technical solution developed in splendid isolation needed a capacity building process for it to be put into use,

[44] Dijkman, J. (2010) Africa matters: Emerging lessons from the RIU country programmes. RIU Discussion Paper No. 10

i.e. the rate-limiting step is not technology development or promotion but the level of innovation capacity. This portfolio of work also suggests that rather than simply promoting research products, it is more valuable to link research processes to activities led by entrepreneurs and other users of new ideas.

Dissemination of technological interventions alone is unlikely to contribute significantly to uptake; what is needed is the diffusion of the process instrumental in systems innovation. Commonly research was initially largely peripheral to developments. It is only after production increases and linkages are developed that researchable issues, or so called 'second generation' research issues, arise. This is an important observation because it not only gives further weight to the observation that investment in research capacity alone will do little to enhance innovation and rural development, but it also provides important indications about the type of research capacity that needs to be present for it to be relevant to rural sector innovation and growth. With researchers in most countries still ensconced in research organisations that set long-term priorities, there is often not the required capacity or institutional flexibility that would allow research to respond to the types of needs described above. In terms of strategies that would increase the integration and relevance of research to rural innovation and development, a crucial aspect will, thus, be the degree to which at least part of the available research capacity can respond to real needs.

Institutional Architecture

Some of the country programmes were led by private companies, others an integral part of policy bodies or ministry departments. These differences in institutional arrangements led to a number of different ways in which the country programmes linked into the wider policy and economic environment. A crucial aspect appears to be the ability to discern when different strategies may be more or less effective in influencing policy and investment choices, and to build the capacity that can respond accordingly. Notwithstanding these differences in institutional architecture, by slimming down operations post MTR, the RIU country teams evolved from active implementation to facilitation of the necessary linkages or the elimination of obstructions — roles now described as 'innovation brokering'. The impact of these activities on the ability of the systems in which the country programmes operate to cope, respond and prosper under changing conditions indicates that these brokering functions fill an institutional hiatus. However, this also poses significant questions about who will take over such roles at the end of the RIU programme. It suggests that in addition to investment in research and technology initiatives, agricultural innovation and rural development may also require the establishment of independent rural development brokering agencies.

The Private Sector

This portfolio also indicates that most market-oriented rural development initiatives need strong private sector involvement to succeed — particularly in light of the continuing retreat of the State in most developing economies. Entrepreneurship in Africa, however, is not uniformly developed across all sectors and all nations. The absence of such private financial initiatives has led to the emergence of a new member of the institutional architecture, often rooted in civil society or the public sector. These budding organisations use public or donor money to perform private sector brokering and

other private sector roles[45]. This portfolio also provided examples of private sector agents performing a variety of functions that would normally be considered to belong to the public sector domain. In institutional landscapes where both private and public sector functions may variously be under-represented or underdeveloped, competing and prospering requires each sector to undertake activities that would usually be considered outside their traditional roles and competencies. Similarly, the emerging type of entrepreneurship observed doesn't conform to commonly recognised industry models; they often consist of networked business models covering a broad range of necessities that their clientele, generally located in the lower socio-economic strata of society, have. Such *Bottom Billion Businesses* may well be starting to rewrite the commerce development handbooks in Africa. Results obtained in the RIU country programmes in funding the activities of these nascent groups are indicative of new avenues where development donors may want to direct their investments to stimulate rural innovation.

The policy implications of these findings in building innovation capacity in the RIU African country programmes clearly indicate that agricultural innovation, rather than simple investment in research and technology initiatives, may also require the establishment of appropriately-funded rural development brokering agencies — or bodies with a similar function, which address this obvious gap in institutional architecture. While the interpretation of what constitutes agricultural research has broadened considerably both in terms of the scope of activities and the scope of partnerships involved, development practice still maintains firm administrative and operational distinctions between development and research. Moreover, many of the large-scale investments in agricultural innovation capacity by the international development community remain firmly focused on the strengthening of agricultural research only. The evidence here confirms that while research is — in many cases — necessary, in the absence of concomitant institutional and organisational changes it is unlikely to be sufficient for innovation. Moreover, the results suggest that for research capacity to be relevant to rural sector innovation and growth, it requires the capacity and institutional flexibility to respond to evolving and emerging sector needs. In this respect, redirecting at least part of the funds allocated to the strengthening of research and research infrastructure could significantly enhance the pertinence and response capacity of these investments to sector development needs. In addition, while the private sector may be ideally placed in some sectors, local circumstances may currently limit their role in many areas. In light of this, coalitions of private, public and civil society sector actors are important for developing, accessing and using knowledge and technology for agricultural and rural system innovation.

These findings raise important questions about how global public research and development efforts could or should reorient themselves to be able to respond.

[45] Hall, A., Clark, N. and Frost, A. (2010) Bottom-up, bottom-line: Development-relevant enterprises in East Africa and their significance for agricultural innovation. RIU Discussion Paper No. 2

3.3 Best Bets Initiative

3.3.1 The approach

Best Bets was initiated in the period after the MTR although much of the generic thinking had already taken place earlier under the conceptually idea, Innovation for Development (I4D) (original RIU output 1.3).

The approach took its inspiration from the popular BBC television programme Dragons' Den[46]. The basic concept is that would-be entrepreneurs pitch their business ideas to a panel of successful entrepreneurs who, subject to satisfactory due diligence, invest their own money and expertise in proposals that they find convincing in return for an equity stake in the business. The RIU Best Bets takes the central tenets of ideas being pitched to an expert panel and rigorous due diligence, but in other significant aspects the procedure and principles vary significantly. A major difference is that the RIU Best Bets panellists would make recommendations as to how RIU should invest its programme money by way of a grant.

The objective of RIU Best Bets was to identify promising proposals to take existing agriculture research products and put these into use in ways that will benefit the poor (and others) in developing countries through partnerships in which the private sector had a major role.

The focus of the RIU Best Bets was any aspect of agriculture in Africa – including crops, livestock, fisheries or forestry throughout the entire value chain, from production, through processing, storage and input and output markets, to consumption. The first round was launched in the Autumn of 2009 focussed upon East, Central and Southern Africa. A subsequent round was launched in West Africa in March 2010.

3.3.2 The Process

Advertisements were placed in a number of newspapers covering East, Central and Southern Africa inviting the submission of Best Bets concept notes. Applicants were asked to state how much financial support they were seeking from RIU, but no limits were stated.

Concept notes were required to address four criteria:

- The proposal should be grounded in rigorous research in agriculture, including fisheries and forestry
- The originators of the research should be involved in the programme in a significant way so that they are able to apply their tacit knowledge and learning to the programme
- The proposal will be expected to achieve significant development impact at scale in East and/or Central Africa (and perhaps beyond)
- The proposal should comprise a consortium of partners (e.g. academic, public sector, NGO) led by an African institution and should include a private sector partner with evidence of support, which could be financial or in-kind

[46] Versions of this programme are broadcast around the world under a variety of local names e.g. Money Tigers in Japan, Shark Tank in the USA, The Entrepreneur in Nigeria.

*The **best bet process** used a venture capital like business process which looked at sustainable business plans. Four key criteria had to be addressed:*

Firstly, the plan needed to be grounded in rigorous research in agriculture, including fisheries and forestry.

Secondly, the originators of the research had to be involved in a significant way so that they are able to apply their tacit knowledge and learning.

Thirdly, the plan needed to show a clear pathway to achieve significant development impact at scale in East and/or Central Africa (and perhaps beyond).

Fourthly, the plan needed a consortium of partners (e.g. academic, public sector, NGO) led by an African institution and had to include a private sector partner.

Plans were presented in a Dragons Den format without any visual aids. Those plans convincing the panel were then subject to due diligence prior to any financial support.

This process was not restricted to the private sector but it actively encouraged a more business-like approach.

By the deadline for submissions in early October, RIU had received 105 concept notes. These were screened in a process in which RIU was assisted by the London-based Cambridge Economic Policy Associates (CEPA) - an economic and financial policy advisory business. A short-list of 11 proposals was developed.

In two cases, pairs of proposals that appeared to offer significant opportunity for synergy (an army worm forecasting system and an army worm control technology; and two aquaculture proposals) were invited to amalgamate their proposals.

In another case, a proposal from Zambia (very highly rated by reviewers) to develop a value chain for cassava flour, in which the flour would be bought by a brewery and used as the raw material for a new type of beer, was put on hold pending guidance from DFID which was subsequently received as being in conflict with its policy on supporting alcohol-related activities. Unfortunately, this proposal was not considered further.

The lead organisation for all the other short-listed proposals were asked to submit a business plan following a format provided by RIU (see Annex 9 for template). To facilitate this, a grant of US$ 2,500 was made available which teams used in various ways, such as to bring team members together to enable them to work jointly on their plans. Two representatives from each proposal were also supported to attend the Best Bets event in Nairobi[47].

At this event the two representatives of each of the short-listed proposals presented their idea to an independent panel drawn from leaders in the African business, finance and research and development communities. The panellists had already read the business plans. Following a ten-minute oral presentation, panellists had 20 minutes to interrogate the proposal, followed by a further 10 minutes of private discussion by the panellists. At the end of the day, the panel announced the proposals they were recommending that RIU should support. Thereafter a due diligence was carried out during December by CEPA prior to release of contracts.

RIU assembled a high-calibre group of independent panellists to review the short-listed proposals at the Nairobi Best Bets event; all leaders in their respective fields and their individual skills and experiences were highly complementary (see Annex 10 for further details)

The money that RIU invested in the selected Best Bets

[47] This event took place 26-27 November 2009

was in the form of a grant. RIU's return on its investment was not be financial; but in the form of learning. The Best Bets proposals formed the portfolio of the third of the RIU's experiments in enabling innovation.

3.3.3 The RIU Best Bet Portfolio

Table 16 below provides a summary of achievements and lessons learnt from the Best Bets portfolio with the end of project reports providing further details (see Annex 11).

The Independent Review selected two case studies from this portfolio:

- The FIPS work in Kenya looking at the Village-Based Agricultural Advisers (VBAs) supporting small farmers with appropriate technologies and appropriately scaled inputs for locally important crops.
- The Shujaaz FM work in Kenya with focus on demand management for the youth targeted printed and radio mass media used to disseminate agricultural and other advice.

Table 16 Summary of RIU Best Bets Portfolio for funding period up to June 2011

Best Bet	Research put into use	Key achievements	Key policy achievements	Key Lessons learnt
Empowering smallholder farmers through private sector led extension Led by FIPS *Case Study for Independent Review*	6 RNRRS and much other international and local research	Over 140 Village Based Advisors trained and fully operational in Kenya and Tanzania with 78,000 on-farm demonstrations completed. This directly benefited over 140,000 farmers and over 700,000 farmers indirectly; 55-97% of households started planting new varieties of sweet potato. Harvest time reduced from 6 months down to 3. Observed increase in tuber size ranged from 200-600%; 60-79% household now using improved bean varieties; 70-89% households reporting increased maize production[48] with average yield improvements ranging from 60-260%	FIPS has brought about both instrumental changes in relation to incentives and more systemic institutional change, changing relations with seed companies as well as new public-private linkages with government agricultural research institutes like KARI.	FIPS VBAs are presently dependent on donor funding – whilst provides an excellent means of replication and scale out (AGRA, USAID, CIP and Rockefeller are all working with FIPS) – need to think about commercial options available without damaging the heartland of the FIPS approach, which is very much valued. Management capacity needed to be strengthened and that was addressed by way of the RIU contract.
ShujaazFM Led by Well Told Story *Case Study for Independent Review*	At least 12 RNRRS and numerous other international and local research	Over 10 million Kenyans have seen or heard about Shujaaz with core audience of over 1.5m who followed Shujaaz closely and interact and take action based on stories; Comic and radio station have an estimated reach of 700,000 and 820,000 respectively then Shujaaz reaches an estimated 1.52m poor young Kenyans every month Shujaaz characters now have cult status New media e.g. Facebook, Twitter and SMS active channels for audience interaction with Shujaaz – over 250,000 on Facebook and over 100,000 on SMS Won One World Media Award 2011. See Figure 6 below for update overview on achievements of Shujaaz	Well Told Story has not made any official links with government or has an explicitly stated advocacy strategy. However, many of the stories directly confront issues around political corruption, elections, conflict and governance. Shujaaz already attracting funding from other donors e.g. USAID and GTZ and more recently from the Government of Kenya as exciting and innovative means of communicating messages	Through this project DFID is reaching young Kenyans at a cost of less than 1p per head every month – real VFM. Individuals who transfer knowledge on innovation can be virtual, not real as long as they are believable, realistic and have an on-going relationship with the user. There is enormous appetite for consuming new ideas amongst young people. Simple, low risk innovations have greatest uptake and potential influence for poor people.

[48] See pages 60-62 for subsequent update.

Promoting yield improvement through farmer applied biocontrol Led by Real IPM	4 RNRRS and from IITA and University of Hohenheim	Registration of over 50,000 on mobile phone contact database; Support for farmers in three successive waves of plantings by distribution of small scale technology packs to 48,000 farmer households; 45,000 farmers received GroPlus packs at retail value of 130 Ksh each which equates to over £45,000	Engagement with four key policy makers. Firstly with KEPHIS[49] enabling the importation and trial use of StopStriga; Secondly PCPB (Pest Control Products Board) that regulates and authorises the use of pest control products, who were responsible for allowing the use of StopStriga, thirdly the KBS (Kenya Bureau of Standards) for registering and permitting the sale of the priming fertiliser seed treatment and finally the Provincial Administration of Nyanza province. In all cases the process has been transparent but has taken much	Registration is a lengthy process, on hindsight, three years is the minimum companies are currently experiencing in Kenya; much longer than in other African countries
Registration and distribution of biological control in Ghana Led by Real IPM	6 RNRRS plus other international (ICIPE and US) and local research	Registration of 4 BCAs for use in Ghana, the first of its kind; Developed distribution network for BCAs – two products have been licensed	Worked in liaison with Environmental Protection Agency (EPA) of Ghana to refine their registration administration and prepare guide for registering biological control agents in Ghana; Providing reassurances to regulatory authorities in Kenya (KEPHIS)	Regulatory process varies greatly between countries
Aqua shops: Aquaculture development through building services Led by FARM Africa	4 RNRRS plus research from STREAM and NACA initiatives in Asia	552 farmers benefiting from training and six aquashops franchises established	Worked extensively with the Kenyan Bureau of Standards to develop quality standards for fish farming inputs Supported drafting of the Aqua Shops Licensing regulations with active engagement of the Director of Fisheries who is keen to see Aquashops scaled up Project participated actively during the development of National Aquaculture	Adaptation of the research maybe required during implementation; Establishing a franchisor did not work as planned; Prolonged drought slowed down implementation; Scarcity of quality seeds and affordable feeds remain a key challenge and need to encourage private sector participation to

[49] Kenyan Plant Health Inspection Services

			policy, ensuring that the policy priorities presented by stakeholders were adequately addressed by the policy	resolve these constraints
Safe and Affordable Armyworm Control Tools (SAACO-TOOLS) Led by EcoAgriConsult, Tanzania and CABI Kenya	6 RNRRS plus SADC and USAID research	Spex NPV production established in state of the art biotechnology facility in Arusha which is already becoming a training hub; 112 Trainer of Trainers trained in Kenya and another 40 in Tanzania; Harvesting techniques validated and improved methods for mass harvesting developed To June 2011, over 80,000 farmers in Kenya and over 25,000 in Tanzania directly benefiting from improved CBAF	Development of a Government of Kenya approved procedure for registration of pheromones – this will facilitate the commercialisation of other pheromones for lepidopteran pests in Kenya; Development of Government of Tanzania approved procedure for registration of Spex NPV; Mindset change on Kenya with CBAF now integral in providing data on armyworm status In Tanzania government support has been both financial in terms of adding additional sites for CBAF. CBAF has been integrated into district agricultural development plan (DADPs), thus ensuring longer term sustainability. GoT has also committed to using SpexNPV in its armyworm control programmes to show farmers its efficacy	Putting research into use involves team work. Additionally, all team members need to understand the genesis of the research findings and what they are meant to achieve. Key beneficiaries require to be made to own the processes and be able to provide support within their means. Appropriate linkages are of essence. To this end linkages between the key beneficiaries and crucial stakeholders is important. Public-private-partnerships are important and have to be made and maintained. Support from stakeholders need to be sought strategically. Involving persons in Key positions in government is paramount for purposes of policy influencing. Clear need to marry systems of forecasting with those of control. Whilst public systems are inadequate it needs the private sector to implement and deliver effective control mechanisms.

Transfer and dissemination of NERICA in Uganda Led by CABI Kenya	2 RNRRS plus other research from WARDA and SDC	Three tonnes of basic seed of three registered NERICA varieties produced by NACRRI Farmers trained as out-growers to produce quality rice seed through a FFS approach Rice seed health video aired National TV in Uganda Quality rice seed production manuals developed and translated into five local languages	Policy makers have been engaged in activities of seed production through the National Rice Development Strategy and the National Agriculture Advisory Service, both of the Ministry of Agriculture. The critical policy makers are the Department of Crop Production and rice steering committee made of the top management in the Ministry of Agriculture, Animal Industry and Fisheries. The best bet team provided the policy makers with project updates in meetings and feedback from rice seed videos. The National Agricultural Advisory Services (NAADS) staff use information materials developed from the project. There has been great acceptance by NAADS of information materials and they are now being used in their programmes away from project areas.	The Farmer Field School (FFS) approach has proven to be an effective way of disseminating upland rice seed production technologies. (
Improving human and animal health in East Africa Led by Uni Edinburgh and Makerere Uni, Uganda	8 RNRRS and other research	Establishment of framework for public private One Heath Engagement in Uganda with MINTRACS established as function of AFRISA; Roll-out of 3V network to Soroti and Serere; Risk assessment for market trade, cattle flow and herd dynamics completed; Validation of translation of RAP technology to Tanzania; Foundation laid to start work on innovative financing mechanism.	Raise community awareness and worked closely with Ministry of Health. SoS seen as test case for increased focus on other neglected diseases New service industry developed Work in Nigeria via BBSRC funding	The privatisation of sleeping sickness control would have been unthinkable a decade ago, but with the introduction of insecticide-treated cattle, this is now a viable option and RIU has been developing innovative funding options social investment bonds

Production of clean yam seed Led by Missionary Sisters of the Holy Rosary (MSHR) and IITA	11 RNRRS	Established 25 entrepreneurs supported with packages of training and mentoring in business practices, technical support and access to credit	Provided proof of concept and addressed constraining factors preventing into use at scale. This funding scaled up healthy yam seeds was an important interim step to securing funding ($12m) from BMGF for Yam Improvement for Income and Food Security in West Africa (IITA project)	Key scoping study which allowed an important project to be formulated.
COB Asia	Reported under Asia ICF section			

3.3.4 What have we learnt?

The "Best Bets" outlined above were only active from January 2010 so a much shorter timeframe than that for the other two RIU experiments. They all specified private sector involvement since it was hoped this would promote longer term sustainability once public aid support ceased; the rationale was that donor aid is necessary to cover the risks associated with pre-competitive social costs of technology development but often acts as a disincentive to longer-term entrepreneurship. A major working hypothesis was that technology development needs a further impetus from private sector players since research outputs have usually remained 'on the shelf' in the absence of further support. Since at the start of the programme it proved hard to identify examples of 'knowledge use', RIU explored different mechanisms to facilitate greater use and one of these was the "best bet" sub-programme. Although many of the projects are still on-going there are, we believe, a number of preliminary conclusions that can be drawn:

- Despite an early failure[50] to identify 'low hanging fruit', a total of over 50 RNRRS projects were 'put into use' by the RIU Best Bet process.
- The selection process combined with flexible technical and financial management enabled the Best Bets Programme to develop the most appropriate pathways to its objectives (in full consultation with RIU management) but without being constrained by rigid management tools. This indicates the advisability of a lighter touch to be taken in relevant technology development aid.
- In many cases the original scientists and their organisations continued to play an important role in subsequent technology development, especially by virtue of their tacit knowledge of the problem area, to be a mentor/adviser derived from many years' experience in the field.
- In all cases, however, the mobilisation of other linked knowledge sources proved necessary. Often these derived from NGO bodies but included government departments, other international science bodies, local scientific institutions, as well of course as the private sector itself. Indeed the projects worked best as consortia in which the different stakeholders operated as an holistic innovation system with each player contributing its own unique expertise
- In all cases RIU project funding played a necessary role in covering pre-investment costs associated with risk and related factors such as exemplified in the social costs of armyworm forecasting. In our view it is likely that this type of pre-competitive support will continue to be an area for necessary technology development aid.
- The actual business of technology development was complex in all cases; it involved applications engineering, negotiations with government regulatory bodies, accessing products through imports (in the absence of local production capacity) and dealing with the many problems that always plague new innovative ventures
- In all cases private sector interests have played a key role, both as 'product champions' and as a core activity ensuring economic continuity. Clearly economic incentives have an important role in ensuring longer-term sustainability and in some cases markets for established firms have expanded as new outlets have been created. In addition there have been a range of new small businesses created as a result of RIU interventions and there are indications that new forms of financial support will be forthcoming.

[50] Balogun, P. (2007) Identification of possible case studies: Analysis of RNRRS outputs (September 2007) MIL Report

- The evidence has confirmed the generally held view that formal national government led extension systems need to be reformed and it is our view that the private sector should now play a much greater role in this respect. In this way it will help to improve the pace and impact of technology development for the rural poor.
- In some of the projects examined, national regulations and their application have proved a significant constraint though there is also some evidence of reluctance of farmers to use bio control methods[51]. This seems mainly due to a lack of suitable guidelines for bio control agent use. Countries still use guidelines designed for the use of chemical biocides and have difficulty making appropriate judgments. The issue, however, varies across countries with, in the BCA case, Ghanaian regulators proving much faster to adapt than the Kenyan equivalent.
- In many cases RIU Best Bet projects have helped to mobilise national capacities, particularly in universities. This is important in the light of frequent criticisms of TE sector viability in Africa and the need to encourage local innovation. The RIU experience appears to show how higher education might play a more substantial role in economic development.

A fuller account of the RIU Best Bet process[52] is currently in press and is expected in March 2013.

[51] The other problem is that bio control agents take a little longer than chemical ones to function effectively and farmers are reluctant to wait the extra few days.

[52] Clark, N., Frost, A., Maudlin, I. and Ward, A. (in press) Technology Development Assistance to Low Income Country Agriculture: Putting Research into Use (RIU)

RIU was established to get research into use and bring about meaningful developmental impact for the benefit of poor people – whether economic, social or otherwise. Considerable emphasis was placed on Monitoring, Evaluation and Learning (MIL) within the RIU and it was mandated that this function should be independent. DFID guidelines for Research Programme Consortia are quite clear: that powerful lessons need to be learnt from its research and that innovative ways of measuring impact are important. The MTR was critical of the initial work programme in this area yet some important had been done[53]. The 2010 DFID Annual Review was the first independent review following the management change and re focusing of the RIU; the review was very positive but highlighted the need to ensure a full evaluation was undertaken soonest to ensure lessons arising from the RIU were learnt at the earliest opportunity; this started in mid-2010.

3.4 Independent Review

An extensive independent review[54] was commissioned by DFID to ensure that the lessons from the RIU were learnt from an early stage. It is not the purpose here to reiterate the evaluation, the main report, associated literature review[55] and associated annexes are available on the DFID R4D website[56]. In order to facilitate dissemination of the main review, a separate reflection or lessons learnt commentary was commissioned from two of the review team; this is also available on the R4D website[57]. The case studies selected which are summarised in Table 17 below – many of the findings have already been incorporated elsewhere in this report.

Table 17 *The case studies undertaken during the Independent Review*

Types of innovation	Africa Country Programme	Best Bets	Asian Innovation Challenge Fund
New technologies (e.g. crops, varieties, fingerlings, rat traps, etc)	Rwanda Nigeria Sierra Leone		Rat Management (Bangladesh)
New local sources for seeds	Rwanda	FIPS-Africa	PCI -Forward (Nepal)
New connections between providers and farmers		FIPS-Africa	
New ways of disseminating information		Shujaaz	

[53] O'Reilly, S. (2009) RIU Impact Evaluation Component – What have we learnt so far? See http://www.researchintouse.com/resources/RIUImpactEvaluationFinalReport2009.pdf for further details.

[54] The review started in late 2010 although the final version of the report accepted by the Steering Committee was received in November 2012 following several redrafts.

[55] http://www.researchintouse.com/resources/RIU-Evaluation-Literature-Review2010.pdf

[56] Main Independent Review Report as http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Research_Into_Use_An_Independent_Review.pdf

With the eleven complied annexes as http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Research_into_Use_Independent_Review_Complete_Annexes.pdf

[57] Putting innovation into farmers hands: What works? Allyson Thirkell and John Wyeth (October 2012) 4pp http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Putting_Innovation_Into_Farmer_Hands.pdf

3.5 Summary to June 2011

How research is effectively put into use is a key concern not only to RIU and DFID but to all those involved with improving the agriculture sector. The RIU has tried different ways of putting research into use in different agro-ecological and socio-political contexts across Africa and Asia. Some notable successes were attained and some approaches were ineffective.

The main changes that the RIU programme enabled were presenting availing inputs, technologies and services to farmers in ways that reduced risk to the farmers trying out these new technologies. Some may argue the RIU chose safe, tried and tested entry points, but it should also be remembered that the RIU was venturing into unfamiliar territory. Changes the RIU did bring about included enabling and building the capacity of individual men and women and their agencies to take on a brokerage role, and changing the ways in which value chain stakeholders relate to, have access to, and partner with each other.

The Independent Review concluded the RIU had relatively little impact on policy change and indeed took a conservative approach to this with little evidence of it seeking to position itself to be able to promote radical policy change. Whilst this statement holds, the RIU was not set up as a policy programme but engaged in policy advocacy where this was a barrier to achievement of objectives e.g. regulation of BCAs in Ghana; development of national action plans in Nepal etc.

Five key lessons emerge from this study

1. Positioning

   Putting research into use effectively requires a good understanding of policy opportunities, priorities and constraints at the national level as well as an understanding of the opportunities and barriers at the value chain level. It is vital that any such initiatives are aware of, and keep up, with other government, donor funded and private sector programmes in the sector.

2. Choice of entry point

   In a research project that concerns learning about how to put research into use it is critical that strategic choices are made concerning entry point, so as to ensure greatest leverage. The majority of the experiments reviewed chose provision of incentives combined with brokerage as the key entry point, combined with some degree of change in agency and institutions. However, in some cases a more appropriate entry point, especially considering the limited funds per country, may have been to seek to influence and bring about change through working at the policy and regulatory level although such an approach may well have involved a much lengthier process.

3. Role of brokerage

   Brokerage was a key entry point for most of the RIU experiments combined with changing the incentive structure. The case studies provided evidence that introducing or strengthening the intermediary/brokerage role of individuals and agencies leads to a change in the institutional system, catalysing new relationships between stakeholders and stakeholder groups. From the study it is clear that brokerage at different levels – national and platform/commodity – has synergistic effects, with the former bringing about buy-in at the political level and the latter

significantly changing relations between value chain holders. Furthermore, RIU experiments have shown that this synergy also exists vertically – with enhanced access of district level stakeholders to national level scientists, private sector bodies and decision makers, and membership of commodity platforms enhancing the purpose and activities of national level brokered relationships for example in Sierra Leone. The study also showed the relevance and effectiveness of different types of brokerage ranging from the more formal approaches seen in the country programmes to the more entrepreneurial, informal and dynamic approaches seen in the Best Bet experiments.

4. Policy alignment and influencing

RIUs influence on policy was, as mentioned above, fairly minimal in the countries visited. The evaluation found several reasons for this that provides lessons for any similar project in future. To have a voice and to have influence it is important to build strategic networks and alliances with large agriculture sector programmes – with the Government departments responsible for these and with the major donors. In this case most country programmes had little or no contact even with DFID in-country representation and links with the World Bank, USAID, and other large donors were minimal.

5. Sustainability considerations

Sustainability is always an issue in time-constrained donor funded initiatives. This is particularly the case where a major focus is on building multiple-stakeholder platforms that can only thrive once trust is built within and between stakeholder groups. Many RIU experiments have only been running for a 1-3 years, and there was strong evidence that the transformations brought about through having platforms and coalitions – the new institutional architecture – are not strong enough yet to survive once RIU funding ceases, especially where RIU has been covering the costs for platform members to attend meetings. Where a commodity has clear commercial value then it is more likely that the activities initiated or catalysed by RIU will continue, but it is not clear to what extent the commercial viability of each commodity has actually been assessed – value chain initiatives will only continue if, indeed, there is enough value in the chain.

Pilot to scale

The experiments discussed above explored a number of push and pull mechanisms for the translation of agricultural development research into sustainable activities. The RIU deliberately took the decision by pushing a private sector approach to ensure sustainability, to introduce commercial rigour and move away from aid dependency. In light of the experiences documented above, thinking evolved in how best to achieve the translation of research outputs into commercial products and services that improve smallholder productivity and help farmers to access markets for their surplus production and to trade themselves out of poverty. This guided the activities under the extension phase, which will be discussed in the next section.

FIPS-Africa
FARM INPUT PROMOTIONS AFRICA LTD.

Farmers in Kilungu district benefit from the early-maturing PAN4M-19 maize variety promoted by FIPS-Africa's Village-based Advisors

Promotion Update: December 2012

Background: Maize is the preferred staple food crop of farmers' in Kilungu district in Kenya's Eastern Province. The district, however, receives marginal rainfall for maize production, and farmers often experience crop failure (see left).

In 2010, with the support of DFID's Research Into Use Programme (RIU), FIPS-Africa established a network of self-employed Village-based Advisors (VBAs) in Kilungu district, with the aim of helping small-holder farmers gain access to the appropriate farm inputs, and information on their best management. In the process, VBAs generate income from a number of activities such as the sale of improved seeds, tree and vegetable seedlings, and vaccination of local poultry against the Newcastle disease. The VBAs have been demonstrating to farmers that they can grow a good maize crop if they use an early-maturing variety, coupled with improved soil/manure management practices.

One such maize variety is the PAN4M-19 variety supplied by Pannar (Kenya) Ltd. which matures only 90 days after planting. Performance of the crop can be enhanced by deep incorporation of manure along the planting rows using the "spring" jembe, and the formation of tied ridges to capture rainfall (see below).
In November 2012, FIPS-Africa staff visited beneficiary farmers to determine the impact of this work on their livelihoods – a couple of testimonials follow.

Image: Crop of PAN4M-19 maize variety in Kilungu district, with soil prepared by deep row tillage.

Judah Munyao, Kithangathini Village, Kikoko Location

The farmer had purchased 2 kg seed of the PAN4M-19 variety from his local VBA. He harvested 7 bags of grain that he has kept for food.

Martha Musyoki, Kithangathini Village, Kikoko Location

During the October 2011 rainy season, the farmer had grown 8 kg of the traditional '*Muthamba*' variety. She harvested only 1.5 bags of maize. "I got too little harvest despite receiving sufficient rainfall", she says. In March 2012, the mother of 5 switched to the PAN-4M-19 maize variety. She purchased 2 kg seed from her local VBA and harvested 7.5 bags of grain that she is keeping for food.

Sospeter Silo, Kithangathini Village, Kikoko Location

In March 2012, the farmer had purchased 2 kg seed of the PAN4M-19 variety from his local VBA. He harvested 6 bags that he is keeping for food.

"I previously used to spend a lot of money on buying food but since the harvest, I have not spent a Shilling on buying maize flour. Ugali made from the new variety is sweeter than the local 'Muthemba' variety", says Sospeter.

Mary Kitunge, Kitulu Village, Kasikeu Location

Mary had purchased 4 kg seed of the PAN4M-19 variety from her area VBA. She harvested 14 bags and sold 8 bags for a total of KES 25,600 that she spent on buying a cow while keeping the rest of her harvest for food.

"The cow has become a blessing to my family. I usually sell 3 litres of milk a day, (2 litres in the morning and 1 litre in the evening) for KES 35/litre. From this, I make about KES 3,000 every month. I use the money to pay my children's school fees at a local primary school", says Mary.

3.6 RIU Extension period (July 2011 – December 2012)

3.6.1 The Approach

Following a mid-term review (MTR) RIU management adopted a more private sector-like approach in addressing two aims – an approach which was subsequently becoming more mainstream within DFID, with the private sector seen as the engine of development leading to prosperity for poor people. Adopting this approach RIU had made good progress in meeting both aims[58].

On the first aim, organisations involved in the successes of the RIU 'Best Bets' initiative were now moving towards business models that blend entrepreneurial skills and perspectives with mission statements that seek to serve both the needs and welfare of poor customers. On the second aim, RIU now has good evidence that researchers can be guided by donors in directions more likely to result in benefits to the poor. The work on sleeping sickness is a good example where effective networks (which include researchers, medical and veterinary practitioners, venture capital and drug companies) can be built to directly benefit the poor in rural areas. This project, and others like it within RIU, provides very simple lessons - proof of concept - that may be used by donors to guide researchers through, for example, the bidding process.[59]

The RIU had been successful in getting a number of activities (all with a deep-rooted RNRRS legacy) to the proof of concept stage, but to achieve sustainable impact at scale required new skill sets and know-how. To this end, RIU started to work with H20 Venture Partners to take activities to the next stage – proof of value shell companies, ready for investment. In other words, the RIU had incubated good research (DFID-funded and other) and de-risked the process towards sustainable impact; this was the purpose of RIU post MTR - summarised in the schematic in Figure 5 below.

3.6.2 The Process

The purpose of the extension period was three-fold to explore the potential for commercialisation of new and emerging technologies (from tools to techniques, and know how to business models) to deliver sustainable solutions to economic and social development challenges within East Africa's agriculture sector.

The key components of this phase were:

- *Commercial Mentoring* of early stage, social enterprises, identified principally through DFID-funded initiatives - RIU's Africa Country Programmes, RIU Best Bets and also research outside the RIU e.g. from the CG institutes, and assessed to have potential to become investable, commercially sustainable, high impact social enterprises;

- A *New Enterprise Pilot Programme* to originate and/or source and develop new, commercially sustainable solutions to specific development and market needs, involving

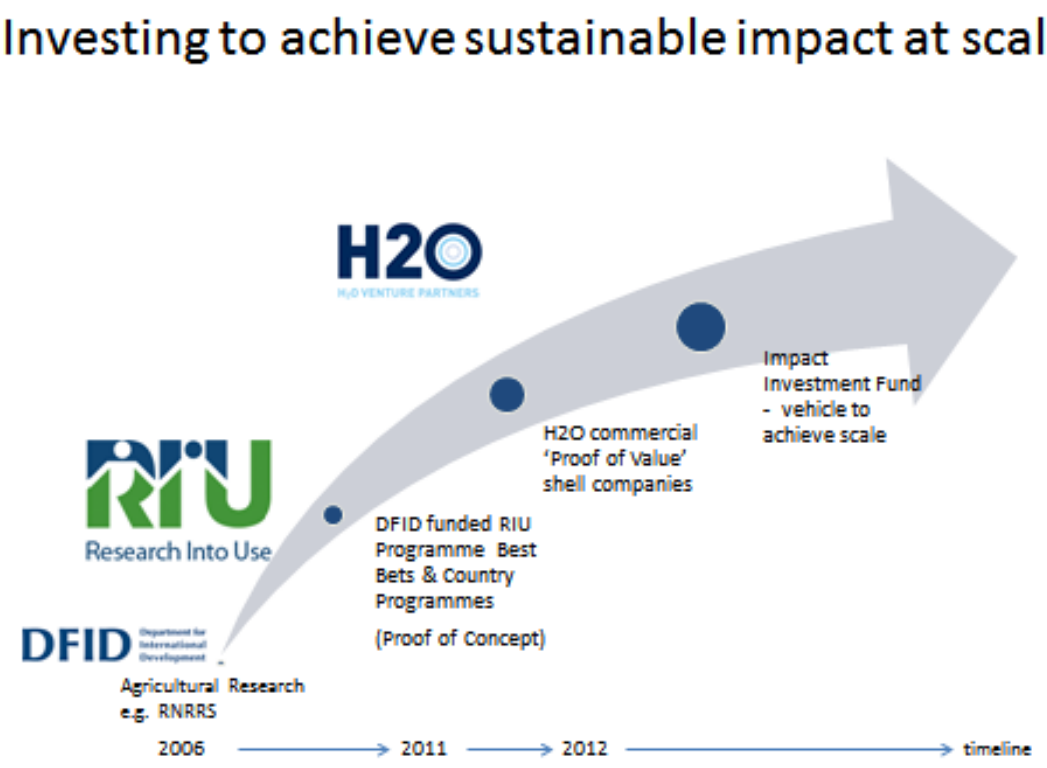
[58] The aims of the Research into Use Programme (RIU) are two-fold: (1) How to better utilise outputs from agricultural research and (2) How to nudge research funded by donors - who fund much of the agriculture-related research in the developing world - more directly towards the benefit of poor farmers

[59] To their credit, DFID is already ahead of the game in partnering BBSRC with the SCPRID call and with NERC/ESRC on the ESPA Programme suggesting that this type of partnership will become commonplace in the future.

initial evaluation of prospects for the development pipeline, recruitment and mentoring of entrepreneurial managers to take each pipeline prospect forwards, early stage prospect development, including refinement, termination and further development as required; and,

- Developing a novel financing mechanism for large area, long-term implementation of effective measures to control neglected tropical diseases through a *Development Impact Partnership*, focused on sleeping sickness control in Uganda.

Figure 5 *Trajectory for translation of research into sustainable businesses for impact at scale*



3.6.3 Commercial Mentoring

A portfolio of nine smallholder farmer-focused business prospects (termed 'innovation services' here), identified and developed by previous work arising from RNRRS legacy, among other donor-funded research outputs, and particularly those emerging from RIU-funded activities, that have achieved 'proof of concept' and show significant commercial 'proof of value' potential.

The portfolio of business prospects comprised:

- *Warehouse receipt/warrantage system and post-harvest crop management*: involving staple and cash crop purchase, consolidation, storage, trading on warrantage basis, including high quality input provision (improved seeds, fertilisers, advisory) to farmers, building on the *Maize Innovation Platform* of RIU Rwanda;

- *FIPS-Africa resources for smallholder farmers*: base-of-pyramid inputs, consolidation, processing, marketing, sales including improved vegetable seed and planting materials, cassava and local chicken value chains (Kenya, Tanzania, potentially regional), building on the *Resources for smallholder farmers* RIU Best Bet-funded project;

- *Well Told Story Shujaaz FM communications platform*: growth plan to expand the Shujaaz grassroots magazine and radio communications platform, including entry into new regional markets (Kenya, Tanzania, Uganda), building on the *Shujaaz FM – agricultural messages to young people* RIU Best Bet-funded project;

- *EcoAgri Consulting armyworm forecasting and control*: bio-forecasting and sustainable bio-control for agricultural pests and diseases, with a focus on armyworm control in Tanzania, with an option to develop a new biotech facility for tissue culture technology, building on the *Armyworm forecasting and control* RIU Best Bet-funded project;

- *Human and animal sleeping sickness control*: developing novel financial instruments to fund implementation of effective veterinary interventions for public health control in Uganda, building on the *Stamp Out Sleeping Sickness* RIU Best Bet-funded project;

- *Smallholder crop storage system*: scalable models for storage of crops and crop residues, for promotion of plastic storage bags at a national level, and for provision of dry season fodder to high cattle production areas, building on the *Cowpea/Soybean Crop Livestock Integration Innovation Value Chain Platform* of RIU Nigeria:

- *Real IPM biological control agents*: market growth and expansion (product range, target crops, production volumes) and quality control (regional, European markets), building on the *StopStriga and Gro-Plus* and *Bio-pesticides registration* RIU Best Bet-funded projects;

- *Indigenous chicken production, processing and sales*: village-based production of high quality, affordable local chicken, including development of chicken feeds business activity (Tanzania), building on the KukuDeal contract business model developed under the *Indigenous Poultry Innovation Platform* of RIU Tanzania;

- *FARM-Africa AquaShops*: commercialisation of an extensive network of franchised-based aquaculture input providers in Kenya, focused on the *AquaShops* project of FARM-Africa, funded through the RIU Commissioned Work programme.

A critical control point was designed in to the commercial mentoring timetable (March 2012) which would form a go/no-go decision point. The activity headlines and the assessment against performance criteria e.g. schedule of activities, the team and resources and, risks and issues are presented on Table 18 below[60]. Those activities which did not get a green light began a process of cessation – for some activities funding continued until June 2012 with a specific focus on the

[60] The table incorporates a simple traffic light system to indicate assessment

generation of knowledge outputs, which was a key aspect of DFID funding an extension phase (see Annex 1b).

In addition to the above a further allocation was made to support the two seed companies arising from the COB work in Nepal. The intention being to undertake a management review to guide the strategic direction of these companies. The management review would form the exit strategy for the RIU. This activity is reported on the summary table 18 below for completeness.

Table 18 *Summary of headlines, assessment of key criteria & decisions regarding commercialisation options of RIU innovation services (at end March 2012)*

Innovation Service	Assessment criteria	Assessment	Headline update at end March 2012	Go or No-go
Warehouse receipts – warrantage, Rwanda	Schedule of Activities		Detailed elaboration of commercial model and financial plan for business within maize value chain undertaken. Commercial entity, SARURA Commodities Ltd, being established. Major opportunity identified for accelerated and scaled implementation of business plan. Linked TA funding agreed in principle with DFID Rwanda regarding development for newly established Rwanda Grains and Cereals Corporation (RGCC) where the RIU has been instrumental and the RIU Country Coordinator currently serves as the interim MD. RIU funding through to December 2012.	
	Team & Resouuces			
	Risks & issues			
FIPS	Schedule of Activities		Intensive interaction to align and agree commercialisation process – FIPS provided a range of opportunities. Three areas identified with vegetable seed distribution highlight as priority followed by cassava then indigenous poultry – with the first two given consideration by RIU funding through to December 2012.	
	Team & Resouuces			
	Risks & issues			
Shujaaz	Schedule of Activities		The commercialisation options for Well Told Story (WTS) covering Shujaaz were always very different and interaction has focussed upon regional growth options including positioning to capture monies external to RIU. WTS currently bidding for GATES and other DFID monies. Shujaaz won the 2011 One World Media Award was nominated for an International Digital Emmy Award 2012[61] and it remains an exciting dissemination conduit for FIPS & for other RIU activities with RIU funding currently running through to late May 2012. Additional monies were provided by DFID to run a series of six stories on Nutrition; these appeared in Shujaaz (July – December 2012). See Figure 6 for Shujaaz overview.	
	Team & Resouuces			
	Risks & issues			

[61] Well Told Story duly won the International Digital Emmy Award (for Children and Young Persons content) for the Shujaaz initiative

Armyworm Control	Schedule of Activities		The lack of an armyworm outbreak in 2012 has restricted development in terms of the Spex NPV control intervention. Yet a strategic review of Crop Bioscience Solutions (CBS) business proposition was taken forward and initial armyworm intervention business model drafted; assessment made of cost model/financial plan need. Armyworm control in itself is unlikely to be stand-alone business but needs to be an integral part of an organisation offering other skills - consultancy, training etc. Whilst the public sector is failing to address the inadequacies of the existing system there is a real opportunity for a business venture like CBS to cover a range of opportunities from pest control to biotechnology. RIU funding through to December 2012 to prepare for armyworm outbreak towards the year end.	
	Team & Resouuces			
	Risks & issues			
Control of sleeping sickness	Schedule of Activities		Potential for innovative financing model to be scoped given the compelling case for a GAVI-style bond initiative. Discussions undertaken with Social Finance to develop first working model of the bond issue and requirements for supporting documentation – the research evidence base. Development of draft operational plan for scaled roll-out of control activities across Uganda in meetings with University of Edinburgh and IK Foundation. Discussions also with senior academics at the London School of Hygiene & Tropical Medicine to advise on the design and lead the independent evaluation of an appropriate performance and impact evaluation framework	
	Team & Resouuces			
	Risks & issues			
Improved storage of cowpea and soybean, Nigeria	Schedule of Activities		This initiative saw over 3.6m people made aware, by face-to-face information initiatives, of the triple bagging technology with over 380,000 farmers producing some 352,000 metric tonnes of cowpea grains. Over 300,000 triple bags supplied to the system allowing for storage of £6.5m worth of cowpeas which prevented losses of over £2.1m. Analysis of commercial potential within the cowpea value chain (storage and distribution) was inconclusive. Review and re-specification of study needed for extension of analysis to provide required information. The RIU has been able to leverage buy-in from many other parties interested in the triple bagging application and a robust private sector has now emerged to take this forward in the future. There is also a copy-cat market, whilst is maybe seen as an indicator of a successful technology it also reduces commercial potential. RIU funding through to June 2012 concentrating on delivery of knowledge outputs e.g. RIU and IITA jointly presented at the 7th IPM International Symposium (March 2012). See Annex 8 for end of project report. Case study for the KIT Evaluation – see Full report as http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Learning_from_RIU_in_Africa_book2.pdf	
	Team & Resouuces			
	Risks & issues			

Biological control (Real IPM)	Schedule of Activities		Strategic review questionnaire completed, discussed with Real IPM and assistance provided with respect to capacity assessment/development for future activities. Unlike the other innovation services Real IPM is a much more mature business so options for commercial start-up limited. Several ideas emerged from review e.g. biological control within the South Africa rose industry but these lie outside the RIU mandate. Continued effort on knowledge outputs and highly successful biocontrol workshop completed in Ghana (March 2012) with significant influence on policy making now achieved. RIU would exit in June 2012. See Annex 11 for end of project report.	
	Team & Resouuces			
	Risks & issues			
Indigenous poultry, Tanzania	Schedule of Activities		This was a striking potential at the start of the extension phase. But significant systemic constraints identified which prevented scaled commercialisation effort at this point. Furthermore there were major challenges to the continued supply from independent producers of affordable, high quality day old chicks and chicken feeds, and a slow growth rate - 4 months to rear from egg to selling weight. This needed more detailed data on costs, potential revenues and market growth estimates. These issues may well be addressed and the situation may change but this will require additional public monies which are not available via RIU. Continued effort on generating knowledge outputs to influence policy and leverage potential funding in Tanzania. High level workshop took place in late March 2012 to launch a series of RIU policy briefs. This would be the exit point for RIU. See Annex 8 for end of project report.	
	Team & Resouuces			
	Risks & issues			
Aquashops	Schedule of Activities		Good local team in Kenya who were involved in strategic period of integration including intensive workshops (in late 2011) which drafted commercialisation-related outputs. But significant challenges to commercialisation opportunity identified. Not least the predicted margins on individual aquashops very small and may be better to be part of village based agribusiness (this may also be better covered linking with the Sidai Africa Limited intervention). This still remains a viable option for commercialisation but not within RIU lifetime – needs more time and a greater critical mass of aquashops upon which to build a robust and sustainable business model. RIU funding through to June 2012 would concentrate on knowledge outputs. See Annex 11 for end of project report.	
	Team & Resouuces			
	Risks & issues			
Client orientated breeding – seed delivery, Asia	Schedule of Activities		Main objective under the extension phase was always to build/mentor the business management capacity of GATE and Anamolbiu (the two new seed companies established in Nepal). A management review was undertaken in March/April 2012 to assess both seed companies and advise them on future strategic direction. This would be the exit point for RIU. See Annex 6 for end of project reports.	
	Team & Resouuces			
	Risks & issues			

Figure 6 Shujaaz Overview

Throughout the RIU to date there had been a filtering process on-going; large numbers of activities under the three RIU experiments filtered down to the nine which started the commercial mentoring progress in July 2012. The critical control point was again another filter to allow available resources to assist those prospects which were successfully passing the check points. The RIU was demonstrating a route towards sustainable impact based on good DFID-funded agricultural research but using private sector principles and resources.[62]

As this trajectory continues further there is a need to get smart about how we define and demonstrate impact. This thinking was incorporated into an intensive phase of mentoring.

A further assessment was made in August 2012 before deciding on the final business concepts to go forward to the end of the RIU funding period (December 2012). This is summarised in Table 19 below indicating which concepts successfully navigated each check point.

The commercial mentoring activity highlighted some high level lessons:

- Commercial mentoring of existing business concepts and management teams can be challenging:
    - the entrepreneurs often have a fixed view of their business concepts/models and are unwilling to consider revision;
    - business models and expectations are often over-ambitious;
    - securing the right alignment of interests, which shared risk in a balanced and proportionate way is frequently challenging;
    - alignment challenges while being entrepreneurial in developing their early stage businesses, existing owners often have insufficient management experience to progress development, nevertheless being unwilling to vary from entrenched processes
- Commercialisation of NGO initiatives or in partnership with NGO requires explicit agreement on purpose and goal, objectives and process, otherwise there are risks of conflicts of interest;

- Origination, while demanding, provides opportunity to develop goal-focused, aligned and well managed enterprises

It is interesting to note that one of the most promising prospects back in July 2011 was one of the first to drop out. The indigenous poultry work in Tanzania whilst showing much promise and being driven by a charismatic entrepreneur at a pilot level suddenly became much bigger – maybe a victim of its own success, growing too fast too quickly without assurance of a sustainable business plan to support such a change. There is no denying the potential of this initiative but it needs more time. At the time of writing, this looks likely to happen with funding from USDA through Catholic Relief Services (CRS) to implement a similar project on chicken but piloting on egg production in two districts.

[62] Inevitably this route moves away from the DFID Central Research heartland towards the domain of other departments such as the Private Sector Department but this is seen as very positive and part of the evolution of commercialisation of research towards impact.

Table 19 *Summary of decision points during the commercial mentoring phase*

July 2011	March 2012	August 2012	December 2012
Warehouse receipts/warrantage system (RIU Rwanda)	Sarura Commodities (warrantage) (RIU Rwanda)	Sarura Commodities (warrantage) (RIU Rwanda)	Sarura Commodities (warrantage) (RIU Rwanda)
Resources for smallholder farmers (RIU Best Bet) (FIPS – Africa, Kenya)	FIPS Vegetable Seeds and Inputs Trading (FIPS-Africa, Kenya)	FIPS Pulses Production and Trading (FIPS-Africa, Kenya)	FIPS Pulses Production and Trading (FIPS-Africa, Kenya)
ShujaazFM Communication Platform (RIU Best Bet) (Well Told Story, Kenya)	FIPS Tubers off-taking (FIPS-Africa, Kenya)	Crop Bioscience Solutions (Armyworm control) (EcoAgriConsult, Tanzania)	Crop Bioscience Solutions (Armyworm control) (EcoAgriConsult, Tanzania)
Armyworm forecasting and control (RIU Best Bet) (EcoAgriConsult, Kenya)	Crop Bioscience Solutions (Armyworm control) (EcoAgriConsult, Tanzania)	Financing sleeping sickness control (SOS, Edinburgh, Uganda)	Financing sleeping sickness control (SOS, Edinburgh, Uganda)
Stamp Out Sleeping Sickness (SOS) (RIU Best Bet) (Uni Edinburgh and Makerere Uni)	Financing sleeping sickness control (SOS, Edinburgh, Uganda)		
Improved cowpea storage system (RIU Nigeria)			
Biological control agents (RIU Best Bets) (Real IPM Company, Kenya)			
Indigenous chicken production (Kukudeal) (RIU Tanzania)			
Aquashops (RIU Best Bet) FARM Africa, Kenya			
Client Oriented Breeding (RIU Best Bet/Asia ICF) (CAZS, LI-BIRD, FORWARD, Nepal)			

As of August 2012, there were four business proposals that were considered to have potential as sustainable businesses. Short summary of three of these is provided below on:

- Sarura Commodities Limited, Rwanda
- Mavuno Commodities, Rwanda
- Crop Bioscience Solutions, Tanzania

Further discussion on the Development Impact Bond for the control of sleeping sickness is provided later.

Maize Innovation Platform (RIU Rwanda): from Warrantage to Sarura Commodities Limited

Seminal research conducted in the 1990s onwards under the DFID-funded Renewable Natural Resources Research Strategy (RNRRS) programmes led to the development of inventory-based financing systems as appropriate products for pro-poor agricultural market development. These systems, such as inventory-credit financing, crop storage and trading system and warehouse receipt systems were designed to combat the persistent problems and inefficiencies that characterise agricultural markets in much of sub-Saharan Africa. Such problems include highly variable seasonal prices (particularly for staple grains and cereals), high post-harvest losses stemming from a lack of efficient quality storage facilities, poor rural transport, poorly developed systems of standard grades and measures, unreliable market information systems and limited access to finance. These market failures impact disproportionally on poor farmers who are excluded from high-value, post-harvest markets and instead are forced to sell their crop at times of peak supply for low prices.

Informed by the RNRRS research legacy, RIU Rwanda, headed by Augustin Mutijima, first piloted a warrantage programme in the main maize growing area of the country in 2010. To assess the potential of the system to enable small-holder farmers to secure more value for their crops than selling into inefficient, existing market channels at harvest. Over five maize harvests between January 2010 and June 2012, the RIU team proved the principles and potential value of the warrantage system enabling small-holder farmers to share more equitably in the value of their harvest. However, the RIU work had not looked at the commercial sustainability of the warrantage system beyond the end of RIU support. From this basis, H2O and senior RIU management developed a business model in which the warrantage system could be offered as a commercially viable service while still financially benefiting the client farmers. This resulted in the establishment of Sarura in 2012.

Sarura Commodities Limited, a private Rwandan company, entered the market in June 2012 offering the first ever commercial warrantage services to small-holder staple crop farmers. Warrantage is an inventory-credit financing, crop storage and trading system that addresses market inefficiencies allowing small-holder famers to share more equitably in the value of their crops. In response to demands from farmer cooperatives, Sarura also offers direct purchase of crops alongside the warrantage service.

In Harvest B 2012, Sarura secured deposits of over 300 tonnes (metric ton = 1,000kg) of beans (145 tonnes) and maize (158 tonnes) from 3 cooperatives (231 members) and Nyamig, a local business entity with 15 cooperatives as shareholders (4,025 members) in Eastern Province. The commodities were stored to high standards in a central Kigali warehouse allowing Sarura to sell the inventory at a significant premium over the initial harvest price to off-takers demanding high quality commodities.

Under the warrantage model, the farmers receive an initial payment when crops are deposited in the Sarura warehouse equivalent to 60% of the harvest value, and a second payment equivalent to 40% of the post-harvest sale value when the stored crops are sold to the off-taker. Under this system, we estimate that a farmer with an average crop of 200kg of beans and 750kg of maize would benefit from an additional approximately US$43 of profits through working with Sarura rather than selling their crop through existing channels at harvest; **a 42% increase in harvest profits.**

Sarura intends to expand its operations in Harvest A 2013, securing up to 1,000 tonnes of beans (600 tonnes) and maize (400 tonnes) while piloting a new mobile technology platform that will support the future expansion of the business as well as offering price transparency to farmers and cooperatives. This same platform will also allow Sarura to trace the impact of its business operations to individual clients. As a social enterprise, Sarura will work to internationally recognised DCED standards to quantify impact, primarily quantified as the increase in household income of its client farmers.

Sarura sees significant growth opportunities in expanding the inventory-financing warrantage model and has an ambitious growth plan. The intention over the next 5 years is to grow Sarura's storage capacity in Rwanda to over 30,000 tonnes generating revenues in excess of USD30 million per year, an EBITDA of over 19% and a Net Present Value of USD15.8m. Over this period Sarura will work with more than 345,000 farmers, unlocking financial returns of approximately USD7.5m in additional household income to its clients. The Net Present Impact of Sarura is estimated at USD10m[63].

To deliver this business, Sarura has assembled a highly experience management team, led by Augustin Mutijima, and other key field officers that worked on the pilot under the RIU Rwanda Country Programme. Additional expertise in warehouse management and commodity trading will be recruited as Sarura grows.

As a first-in class private sector entrant providing high quality grain handling, storage and trading services, Sarura is fully aligned with all the major agricultural initiatives implemented by the Rwanda Government. These strategies are aimed at advancing a mature, private enterprise-led, agricultural sector in Rwanda. The *Strategic Plan for the Transformation of Agriculture in Rwanda*, now at Phase III, is focused on the role of the private sector in agricultural development. The *Post-harvest Handling, Storage and Marketing Strategy* aims to develop an efficient post-harvest system driven by the private sector to ensure food security of staple crops. While the *Rwanda Rural and Agricultural Financial Services Strategy* is actively promoting increased access of small-holder famers to inventory credit financing.

Sarura has developed strong and supportive links with the Ministry of Agriculture ("MINAGRI") and Animal Resources and Ministry of Trade and Industry ("MINICOM"). Sarura continues to provide technical assistance viva the to the recently created public-private initiative, the Rwanda Grains and Cereals Corporation ("RGCC"), promote the emergence of structured, crop commodity markets in Rwanda established by MINICOM and MINAGRI to promote the emergence of structured, crop commodity markets in Rwanda.

The key lessons from the Sarura commercialisation activities are:

- *Importance of a commercial pilot*. The Harvest B activities, financed under the RIU Sarura Commercialisation resources, proved highly valuable in quantifying those key variables in Sarura's business plan. The operational experience was also essential in securing participation from WFP, other off-takers and the commercial banks necessary for growth from Harvest A 2013 onwards.
- *Debit financing opportunities*. Unlike Western markets, commercial banks (and associated government loan guarantee schemes) in Rwanda (and the region) are open to debit financing early stage operations. These financing opportunities include both working capital (e.g. inventory-credit facilities) and capital infrastructure (e.g. warehouse construction) requirements. Growth by debt offers an alternative to reliance on early stage risk equity financing.
- *Public sector distraction*. Sarura was invited by MINICOM to be a founding shareholder and effectively take over the running of RGCC. However, the complexities and restrictions imposed on the RGCC meant that Sarura was better placed to deliver impact by operating as a purely private entity. In retrospect, the involvement with RGCC set back the development of Sarura several months. Sarura continues to provide technical assistance to the RGCC but will look to secure grant financing to support this and other capacity building/knowledge transfer work with MINAGRI, in the future.

[63] Further details on our thinking on NPI as a meaningful indicator of impact – using Sarura as a worked example is prepared in Annex 13

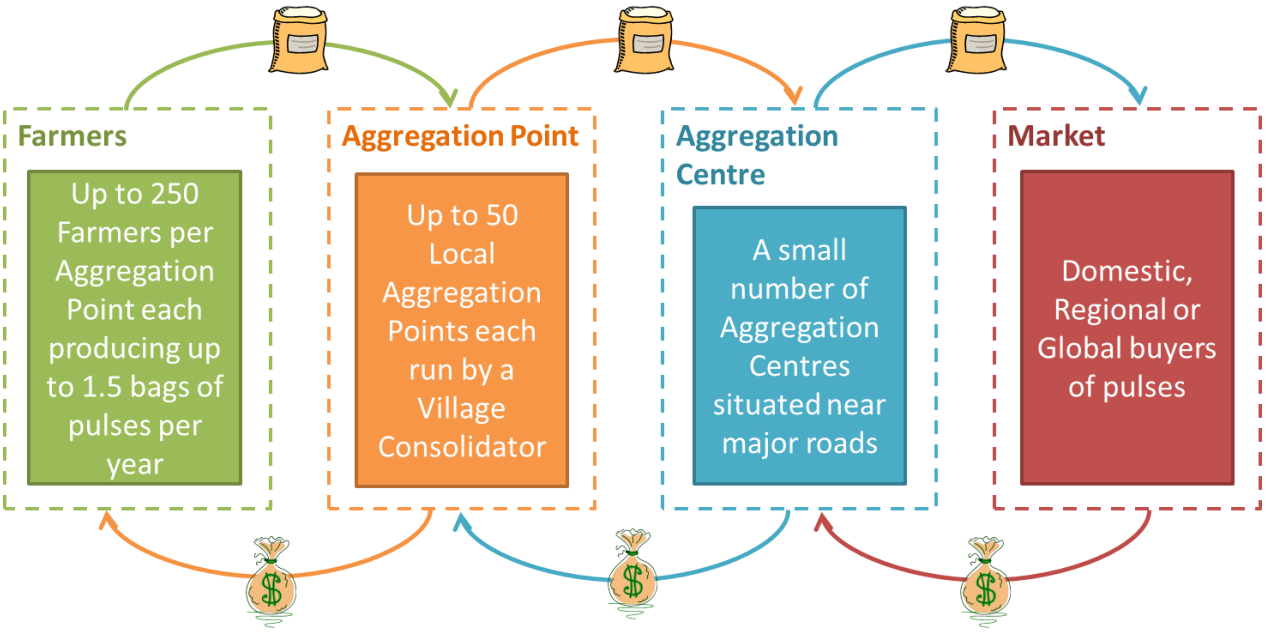
Mavuno Commodities

[64]Mavuno Commodities' vision is that smallholder producers of high nutrition, high value pulses will: improve productivity, thereby contributing to food security as well as generating surplus for sale; secure more direct access to competitive markets for their crops, thereby ensuring more equitable trade; and, enjoy increased household income. While the market for pulses is generally competitive, it is also significant and well diversified, and Mavuno believes that it can achieve its vision through an efficient network of village-based agents, who both provide subsidised inputs (including agronomic advisory, appropriate varieties, crop enhancement and crop protection products and services), and buy, consolidate and transport produce from smallholder farms to Mavuno facilities, which store and process, market and sell produce through proprietary channels.

The markets for the three target pulses (pigeonpea, green grams /mung bean and soy bean) are large and growing. There is a global trend of increasing pulse consumption stimulated by a decrease in meat consumption, an increase in vegetarianism and a growing awareness of the nutritional benefit of pulses. The demand from India, the largest global consumer of pulses, particularly pigeonpea, is also increasing due to the growing population and rising GDP.

Mavuno's business model is based on the FIPS-Africa Village Based Advisor (VBA) technology and the assumption that there is a domestic and global demand for high value pulses. It also assumes that by creating a market for farmers and providing access to improved inputs and services, the food security, nutrition and income of farmers and their families will be improved. The business model (shown in Figure 7 below) revolves around the consolidation of high value pulses from smallholder farmers through an adapted version of the VBA network.

Figure 7: *The Mavuno Business Model*



[64] Pulses off-taking, processing and trading prospect emerged from experience of Inputs Trading and Tubers Off-taking development, another business prospect that has since been dropped

Three high value pulses have so far been identified for inclusion in this model: Pigeonpea, Green Grams and Soy Bean, due to their suitability for production in East Africa and market demand. However there are a number of other high value pulses that could be considered for inclusion in the model. Diversification into multiple pulse crops which are harvested at different times and grown in different areas allows the business to operate more continuously, rather than only for a few months per year as would be the case if only one crop was being consolidated. Diversification also decreases the risk of total loss from disease or other factors and allows the model to benefit more farmers.

The majority of smallholder farmers grow some type of pulse, usually intercropped with maize or another cereal for their nitrogen fixing abilities. Although some of the pulses will be consumed on farm the rest may be sold, to other farmers, at local markets or to traders. However FIPS-Africa's experience and evidence from their data gathering have shown that farmers lack incentives to increase their production of pulses as they do not think there is a consistent high value market for them. They also view local consolidators and traders with distrust, and the market in general as volatile. The VBAs however are generally well trusted within their community and are a constant presence, so by using these individuals to consolidate from farmers Mavuno can encourage trust in the market and stimulate an increase in quantity and quality of pulses produced.

In this model VBAs are recruited from the current FIPS-Africa network to become independent Village Consolidators (VCs) who purchase pulses from up to 250 farmers in their local area. After harvesting the farmers are responsible for transporting the pulses to the VCs Aggregation Point; a simple lockable storage facility such as a rented room or shed. Consolidated produce is then regularly collected from the Aggregation Point by Mavuno so the product is not stored for long, reducing the risk of loss due to pests or theft.

The VCs may be trained to clean, grade and test the pulses for contaminants on delivery by the farmer; farmers are then paid on a scale according to the quality of the goods. This is a common system in East Africa, and provided the system is transparent to the farmer, can be a successful way to promote an increase in quality. The pulses are then collected and brought to a central Aggregation Centre which should be situated near a major road for ease of transport of larger quantities to buyers. The most efficient point (at the VCs Aggregation Point or the main Aggregation Centre) for the produce to be cleaned, sorted, graded and checked for contaminants is yet to be determined.

In this model VCs are paid commission, dependent on the quality and quantity of goods consolidated, as well as their ability to hit set targets. In this way the VCs are incentivised not only to consolidate high volumes of goods but also to increase the quality and quantity produced by farmers, as more is paid for higher quality graded goods. The higher price paid for improved grade pulses would also be passed on to the farmer, further stimulating an increase in quality.

There is also scope for further processing of the pulses into products such as dhal, however the largest market for most pulses is for the dry bean. The Mavuno business model is therefore focussing on sale of dry pulses rather than further processing, although this could be built into the business at a later stage if justified by the market demand.

Crop Bioscience Solutions opens first commercial tissue culture facility in Tanzania.

For African agriculture to be productive and contribute to national growth and poverty reduction African farmers need access to the latest high quality growing material. Agriculture in sub-Saharan Africa remains blighted by low productivity and often even that low level of production is under threat as improved communications facilitates the spread of new plant diseases which can be devastating to poor farmers struggling to produce food and income from small plots of land.

A key problem for these farmers is getting hold of clean planting material not already infected with viruses. One example is Cassava, a crop that feeds up to 600 million people in SSA but whose production is collapsing in many areas with the rapid spread of the cassava mosaic virus and cassava brown streak virus which infect plants and drastically reduce yields causing losses of between $ 1.9-2.7 billion per year. These viruses have become so widespread that finding new disease free planting material has become impossible for many farmers.

New Tissue culture Facility fitted with programmed climate controlled growth room with hardening off screen houses in the distance

However a combination of improved diagnostics and tissue culture propagation has enabled researchers to identify and produce new disease free lines of cassava that are also resistant to the disease to help farmers replant with clean productive stock. However the challenge remains to propagate this new clean material quickly so it can be distributed to the hundreds of thousands of growers in Africa. To date Tanzania lacked the capacity to mass propagate tissue cultured plants on the scale needed.

To meet this challenge Crop Bioscience Solutions has just opened its new commercial plant tissue culture facility at its laboratory in Arusha. It will now play a key role in the mass propagation of disease free cassava as part of 5G cassava project, a Gates Funded project lead by IITA.

New variety of Bananas being mass propagated at CBS

The facility will also produce tissue culture propagated plants of other species such as banana or sweet potato in which tissue culture is used to multiply new plants with better agronomic characteristics, higher yield or of higher value as well as being disease free. The CBS director Mr Mushobozi said “this new facility for the first time gives Tanzania the ability to take better varieties of crops developed anywhere in the world and mass propagate them for the use of Tanzania’s farmers”.

CBS already has contracts for banana multiplication which is underway to implement a World Bank ASARECA initiative to revitalise banana production in Tanzania.

The CBS facility built with assistance from the DFID RIU programme is one of the most advanced commercial biotechnology facilities in East Africa. Its early success in winning contracts for tissue culture from organisations such as Gates and ASARECA gives it a solid sustainable, financial base for its operations and services. Besides disseminating new varieties it will also be active in programmes of disease diagnostics services, production of bio-fertilizers and farmer training in new production systems and variety evaluation.

The CBS facility besides working to control plant diseases is also undertaking the production of new environmentally safe biological pesticides for controlling crop pests such as African Armyworm, another first in Tanzania and East Africa.

3.6.4 Review and reflection on the sustainability of the innovation services selected, nurtured and mentored during the extension phase

As stated previously the RIU has provided a testing filtering system in nurturing and incubating potential business options. It is pertinent at this point to bring activities up to date at the point of closure of the RIU Programme. Whilst this filtering process brought some options to a close – it is important to note that all the options explored are still sustainable. Some have been able to reach their potential under the RIU and some have yet to see that potential realised. Table 20 below provides an update and reference for further details.

Table 20 *Sustainability of the innovation services nurtured and incubated by RIU during the extension phase*

Innovative Services	State of play at end of the RIU (December 2012)
Warehouse receipts – warrantage, Rwanda	Considerable success story under the RIU leading to establishment of Rwanda Grains and Cereals Corporation (with the RIU team providing the interim management team). Sarura Commodities Limited, a private Rwandan company, entered the market in June 2012 offering the first ever commercial warrantage services to small-holder staple crop farmers (staffed by some of the original RIU Rwanda team). An ambitious business plan has been prepared and the Net Present Impact of Sarura is estimated at US$10m. Short summary on Sarura provided above and end of project report from the Rwanda Country Programme is provided in Annex 8.
FIPS – Africa	FIPS remains a highly effective organisation and as observed during the KIT evaluation, the Village-Based Advisers network generates impact at household level very quickly. RIU assisted FIPS build its management competence and this has led to FIPS securing USAID funding to continue its activities. Under the RIU three possible commercial ventures arising from the FIPS approach were explored – one on pulses (Mavuno Commodities) is progressing well and will be taken to market for external financing in Spring 2013. Short summary on Mavuno provided above.
Shujaaz	Shujaaz won the International Digital Emmy Award in 2012 and is now an established highly innovative communication activity with cult status and a core audience of 1.2m young Kenyans. Options to expand regionally exist but there is still much to be achieved within Kenya. Other donors and indeed the Government of Kenya now fully aware of the potential of Shujaaz in its various forms (comic, radio, social media etc.). Current application in with DFID Research and Uptake for expand on work started under RIU. End of project report provided in Annex 11. The 2012 production **JongoLove** is a drama on syndicated FM radio, Facebook, Youtube and in comics that we

	spun out of ShujaazFM - last year's Emmy winner. This project was funded by Tupange - a Gates Foundation funded reproductive health project focused on urban youth in Kenya. A clip explaining how it works at http://www.youtube.com/watch?v=haONhJVCIzo&feature=youtu.be. The decision on the 2013 award will be known on 8th April 2013. Shujaaz comic also being used as a medium, playing a crucial role in preventing violence during the current elections in Kenya .
Armyworm control	Successful use of high science funded through BBSRC, field tested under the RNRRS and taken further under the RIU. Leading to Crop Bioscience Solutions (CBS) the first commercial tissue culture facility in Tanzania. The armyworm control work is just one strand of a wider suite of crop protection activities. This diversity gives stronger foundations for sustainability and CBS is already attracting other donor monies e.g. BMGF and becoming a training facility for government extension personnel. On armyworm control specifically, there was no outbreak in 2012 so the technology could not be tried at scale. But already in 2013 there are major outbreaks in Zambia and Zimbabwe and this is expected to be seen in Tanzania and Kenya also.
Control of sleeping sickness	The RIU moulded the evidence base, much generated under the RNRRS, into a compelling case that sleeping sickness could be significantly controlled if not eradicated. This needed a military style campaign of mass treatment of cattle but it was not going to happen under "traditional" donor funding mechanism. It needed an innovative financing mechanism which delivered monies up front to undertake the mass treatment. This led to linkage with Social Finance and a feasibility study is currently nearing completion which will feed into a business case for DFID funding. It is important to state here in terms of sustainability, this novel approach that RIU has trail blazed could also impact more widely on funding disease control in Africa moving away from dependence on unsustainable publicly funded programmes towards private investment in disease elimination.
Improved storage of cowpea	The technology proved to be highly successful although difficult to develop a sustainable business plan given longevity of the real triple bags but also the element of "copy-cat" bags entering the system. What has also become evident in recent months – whilst the technology has been successful in significantly reducing crop post-harvest losses, the eggs of the weevils are not destroyed by lack of oxygen during the bagging process and the weevil life cycle is reactivated once the bags are opened. An additional piece of work (research or commercial) is required to address this issue. A proposal has been developed by the Nigeria RIU team and this is currently seeking funding.

Biological control (Real IPM)	The RIU funding saw the first registrations of biological control agents in Ghana – a relatively unsexy but fundamentally important step in the process. The length of time registering products in cocoa is lengthy because of the required approval and field trials by CRIG (Cocoa Research institute of Ghana). However a major step in this process has been achieved, in that both the Metarhizium products and the Trichoderma product have been registered in Ghana on other crops and a precedent has been set. The extension of label to cocoa from pineapple (Trichoderma) and Papaya (Metarhizium) to cocoa is not such a great leap!
Indigenous poultry (Tanzania)	The Kukudeal initiative was very promising but during the commercial mentoring stage it become evident that the business strategy was not fit for purpose. The actual business idea, indigenous poultry production, has considerable merit and in many ways the rapid expansion of the RIU activities from one to many pilot areas meant it was a victim of its own success. What was needed was a further investment of public funding to resolve key issues within the value chain – the RIU funding continued to allow development of key policy related documents which were well received. This initiative has now received funding US$1.2m from USDA through Catholic Relief Services (CRS) to implement a similar project on chicken but piloting on egg production in two districts.
Aquashops	As with the indigenous poultry work in Tanzania – the concept of aquashops is a good one but it took a considerable amount of time to establish each aquashop and there was a minimal margin on each aquashop as a commercial venture. By the end of the RIU funding, 6 entrepreneurs had been taken through the intensive training programme which was not a sufficient critical mass to make a sound business judgement. Hence it remains a good idea but needs more time. It was also being considered to have an aquashop as part of a wider Sidai enterprise offering a broader range of services and inputs to farmers. This is work still in development.
Client oriented breeding – seed delivery, Asia	The purpose of the extension phase was to provide guidance and advice to two new commercial seed companies arising from the COB work – Global Agri-Tech Nepal (GATE), originating from the NGO FORWARD and Anamolbiu, originating from the NGO LI-BIRD. In terms of sustainability, for GATE this would appear to be very positive (not least as GATE is the second commercial venture from FORWARD, the first failed and the lessons have been learnt). In the case of Anamolbiu, the future is less clear cut. Both companies were given a management review by way of an exit strategy from the RIU which provided both with a series of recommendations towards successful business attainment. Both companies are starting to trade in vegetable seed as opposed to just rice – this was seen as a positive move in terms of diversification and hopefully, sustainability.

3.6.5 Kigali Pilot Programme

The aim of the one-year Kigali Pilot Programme was to test a new model of social enterprise creation in a hotbed of past agricultural research funded by DFID and others. Learning from the experiences from earlier RIU activities, appreciating the challenges of getting research into use at scale, the approach here proactively sought to identify outstanding social needs capable of being addressed through commercial delivery of products or services, and invests the skills of experienced entrepreneurs in the development of the social enterprises to do so. By taking enterprises from raw idea to a well-developed, ambitious business plan and management team, this process can secure private sector investment and the highest quality management needed to establish and scale the businesses. The process therefore has the potential to develop large scale social enterprises that deliver substantial social impact at a large multiple to the public money required to conduct the initial development.

The major challenge to this approach in the region is a lack of experienced entrepreneurship needed to develop ambitious but deliverable business plans. The Kigali pilot sought to address this gap by recruiting a team of (inexperienced) entrepreneurial business development managers (BDMs) and mentoring them intensively via highly experienced entrepreneurs from the UK in order to: (i) create scalable social enterprises in the agricultural sector targeting poverty alleviation amongst smallholder farmers; and (ii) provide local entrepreneurs with the skills and experience to embark on a career in social entrepreneurship.

Preparation for the Kigali pilot programme began in January 2012, leading to the recruitment of a full time country manager in March and the recruitment of a full time business development team and establishment of an office and support operations in June. A small intern programme was also run over the summer 2012 for international MBA students exploring more wildcard business ideas. The active planning and development of new social enterprises has run over seven months to December 2012.

To date the pilot programme has reduced to practice a novel and much needed model for the development of social enterprises in the region. Six entrepreneurial staff (two female) have been recruited and mentored to conduct detailed research and development of eight social enterprise propositions. Six of these are being taken forward, with a provisional forecast Net Present Impact[65] in excess of $300 million, which would represent a 300-fold return on programme expenditure.

Selection of Projects

Opportunities to improve smallholder productivity and link surplus more effectively to market are undoubtedly abundant, due to a shortage of quality management and capital in the region. New enterprise opportunities were primarily sourced through extensive research with the relevant Rwandan government Departments and their various agencies, as well as non-governmental organisations active in the agricultural sector, in the six months prior to kick-off in June 2012.

A call was also made for ideas from the CGIAR, although given the time limited nature of the pilot this was only by email to Heads of Science, sponsored by the Consortium Office. This yielded some useful contacts in seed potato (CIP) and livestock (ILRI). Engagement from partnering academics has

[65] Forecast funds returned to targeted beneficiaries (principally smallholder farmers), net of costs to those beneficiaries, through the activities of the social enterprises now under development.

been good, and we are encouraged that greater effort over a longer period would build a strong pipeline of research outputs for a social enterprise development programme to commercialise.

Under the pilot programme we were also able to innovate around a more mature business developed within RIU. Market research in support of Sarura Commodities – a crop storage and warrantage business within the RIU portfolio – led also to the development a plan for an electronic trading platform use the customer base of Sarura as a test bed but has potentially much wider application (see FarmNet, below). We would expect the use of existing portfolio companies as inspiration for new enterprises to be a rich source of ideas in the future.

Enterprise Development Process

Conceptually, the new enterprise development process can be broken down into four broad stages, as follows.

Stage 1: Identification of the Market Need / Opportunity.

- Market landscaping to assess the market size and segmentation and to map the value chain.
- Identification of the potential value proposition(s): what are the areas of need and opportunities for innovation; who bears the cost; and what is the (relative) value ascribable to each opportunity – social and financial?
- This is also when some of the thinking develops about the broad shape of the potential enterprise: product / service; simple / complex; capital intensive / scalable and so-on.

Stage 2: Development of the Coarse-Scale Proposition

- This is the hypothesis generating phase, rapidly prototyping potential business models in spreadsheet form; simply rendered but holistic, to include:
- Inflows: what is the product /service sold; what is the addressable market size (i.e. who will buy it?); what is the market penetration rate (i.e. why will they buy it?); and what is the bearable price (i.e. what will they pay?)?
- Outflows are crudely modelled at first, tending to overestimation (e.g. assume overhead is 100% of wage bill).
- Parameters will be largely guesswork, but thereby directing research and focussing on the most influential assumptions first. Model builds in complexity as the research unpacks the simplifying assumptions made in the early models.

Stage 3: Engage with Potential Commercial Partners, Management

- This is initially a phase of hypothesis testing, where approaches to key partners suggested by the prototype business model (such as lead adopter customers, commercial partners, potential management and other experts) generates feedback on the form and value of the idea upon which the developer can iterate.
- The ultimate goal of these interactions is to identify, and ideally commit to Terms, key commercial partners, lead adopter customers and key management.

Stage 4: Completion of the Detailed Proposition with Partners & Management

- In collaboration with the management-in-waiting (who will have to own it, warrant it and deliver it); and the key commercial partners (who are great sources of market data, realistic timescales etc.)
- Working pro bono (wherever possible) with other professions to provide realistic budgets and timescales that they get to deliver against.

Pilot Enterprise

Given the relatively low and scalable costs of most agricultural enterprises, and the typically short business cycle, it is considered both feasible and desirable to run a pilot of each enterprise over a short period (say, six months) and at low cost (say, £50,000). There are obvious benefits to this approach: it should be designed to allow the key assumptions of the proposition to be tested, both regarding costs and markets; and it in so doing it will allow investors to initially risk small amounts of money, and later on larger amounts with greater confidence. Less obviously, a pilot phase is also a chance for the individual BDMs to take an easier intermediate step before the production of the 'million dollar' plan. Given the inexperience of the BDMs, this learning opportunity will be critical. However, this approach has had the unforeseen consequence of leading the BDMs to forecast the business over five years as percentage growth from the by definition decidedly unambitious pilot scale business, and it has proven important to maintain an ambitious, top-down view of the target market in year five.

Monitoring & Evaluation

The aim of the pilot has been to increase the wealth of poor families by: (i) increasing productivity through innovative technology and systems; (ii) developing value added processes post-harvest; and (iii) creating routes to (high value) markets for that production. That impact is partly prefigured by the starting focus of the projects and the provenance of any founding research. Thereafter, the primary aim is to achieve impact through the proper operation of the business, and its direct impact on household incomes. The individual projects will be developed in compliance with the M&E standard of the Donor Committee of Enterprise and Development (DCED). Appropriate baseline data will be generated. Evaluation will be principally by audit of the recorded and forecast financial returns to target beneficiaries. As this will be through operation of the social enterprises developed under the Programme, most of the necessary data required for evaluation will be generated in the course of normal business.

Enterprise Development

Three each of the BDM- and intern-led projects continue to be developed. The intention is to complete planning and raise funds for pilot programs in spring 2013. These projects are:

- *Mobile trading platform (FARMNET)*: Poor flow of market price information results in smallholder farmers being underpaid for their crops by middle men. In response, this project seeks to develop a mobile phone-based trading platform supported by a backbone of warehouses to aggregate and control quality of inventory, that connects large-off takers with strong M&E/CSR programme to a network of traceable smallholders
- *Lake Cage aquaculture*: Improving diets in the region is challenged by the crash in natural fisheries, one of the most important sources of protein. This project will work closely with

World Fish and the Rwandan Government to establish a demonstration enterprise producing tilapia commercially in an innovative high density lake-cage production system.

- *Horticulture*: Developing an in-grower/out-grower programme for the production of key horticultural crops currently imported into Rwanda and linking to high value domestic customers. Training smallholder's intensive, high quality production on our model far, and then supporting them financially and technically to produce for themselves.
- *Plant Health*: Only a small fraction of Rwanda's 3 million farmers get plant health advice from government extension services. This project partnering CABI to deliver plant health training package (legislated by Government) that Rwanda's 3,000 agro-dealers will pay for, in order that they can provide high quality advice on inputs and thereby gain customer confidence and secure more sales.
- Seed potato: Irish potato is a major staple in Rwanda, which is a major producer in the region. Working closely with CIP and the Rwandan government this project will aim to develop a first-in-class certified seed brand, to win the value argument with smallholder farmers who traditionally save seed and to stimulate the wider seed potato production market
- *Apiculture*: Creating a high value international brand around the smallholder honey production in the Virunga forest region, home of the endangered Western Mountain gorilla, together with government, WWF and FFI. Currently Virunga honey sells domestically for $2/kg but it is believed that it could be marketed for $50/kg on the international market thereby returning substantial additional revenue to farmers and reduce illegal economic activity in the forest.

Short summaries of these are provided in Annex 14.

Of the four BDM-led projects, one has been dropped. This was the livestock project led by the first BDM to leave and focussed on cattle. It was found that dairy is the subject of significant government and donor intervention. The national 'one cow one family' programme with substantial free inputs had generated significant market-distorting subsidies in milk production, and furthermore there had been large scale public investment in dairy processing. Beef also appears to be a challenging market in which to make a margin. Whilst the local Friesian crosses appear to have the potential to be thrifty beef cattle, cost of feed is an issue. In addition, in Rwanda male calves are at present a by-product of the subsidised one cow/one family programme and are not valued. As a result they are either slaughtered immediately or brought on in informal, extensive systems, and therefore market prices do not reflect the true cost of production. A feedlot approach system therefore seems uncompetitive at present.

Of the intern-led projects, the crop insurance research has been dropped. Our specific interest was in harvest insurance (as opposed to the more common input insurance). The opportunity was to work with Sarura (Warrantage business) to receive premiums in kind - based on the experience of Narayana Heart Hospital in Bangalore, India - that when premiums may be paid in-kind (through farmers cooperatives in Karnataka State) this led to substantially higher uptake of health insurance. However, our market research with smallholder farmers appeared to reveal a fundamentally problematical conception of insurance – principally a widely held view that insurance premiums should only be paid after loss has been incurred. Furthermore, crop harvest insurance products are

still under development and no insurer is currently offering them in the Rwandan market. A decision was taken to prioritise other projects, but with the potential to return to this at a later date.

What have we learnt?

Human capital. As anticipated, there is an acute shortage of experienced entrepreneurs, with a further deficit in the number of women. However, the recruitment process seems to have worked well with most staff performing well, exhibiting the raw entrepreneurial ability selected for and developing well under supervision. We are therefore encouraged that individuals with the basic skills are reasonably available in the region and can be developed to reach their potential.

Internship programme. At three months duration, the internship programme proved a cost effective means of progressing wild-card ideas. Shorter internships unlikely to be of use, however, which – for MBA students, at least - limits to either end of course internships or in the US to summer internships on two year courses. Interns from outside the region also introduced different perspectives and business skills to the country team.

Mentoring programme. This has been successful to date using spreadsheet-driven business development process which enables mentors and peers to understand and support the business planning process. Given the relatively low and scalable costs of agricultural enterprises, and the quick turnover, we have also found it possible to programme small-scale pilot plans for each enterprise under development, to give BDMs an intermediate step towards the full scale business plan and fundraising.

Deal sourcing. Founding ideas for the social enterprises developed during the pilot phase have been substantially driven by in-country research, including Government and NGO reports into market needs. Opportunities to improve smallholder productivity and link surplus more effectively to market are undoubtedly abundant, persisting due to a shortage of quality management and capital, and it is possible to start from these needs, and link back to research outputs through targeted technology scouting.

A limited call for ideas and technologies conducted through the CG network yielded some useful contacts in seed potato (CIP) and livestock (ILRI). Engagement from partnering academics has been good, and we are encouraged that greater effort over a longer period would build a strong pipeline of research outputs for a social enterprise development programme to commercialise.

We also anticipate substantial potential to innovate around primary business ideas. For example, market research in support of Sarura Commodities – a crop storage and warrantage business within the RIU portfolio – led also to the development a plan for an electronic trading platform use the customer base of Sarura as a test bed but has potentially much wider application (see FarmNet, below).

Full time, in-country presence. A full time Kigali office with local staff has been essential to produce detailed, on the ground market research in country. A research institute seeking to commercialise a technology in such a market would find it extremely challenging and expensive to do so remotely. By the same token, it is doubtful that a country office could effectively operate in another jurisdiction.

By way of a crude VFM comparison, the pilot programme has seen expenditure of £940,000 which has covered the establishment of a country office and other start-up costs, intensive mentoring and the development of six business prospects to a stage that are close to being taken to market, all in one year. Using these figures, a crude calculation indicates that to get each business concept to a marketable stage costs just under £160,000.

The official figures from the UK for 2010-2011 saw a total of 268 spin-outs from 163 publicly-funded UK Higher Educational Institutions (HEIs); an average of 1.6 spin-outs per institutions per year.

Source: Higher Education – Business and Community Interaction Survey, 2010-11, HEFCE (http://www.hefce.ac.uk/pubs/year/2012/201218/).

More detailed knowledge of two of the best-resourced, well established, leading HEIs (Universities of Oxford and Edinburgh) see 2-4 spinouts per year, with staffing levels of over 60 professionals in each.

The total public support to University technology transfer in 2010-2011 was around £170m (£150m to English HEIs, ~£3m to Northern Ireland, ~£10m in Scotland and ~£6m in Wales) so simplistically this equates to £630,000 per spinout. It is of course accepted that this may include licensing etc. but this makes for an interesting comparison.

3.6.6 Financing and implementing neglected tropical disease control

This activity sought to take the good science base and make something happen. What needs to be done is known but this will not happen by way of normal development practice. The challenge to tackle was of financing the scale up and long term delivery of effective neglected disease control interventions, where markets will not deliver intervention thus to attract investment funding when proof of value is reached.

In the case of the RIU work on control of sleeping sickness there is now a very compelling case for SOS[66] (see below) and work has commenced to develop and trial an IFFM[67]/GAVI[68]-type bond mechanism for neglected diseases.

The evidence base developed under DFID and RIU Funding: Stamp out Sleeping Sickness (SoS) – Lessons learnt and funding regimes

The RIU funded SoS programme is a clear exemplar of the often-complex pathways needed to transform research findings (generated over many years – see Figure 8 below) into practical benefits for poor people

Sleeping sickness is a fatal disease if left untreated and is endemic to Uganda; its distribution is however restricted to underdeveloped rural settings that provide favourable environments for the disease vector, the tsetse fly. The people affected by this disease live in isolated areas with little access to health services giving rise to uncomfortable facts surrounding this disease. It is important to recognise that WHO incidence data for sleeping sickness are based on reported cases; in an African setting, cases that do not reach a hospital (often for the simple reason that poor people are unable to afford treatment) are not reported. For example, in SE Uganda for every death reported, 12 deaths remain unreported; the ratio of unreported cases is about 7 unreported to 10 reported so about 60% of cases are reported[69]. This disease also impacts disproportionately on health services in rural areas; during an outbreak of sleeping sickness in Serere, Uganda, *T. b. rhodesiense* cases consumed 30% of in-patient time in the local health centre and that mortality due to unreported cases was shown to be the major contributor to the health burden placed on the local population[70]. Sleeping sickness is endemic in Uganda but in times of social unrest can give rise to horrendous epidemics, three of which took place in the 20th C with hundreds of thousands of deaths.

Controlling sleeping sickness in Uganda presents an unusual problem for health professionals as this is a zoonotic disease; in fact the main reservoir of disease is not the human population but rather in their domestic livestock. Until recently, measuring the extent of the domestic animal reservoir was not possible as cattle may also be infected with non-human infective *T. b. brucei*, indistinguishable from *T. b. rhodesiense* by microscopy. With the identification of a molecular marker (SRA gene) for *T. b. rhodesiense*, differentiation of parasites in animals became possible[71] and field surveys revealed

[66] Stamp Out Sleeping sickness
[67] International Finance Facility for Immunisation
[68] Global Alliance for Vaccines and Immunisation
[69] Odiit, M., Coleman, P.G., Liu, W.C., McDermott, J.J., Fèvre, E.M., Welburn, S.C., Woolhouse, M.E., 2005. Quantifying the level of under-detection of Trypanosoma brucei rhodesiense sleeping sickness cases. Trop. Med. Int. Health 10, 840–849.
[70] Fèvre, E.M., Odiit, M., Coleman, P.G., Woolhouse, M.E., Welburn, S.C., 2008. Estimating the burden of rhodesiense sleeping sickness during an outbreak in Serere, eastern Uganda. BMC Public Health 8, 96.
[71] Welburn, S.C., Picozzi, K., Fèvre, E.M., Coleman, P.G., Odiit, M., Carrington, M., Maudlin, I., 2001. Identification of human-infective trypanosomes in animal reservoir of sleeping sickness in Uganda by means of serum-resistance-associated (SRA) gene. Lancet 358, 2017–2019.

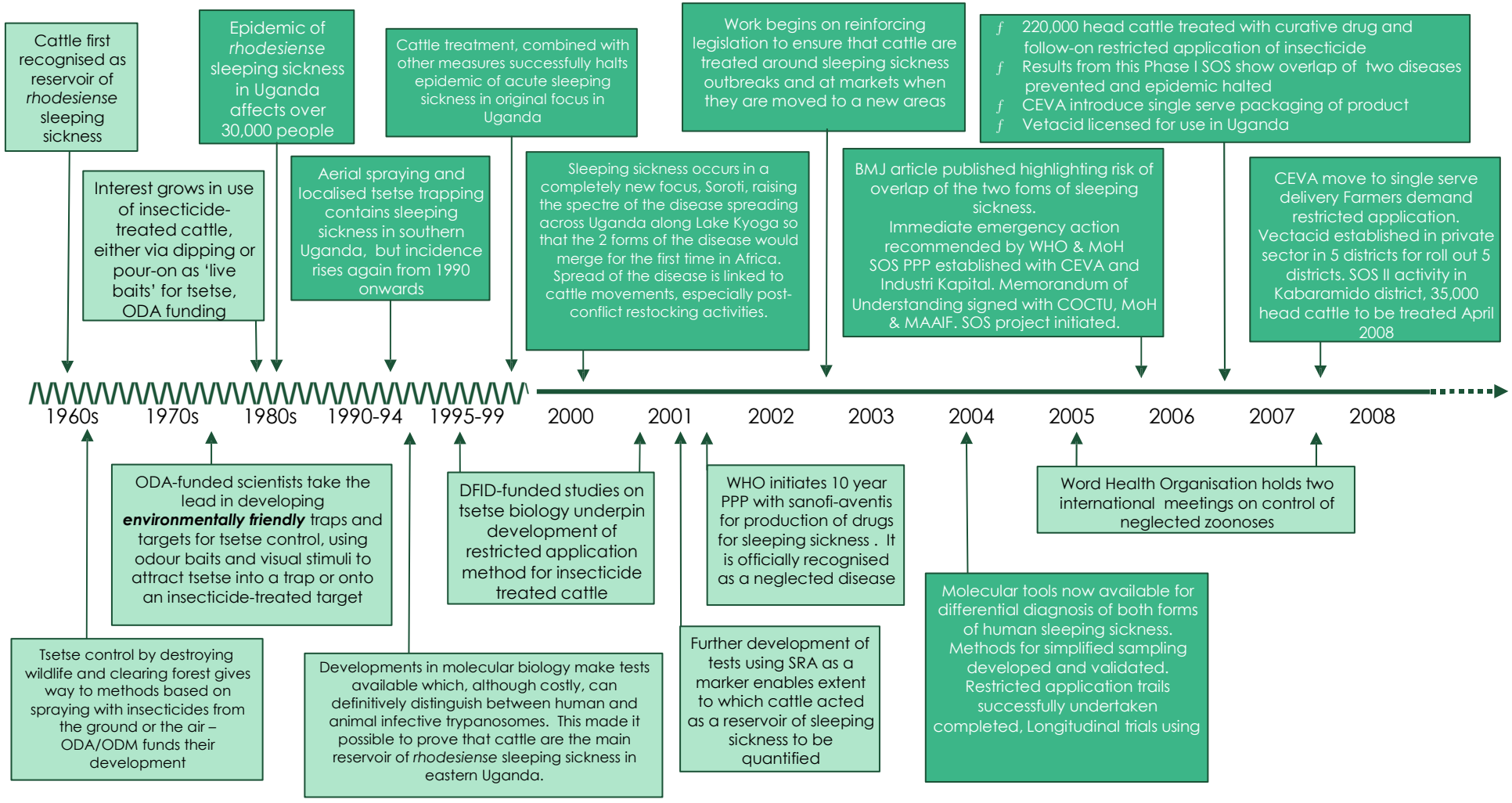


Figure 8 Tsetse Research Timeline

Activities specifically affecting southern Uganda and the control of rhodesiense sleeping sickness

Scientific advances and general activities relating to T&T and zoonoses control

that the domestic animal reservoir was the primary source of human infective trypanosomes for tsetse, with up to 40% of cattle carrying *T. b. rhodesiense* in SE Uganda.

It follows that simply treating infected humans will not control *T. b. rhodesiense* sleeping sickness in Uganda. In this situation, active surveillance and treatment are not sufficient to control the disease as flies will constantly re-infect people by passing on parasites from infected livestock. All approaches to controlling *T. b. rhodesiense* sleeping sickness must therefore revolve around a significant animal reservoir. This means interrupting the fly–animal–human cycle and in practice some form of tsetse control must be involved. The use of ground-sprayed insecticides controlled sleeping sickness epidemics in the late 20th C but these spraying operations were logistically complex, labour intensive and hence costly but fell out of favour largely because of concerns about the environmental damage caused by the use of organochlorine insecticides such as DDT. However research funded by DFID had shown that tsetse are attracted to the odour of cattle and that by simply treating cattle with new formulations of synthetic pyrethroids, treating cattle became a practical proposition for tsetse control. The main drawback to the universal adoption by farmers in Africa of cattle as live bait for tsetse/tick control was the cost of insecticides, especially of 'pour-on' formulations. WHO[72] have indicated that unless we develop new technologies and apply tools we know can work, then we will 'open the door for the re-emergence of the disease'. Researchers funded by DFID have responded to this challenge and have shown that effective control of tsetse could be achieved by treating only the body regions where most tsetse land: the belly and lower legs of cattle in a herd[73] . This 'restricted application' technique reduced the costs of treatment by 90%. Restricted application not only reduced costs but also reduced environmental risks. The 'restricted application' technique has an added bonus in that it also controls tick-borne diseases – a significant benefit for livestock keepers in Uganda.

As sleeping sickness is a fatal disease of normally low prevalence, it should and can be eliminated from Uganda if we put to use the effective tools developed by this ground-breaking research funded by DFID. Tsetse populations are, however, extremely resilient; as few as a dozen female flies, with enough males for insemination, will ensure that the population will not be eliminated without further control efforts. It is necessary to either (i) kill all of the flies in the initial onslaught using, for instance, protracted ground or aerial spraying operations or (ii) maintain an adult mortality of at least 3.5% per day, using techniques such as insecticide-treated cattle, until sampling confirms elimination[74]. Moreover, concurrent treatments with trypanocides offer animal health benefits unrelated to sleeping sickness, presenting an inducement to farmers to treat their animals. Most importantly, it has been calculated that treating livestock to control *T. b. rhodesiense* sleeping sickness, the *cost per DALY averted can actually be negative* because treating cattle will increase income from livestock and the trypanocidal drugs used on cattle will also remove the animal reservoir of disease.[75]

[72] Simarro, P.P., Cecchi, G., Franco, J.R., Paone, M., Fèvre, E.M., Diary, A., Postigo, J.A., Mattioli, R.C., Jannin, J.G., 2011b. Risk for human African trypanosomiasis, Central Africa, 2000–2009. Emerg. Infect. Dis. 17, 2322–2324.

[73] Torr, S.J., Maudlin, I., Vale, G.A., 2007. Less is more: restricted application of insecticide to cattle to improve the cost and efficacy of tsetse control. Med. Vet. Entomol. 21, 53–64.

[74] Hargrove, J.W., 2005. Extinction probabilities and times to extinction for populations of tsetse flies Glossina spp. (Diptera: Glossinidae) subjected to various control measures. Bull. Entomol. Res. 95, 13–21.

[75] Shaw, A.P.M., 2004. Economics of trypanosomiasis. In: Maudlin, I., Holmes, P.H., Miles, M.A. (Eds.), The Trypanosomiases, CABI Publishing, Wallingford, pp. 369–402.

The use of insecticide-treated cattle to control tsetse has been a game-changing innovation as it puts disease control into the hands of farmers themselves; tsetse control is no longer the sole preserve of government- or donor-funded, large-scale, operations using costly technology such as aerial spraying but can be in the hands of smaller scale private or public/private enterprises and is therefore far more likely to be sustainable. Restricted application technology has brought tsetse control within the reach of poor farmers in Africa at a cost of around $US 2 cents/animal/treatment. This approach can also be used to control sleeping sickness; a Public Private Partnership (The Stamp Out Sleeping Sickness campaign: http://www.stampoutsleepingsickness.com/) was set up in Uganda[76] in response to an emergency situation arising in a number of districts in Northern Uganda to control the northward spread of *T. b. rhodesiense* sleeping sickness. By promoting the restricted application technique combined with trypanocidal drugs to control sleeping sickness, this RIU funded partnership has also improved veterinary services in a very deprived area of Uganda and provided livelihood opportunities for young veterinarians.[77]

The privatisation of sleeping sickness control would have been unthinkable a decade ago, but with the introduction of insecticide-treated cattle, this is now a viable option and RIU has been developing innovative funding options social investment bonds. By linking return-on-investment payments to impact, investors in the bonds can be re-imbursed in relation to the primary outcome measure based on reduction in prevalence of human infective parasite in the cattle population. A further interest payment to investors will be linked to independent verification of a sustained reduction in human infective parasite prevalence in cattle in subsequent years relative to the baseline prevalence. The socio-economic and epidemiological work undertaken through DFID-RNRSS provides an analytical framework for linking change in human infective parasite prevalence in cattle to a reduction in DALYs and an increase in animal productivity (expressed in dollars). Putting this funding approach into practice in Uganda will provide a sustainable approach to controlling on this fatal disease and lead to its elimination. **Moreover this novel approach being trail blazed by RIU could also impact more widely on funding disease control in Africa moving away from dependence on unsustainable publicly funded programmes towards private investment in disease elimination.**

To date, the first full model of the payment structure of the sleeping sickness development impact partnership (DIP) linked to the outputs of the epidemiological model of sleeping sickness control has been prepared and submission to DFID of proposal for the pre-implementation phase of the DIP. This work is still on-going with promising developments and ever increasing interest in the approach but further reporting falls outside the scope of this report.

[76] Kabasa, J.D., 2007. Public–private partnership works to stamp out sleeping sickness in Uganda. Trends Parasitol. 23, 91–92.

[77] Waiswa, C., Kabasa, J.D., 2010. Experiences with an in-training community service model in the control of zoonotic sleeping sickness in Uganda. J. Vet. Med. Educ. 37, 276–281.

3.7 Summary to December 2012

There is substantial unmet need for the development of ambitious social enterprises in the East Africa region[78]. Institutions, NGOs and individual local entrepreneurs lack the skills and experience either to source commercialisable outputs from the (international) research base, or to build large-scale investible businesses. On the other side of the transaction, venture capital in the region (much of it donor-supported) lacks high quality investment opportunities. The result is large gaps in these developing economies - market failures that prevent the poor from growing the value of their smallholder and household enterprises.

During the 6 year programme, RIU has explored a number of 'Push' and 'Pull' mechanisms for the translation of agricultural development research into sustainable businesses benefiting poor people. The aim has been to translate research outputs into commercial products and services that improve smallholder productivity and help farmers to access markets for their surplus production and so trade themselves out of poverty.

The ability of push mechanisms to achieve these aims was quickly rejected. Pure push mechanisms start with the individual research output and work to have it put into practice, and specifically with regard to RIU's interests, to see it applied profitably through commercial enterprise. Classically, this is the role of the Technology Transfer Offices (TTOs) of Universities and other research institutions, but TTOs are characterised by poor insight into market needs, a very partial view of the best solutions (as each institution is focused on promoting their in-house research), and a lack of entrepreneurial expertise in any specific sector.

Pull mechanisms have more promise. The 'poster child' of the pull mechanism is the 'x-prize' model[79] that poses a very specific need and invites teams to deliver the best solution, with the winners receiving a cash prize, contract or other financial inducement. Such an approach has the advantage that it is agnostic as to the solution, and therefore likely to secure a better solution than a technology push approach. However, like push mechanisms, it relies on technology adopters – be that established corporations or entrepreneurial management teams - to self-organise to address the challenge. In developing economies, this is a fundamental weakness.[80]

We have identified the lack of technology adopters as the key market failure preventing adoption of research outputs, whether driven by classic push or pull mechanisms.

A New Approach: Pull-through

A new, much more pro-active programme of research translation pull mechanism is required; one which can start from deep insight to need, but then has the technical and entrepreneurial resources to reach down into the research base – in principle globally - for the best solutions and then spin

[78] This reflects the work undertaken by the RIU – whilst much need undoubtedly exists elsewhere on the African continent the focus of the concept here relates specifically to East Africa.

[79] See http://www.xprize.org

[80] The RIU "Best Bets" initiative operated a pull process aimed at existing agricultural companies in East Africa with grant funding as a prize. Whilst this was an important step change in getting research into use it became clear that RIU had limited influence over the quality and strategic vision of the incumbent senior executive teams of these companies, significantly restricting the scale of social impact that could be delivered through the programme. Further details can be found in Clark, N., Frost, A., Maudlin, I. and Ward, A. (in press) Technology Development Assistance to Low Income Country Agriculture: Putting Research into Use (RIU)

them out into intensively mentored start-up enterprises. To distinguish this from classic pull mechanisms, we call this pull-*through*. Table 21 summarises the limitations of classic push and pull mechanisms, contrasted with the pull-through. It is this pull-through that has been successfully piloted under the RIU in Rwanda.

Table 21 *Limitations of classic push & pull mechanisms leading to pull-through model.*

	PUSH	PULL	'PULL-THROUGH'
Social Need	The TTOs of global research institutions have little or no insight into developing country market needs.	X-prize style pull mechanisms tend to have narrowly pre-defined needs; thus risk that solutions identified are not broadly applicable to the real world, and so not commercially sustainable.	Starting point is broadly defined market sectors and needs, the active business development process develops these ideas organically, through detailed market research, in order that they effectively and sensitively address the real market needs.
Technical Solution	Research institution TTOs are tasked to promote their own narrow research output, rather than seek the best of all possible technical solutions.	X-prize style pull mechanisms are in principle solution agnostic. However, they rely on others to effectively source the best of all possible solutions, and also cannot pull through great technologies that do not narrowly address the pre-defined need.	Engages pro-actively and systematically with all research partners for identification of research outputs, without prescribing the specific needs and solutions, but rather responding opportunistically to those with greatest potential impact.
Entrepreneurial Capacity	Lack of entrepreneurial managers needed to self-organise to deliver the solution in the region.	Lack of entrepreneurial managers needed to self-organise to deliver the solution in the region.	Acts as the interim entrepreneurial management to develop a compelling business proposition through to the point where best management and capital can be secured. In the long run the approach trains cadres of local entrepreneurial management.

4. Internalising social impact performance (Impact Evaluation)

RIU was established to get research into use and to see how to do it in bringing about meaningful developmental impact for the benefit of poor people – whether this is economic, social or otherwise. Considerable emphasis was placed on Monitoring, Evaluation and Learning (MIL) within the RIU and it was mandated that this function should be independent. DFID guidelines for Research Programme Consortia are quite clear: that powerful lessons need to be learnt from its research and that innovative ways of measuring impact are important. The MTR was critical of the initial work programme in this area and brought about changes yet the Independent Review also failed to address this issue properly; the key question – VFM - was avoided by both exercises.

The extension phase gave the RIU an opportunity to address this to fill the gap not covered by the previous evaluation exercise and to position the RIU and indeed DFID as a thought leader in this important field of private sector-delivered impact evaluation. The concepts and practical experiences of harnessing the private sector as an engine for delivering development outcomes are new. As such, the consensus methodologies for evaluating social impact and value for money of public investment in this approach have yet to be fully developed. The difficulties encountered to date in evaluating the RIU programme since its adoption of a more private-sector approach reflect this. The additional resources allowed development of a tailor-made plan for evaluation which identifies the appropriate outcome measures and specifically addresses the potential of commercially sustainable businesses to deliver social impact into the future, beyond the end of the donor-funded programme from which the businesses were generated. Uniquely the evaluation framework can be deployed for the retrospective analysis of the RIU programme but also used prospectively, and so form an integral component of the impact business being developed.

Working with KIT [81] in direct partnership[82] with RIU management the study aims were two-fold:

- Draw generic insights from innovative approaches used by RIU to bring about durable change in agricultural systems to inform comparable future interventions aimed at agricultural innovation for rural development.
- Assess the sustainability and value for money of the interventions by RIU in innovation system improvement and support to private sector driven change

The following section draws upon this work [83] concentrating on attempting to address the VFM question and taking forward the thinking on agricultural innovation.

[81] Royal Tropical Institute, the Netherlands – who were involved in the latter part of the original RIU coordinating the excellent write-shop exercise to capture the institutional histories of the RIU country programmes in Tanzania, Rwanda and Zambia

[82] Whilst KIT will be independent from RIU management it is proposed that the working relationship is much tighter to ensure delivery

[83] Gildemacher, P. and R. Mur. 2012. Bringing new ideas into practice; experiments with agricultural innovation. Learning from Research Into Use in Africa (2). KIT Publishers. Amsterdam
Three versions of the report are available: Full report as
http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Learning_from_RIU_in_Africa_book2.pdf
Short 4-page overview as http://www.dfid.gov.uk/r4d/pdf/outputs/ResearchIntoUse/Learning_from_RIU_in_Africa_leaflet.pdf

4.1 Can we demonstrate the RIU was value for Money?

A major question that KIT was tasked with answering, under their impact assessment, was whether the Africa component of the RIU made a measureable contribution to agricultural development that could be considered value for money. This was no easy task given the nature of the RIU and the relatively short time scales involved for some of the funded activities. The resultant analysis must be treated with some caution. The selection of the cases was not random but focussed on drawing lessons regarding impact as a result of promoting agricultural innovation. The five case studies only form a sub-set of the RIU portfolio in Africa but cannot be regarded as indicative of the whole programme.

Profit & Loss projections for an "average" farmer working independently ("Baseline") or with Sarura. Production costs of a farmer growing a 200 kg of beans and 750 kg of maize are based on Government of Rwanda figures. We assume that under the Baseline scenario were a farmer sells through existing channels, the price at harvest for beans is 250,000 RWF per MT and maize is 180,000 RWF per MT. The analysis shows that an average farmer would see a 42% increase in household income, equivalent to ~25,500 RWF (~$43) by working with Sarura rather than selling directly at harvest through existing channels (the Baseline scenario).

The results are very positive given the short time scales involved (two years for some cases). Two of the case studies, the cowpea work in Nigeria and the VBAs in Kenya, showed 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. Both resulted in current household level impact and are likely to continue household level impact in the future. In the case of the Maize work in Rwanda, any impact was somewhat obscured by the strong general trend towards intensified maize production as a result of the Rwanda Crop Intensification Programme. The inventory credit scheme shows much promise and it is fully expected that impact at household level will be realised within 18 months. In fact this has already been realised as the data from the 2012 harvest have now been analysed (this date was not available at the time of the KIT study). A 42% increase in household income is expected by working with SARURA as opposed to selling directly at harvest via existing channels. The case of the cowpea work in Nigeria is covered in Box 5 below[84].

In the case of armyworm control no household impact could be demonstrated. In part this was due to the lack of an armyworm outbreak in early 2012 and that no change could yet be detected in decision making by producers with regard to controlling armyworm. But there is a positive outlook and the capacity to be aware of and indeed, to control armyworms infestations has improved which holds the promise of future household level impact[85].

[84] Figures relate to Kano State only. The RIU actually invested £263,897 on the cowpea platform work in Nigeria covering work in Bauchi, Gombe, Jigawa, Kaduna, Kano and Katsina states; this also covered sensitization workshops in 5 other state. The figure of £310,000 cited in the summary table in the KIT report relates to the budget allocation for the RIU cowpea work.

[85] At the time of writing this report serious armyworm outbreaks have already be observed in Zambia and Zimbabwe and there is every indication that 2013 will see a severe outbreak of armyworm infestation

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. As a result it has failed to deliver household impact to date and it is unlikely to do so in the future. This result was not unexpected – the work on the pig platform in Malawi was stopped early as management were not convinced that this activity was going to deliver impact nor VFM. There were many instances where management took this decision for the good of the programme. It was somewhat frustrating therefore during the independent review to be criticised for such actions[86]. It is very much hoped that other RIU funded activities will be evaluated further at some point in the future.

Looking at the results obtained in the five case studies, there is cautious optimism about the results obtained to date and the prospect of accumulating future impact. Table 22 below shows the interventions together have cost £1.78m, invested roughly over a period of two years, in six countries. The investment has resulted in two case studies (Cowpea in Nigeria and VBAs in Kenya) with current and future household level impact, another (maize platform in Rwanda) where prospects were seen as very good (subsequent analysis proves this has already happened). Another (armyworm control) which is an immature activity, where evaluation came too early, but potential remains high and one (pig platform in Malawi), which has had minimal results.

Table 22 *Summary of results from the five RIU case studies (KIT/RIU, 2012)*

Case	RIU investment (£)	Major Results	Current household impact	Future household impact	Capacity to innovate
VBA Best Bet	554,349	• Measureable income improvement • Food security improvement • Improved research-extension-farmer linkages • Alternative agric. Service provision system at scale	+	+	+
Armyworm Control Best Bet	517,273	• Community based forecasting adopted within Ministries • Improved public extension/local Government linkages • Change in perception of role of producers in agric. Services • State of the art private biotech laboratory built, equipped, staffed	-	+/-	-
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 established • Inventory credit system piloted • Improved maize production popularised	-	+	+
Cowpea Platform, Nigeria	310,000	• Approach adopted by National Agriculture Research Council • Triple bagging technology popularise and commercialised • Multi-purpose, Striga resistant varieties popularised • Improved fodder bailing technology developed and promoted	+	+	+/-

Table 22 also summarises the findings of the KIT study in terms of the capacity to innovate. The RIU was not a conventional programme that simply aimed to maximise the development return on public investment made. Besides the assessment of contribution to household level impact an evaluation was also made on the contribution made to improving the speed and efficiency of emergence of improved practices in agriculture, termed here as the capacity to innovate, as an

[86] As a way of addressing this criticism, the pig platform work was selected as a case study for the KIT study. On hindsight this was no bad thing as this allowed the proposed new model for agricultural innovation (see Figure 9 below) to encompass an RIU activity which did not yield a positive return on investment.

indicator of how successful the RIU activities were. In the case of the VBAs, this showed improved capacity to innovate as FIPS functions as a specific body that scouts for relevant technical and marketable practices that could be useful to agricultural producers and tests these promising practices. For the armyworm control best bet there was less evidence of an improved capacity to innovate but new relationships have been established between public extension, local administration and farmers which can form a framework on which further improvements in pest and disease control can be made. The maize platform work in Rwanda did improve the capacity to innovate contributing to improved relationships between maize producers, small traders, advisory service providers, district administration and public extension officers. The cowpea platform work in Nigeria succeeded in embedding a stakeholder interaction approach in the ARCN strategy. Whilst the RIU work was most active at state level and less so at grassroots level it has been effective in achieving technology transfer at scale, it has focussed less on building mechanisms for more effective experimentation with new practices.

Box 5 Cowpea work in Kano State (Nigeria), the total RIU investment to establish cowpea IP was £169,000 of which:

- 13% invested in the formation and facilitation of the cowpea value chain platform activities. The platform was set-up by RIU as a multi-stakeholder[1] to promote relevant research from the RNRRS and Capacity of the stakeholders enhanced by creating mechanisms to disseminate relevant research, training and extension, creating new institutional arrangements linking input & service suppliers to producers and financial services
- 22% spent on increasing on-farm productivity of cowpea via promoting widespread adoption and cultivation of medium-maturing high yielding and *Striga* resistant varieties of cowpeas. Varieties were introduced by RIU to representatives of farmer associations and then contact were facilitated between farmers and two seed companies – this led to packaging of 2kg instead of 5Kg which were much more affordable. As a result 10.2 metric tonnes of seed (worth £5m) were acquired by 380,000 farmers – enough to cultivate 547,200 ha of arable land – leading to 307,000 metric tonnes of cowpea grains (valued at £13m) and 80,000 metric tonnes of fodder (valued at £1.8m)
- 45% spent on promoting an improved method of cowpea storage (triple bagging). The research concept originated from Purdue University in the US with funding from BMGF and the RIU partnered IITA in taking the work from pilot to scale using village-based sensitisation workshops conducted by 120 trained field extension agents (six ADP[1] desk officers and 14 bag dealers were also trained) in the process. In Kano State alone, 200 villages covering approximately 100,000 farmers were reached directly with these workshops. The RIU purchased 5,100 triple bags for use by field extension staff during these workshops. Nearly three quarters of the project communities subsequently used the technology (a zero return was observed in a control group). This allowed 62% of the project producers to delay sale of their grains by 4-6 months post-harvest thereby taking advantage of higher prices in the off-season (an increase of around £47 per 100 Kg bag when compared to sale at harvest);
- 20% spent on developing, field testing and promoting improved management and use of cowpea fodder. An agricultural equipment fabrication company was engaged to develop, produce, review and test-run a fodder compactor using a design developed under an RNRRS project to produce 5kg and 9kg bales which are easy for farmers and merchants to transport. The unit cost of the compactor was £250 fitting into the required start-up capital range for individual entrepreneurs in Nigeria.

To calculate the financial value for money on the RIU investment in Kano State, data from a total of 10,000 adopters were used (this covered 1,000, 3,000 and 6,000 in years 1, 2 and 3 of RIU's investment period 2009 – 2012). The net income per hectare for year 1 was calculated by subtracting the costs of production (plus any loans, fixed costs) from the operating revenue (sales of cowpea grains and fodder). Total net income is the product of the net income per hectare, the average farm size (1.44 ha) and the number of adopters for the year. For realistic comparisons, the same estimates were generated for a control group. In addition to sales of cowpea grains, years 2 and 3 also included sales of fodder and value of prevented post-harvest losses as a result of using triple bag storage. The figures are presented in the table below using two scenarios – the first based on current (actual) adoption rates and the second based on a spin-off to other producers at 15%.

Table of RIU investment & estimated financial impact related to the Cowpea Value Chain IP – Kano, Nigeria

£	Year 1 2009/2010	Year 2 2010/2011	Year 3 2011/2012	Year 4 2012/2013	Year 5 2013/2014	Year 6 2014/2105
RIU investment	42,748	68,889	57,363	-	-	-
Scenario 1 Impact actual adoption	55,509	166,679	333,358			
Scenario 2 Impact: Predicted linear adoption 15%	-	-	-	383,361	440,865	506,995

Under the first scenario, the rate of return to adopters was £3.29 for every £1 invested by RIU in establishing and supporting the cowpea innovation platform

4.2 Agricultural Innovation

Reference was made earlier in the report about the enormous amounts of literature on the subject of an innovation system as applied to agriculture in poor countries which is well summarised in the KIT bulletin[87] which features RIU activities from Rwanda, Tanzania, Nigeria and Zambia. It is not the intention here to review the theory but to show how this debate has been taken forward as a result of the RIU. It is also noteworthy to refer to the RIU discussion paper series[88] (Annex 7) as an output from the CRT which used RIU activities as a basis for thoughtful discussion on innovation thinking.

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 promoted a shift towards innovation system thinking (Hall et.al., 2001; Spielman, et.al. 2009) which focuses on the interaction between diverse groups, including the private sector (Biggs, 2007)[89]. 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 bring about change on a larger scale. The description by Rogers (1995, 2003) of diffusion of innovation[90] has been criticised for being over-simplistic with the assumption that diffusion of innovation is an autonomous process which happens on its own. However, it does present an idea of how innovation gets to scale. The current discussion on innovation focuses upon how to facilitate the process of innovation and its uniqueness in each environment. What is lacking is a vision of how to use promising practices that have been proven in one environment in an effective manner to realise change on a larger scale.

Under the RIU extension, work undertaken by KIT on five RIU case studies indicates that it makes sense, without resorting to linear transfer of technology thinking, to distinguish three different processes in agricultural innovation:

Needs and Opportunity Identification: This is the basis of the process of agricultural innovation with the objective of a needs and opportunity assessment being to identify entry points for innovation. These entry points can come from multiple sources, farmers, private entrepreneurs, researchers or others and form the basis for the next step, experimentation

Experimentation: During this process, entry points are tested and adapted under real circumstances. This can focus on farming technologies but also on new market relations, services etc. The objective is to arrive at tried and tested promising new practices that can be brought into routine use.

Bringing Into Routine Use: This is the process of ensuring that tried and tested practices reach their full potential, underestimating the importance of this process has been a pitfall which has hampered learning from and replicating successful experiences.

[87] Putting heads together. Agricultural innovation platforms in practice (2011) KIT Bulletin 396 Nederlof, S., Wongtschowski, M. and van der Lee, F. (Eds) ISBN 978 94 6022 1835 which features work from RIU in Rwanda, Tanzania, Nigeria and Zambia

[88] The work undertaken by the Central Research Team explored the RIU activities and prepared a series of 29 discussion papers; many of these are reference in this narrative (full list of discussion papers and links to full text provided in Annex 7

[89] This was not new – the innovation systems approach was tested during the RNRRS, most notably in the Crop Post-Harvest Programme which subsequently formed a foundation of the original thinking within the RIU.

[90] As stated in the introduction, this was an instrumental text behind the thinking in DFID at the time the RIU was being designed.

This analysis of the five RIU case studies suggests an alternative model for the process of agricultural innovation. Whilst it is accepted that this is a simplistic two-dimensional diagram (see Figure 9) does not capture the complex reality and dynamics of the innovation process, it is hoped that this assists in decision making for future investments of public (donor and national government) funds to stimulate agricultural innovation for impact at scale.

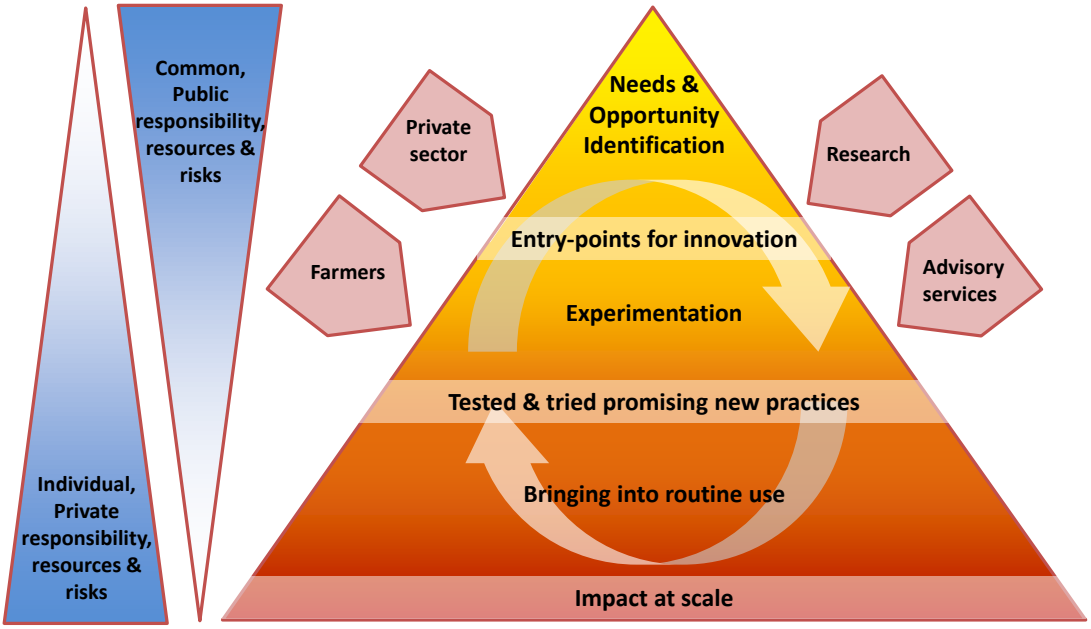


Figure 9 *The deliberate process of agricultural innovation for impact at scale (KIT/RIU, 2012).*

Adopting this model it is now possible to overlay the five RIU case studies (see Figure 10 below)

Taking the Rwanda maize platform, needs and identification was a two-stage process. First the RIU chose maize in Nyagatare as its subject, next the platform served as the mechanism for needs and identification – this was not a one-off process as new opportunities came along throughout the life of the platform. In terms of experimentation, this came from a variety of entry points as new farming practices and new varieties were put to the test. Different financial services were also tested. Experimentation was the main area of focus and some results had been brought into routine use at the time of the assessment. Since then however things have progressed apace – the establishment of Sarura, the maize inventory credit system and NYAMIG means routine use is now forming the basis for larger-scale interventions. This example shows a transition through the agricultural innovation process to impact at scale.

Other case studies were different. For example, the cowpea platform in Nigeria was committed to bringing into routine use tested and proven technology. It successful brought dual-purpose varieties and triple bagging into routine use, taking pilot success from experimentation (that had happened elsewhere) to scale. Somewhat similar applies for the SpexNPV armyworm control project however this is an immature technology that has not yet reached routine use.

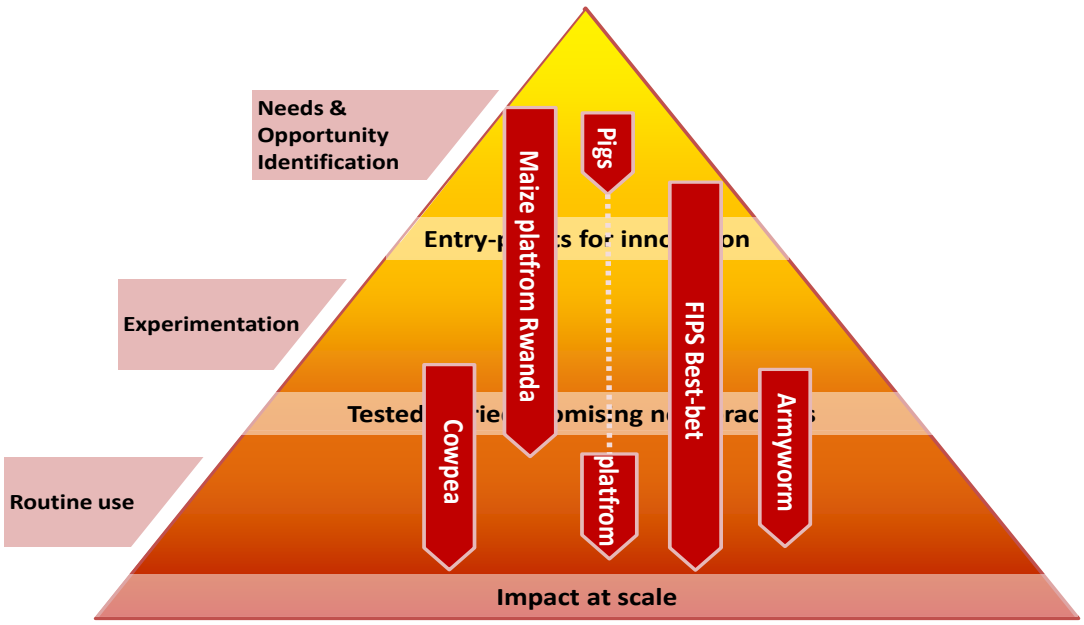


***Figure 10**: Position of the Five Cases in the Process of Agricultural Innovation*

FIPS provides an interesting case. As an organisation it carries on a continuous search for new inputs and farming practices from multiple sources – traditional farming practices, private input industry and research – to be tried by their VBAs and farmers. But there is no specific consultation for assessing needs of producers. What makes the FIPS VBA approach different from that of a platform approach is that the responsibility of gathering ideas and opinions rests with FIPS, there is no direct cross fertilisation of ideas. In the next stage, two levels of experimentation are observed, the first with the combined advisory service provision and input supply through the VBAs as an alternative to the poorly functioning input supply and extension services. Secondly, FIPS experiments with new agricultural practices and inputs. The third area is really what the VBA was all about – intended to bring tested and proven technologies into routine use e.g. soil tillage technology and several improved varieties.

The pig platform was selected to counter some of the criticism from the Independent Review that closing activities early prevented lesson learning. The pig platform was closed early as it was not demonstrating VFM – the analysis here provides an interesting insight. Livestock was selected as the main sector as promising, with particular opportunities for improvement in the marketing system. The platform identified one activity, the development of local slaughtering and marketing facilities. Beyond this the platform did not continue to play any part in identifying continued entry points. The platform focussed completely on building these facilities so no other experimentation occurred. The platform decided too early that a physical slaughterhouse and marketplace would be the solution for marketing problems. It may have been better to assess marketing constraints with stakeholders and if a slaughterhouse and marketplace were considered the best solution, to build one to specifications of the private sector and test its functionality. The platform was not successful in achieving impact at scale.

Different stakeholders have different roles within the agricultural innovation process which are summarised in Table 23 below. Research organisations are important but more so at the front end

of the processes whereas the private sector and farmers themselves have an important role to play throughout.

Table 23: *The role of different stakeholder groups in the agricultural innovation process*

Role of different stakeholder groups

Stakeholder Group	Needs/Opportunity Identification	Experimentation	Bringing into routine use
Research Organisations	✓	✓	
Public sector	✓	✓	
Private sector*	✓	✓	✓
Producers	✓	✓	✓

* Defined here as agri-business, trade, wholesale, processing and retail

The process of facilitation or brokering was an important activity which the RIU brought into play and this function is key at all stages in the agricultural innovation process.

Implications for policy and practice

Next to an 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 if not greater importance. The RIU experience would suggest that any future intervention programme should invest in assuring impact at scale while and simultaneously investing in the capacity to innovate.

Seeking a direct linear relationship 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. Hence 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 RIU work acknowledges the importance of three interrelated processes that underlie agricultural innovation: needs and opportunity identification, experimentation, and bringing into routine use. Focusing on only one or two of these does not necessarily mean no impact can be achieved, however it does assume that the other functions are taken care of.

5 Closing Summary

To place RIU in context, we need to reflect on the wider context of agricultural development in low income countries. Despite the great advances made by the green revolution the present status of such countries is still dire and this is despite over 50 years of funding on the part of international agricultural science. For DFID, the immediate issue in 2005 was concern that significant sums of public money spent in one of their flagship programmes (RNRRS) were not apparently achieving much in development impact terms. Thus it proved hard to identify examples where the target communities, low income farmers in LICs, were benefitting. In our view the issue that DFID had identified is really an example of a wider structural problem that of knowledge market inefficiency, a market failure. By this we mean that 'supply of' and 'demand for' scientific information does not normally correspond. There is a mis-match and so knowledge markets remain inefficient and (often considerable) waste can occur. In turn this also means that science funding despite decades of attempted reform, continues to be driven by criteria that place a low premium on how this knowledge contributes to social welfare.

The DFID response was a very practical one, to facilitate practical application of its (previously funded) research and to achieve better understanding of how this facilitation might be improved. The impetus derived from the apparent failure of technologies derived from previous RNRRS research to be actually adopted in practice, despite successful project completion in a purely scientific sense (i.e. in published papers and associated documents). The RIU work, primarily from its Best Bets initiative and some aspects of the country programmes in Africa (and not forgetting some important lessons from the Asia ICF) all pointed to private sector involvement to promote longer term sustainability, once public aid support has ceased; the rationale was that donor aid is necessary to cover the risks associated with pre-competitive social costs of technology development but often acts as a disincentive to longer-term entrepreneurship. A major working hypothesis therefore was that technology development needs a further impetus from private sector players since research outputs have usually remained 'on the shelf' in the absence of further support. Since at the start of the programme it proved hard to identify examples of 'knowledge use', RIU explored different mechanisms to facilitate greater use. On the basis of the RIU cases, it is clear that 'putting research into use' is by no means something that occurs spontaneously. But this does not mean that DFID past research has been a wasted effort. Far from it; we have shown (albeit on a small scale initially) that given the right networks and environment, much valuable research can be put to use in the developing world. In the context of agriculture in low income countries, it is a complex process that needs to operate and be managed as a necessary development activity. And since public resources are involved this means developmental aid. There is therefore a continued need for support to related science and technology activity. However, on the basis of the Best Bets and other RIU commercialisation experiences we do not believe that bilateral agencies such as DFID should continue traditional funding patterns at current levels i.e. allocating research grants then standing back. Rather what is needed is investment on a sustainable basis that ensures this knowledge is actually put into developmental use. Within the RIU we have applied a hands-on operating approach; rather like a 'private equity' firm seeking value for its investors the programme sought value for DFID investments in research. When this environment was established then successful outcomes were seen.

What this implies for the wider science policy agenda is a subject for further analysis. Certainly the conventional approach usually results in research-based knowledge remaining 'on shelves' and contribute only marginally to development. Part of the problem is clearly a lack of the business skills needed to establish innovative ventures. But public support to alleviate commercial risks still requires complementary input from the scientific community. RIU work supports the current UK moves to integrate research council activities with overseas aid and is probably the right way to go. But it will need a pattern of appropriate incentives that encourages scientists not only to undertake applications engineering research but also to link more closely to other bodies involved in practical development, including finance and private enterprise. If this is too much for scientific bodies to accept at once DFID could continue to fund cognate RIU activity on an experimental basis until such time as this more systemic approach become more widely accepted. It is our firm belief that a policy shift along these lines will create better 'value for money'. In other words it will improve the efficiency of the knowledge market in the context of low income country development.

Andy Frost

28th February 2013