African Journal of Agricultural and Resource Economics Volume 8 Number 3 pages 81-100

Principles, design and processes of integrated agricultural research for development: experiences and lessons from LKPLS under the SSACP

R Buruchara*
International Centre for Tropical Agriculture (CIAT), Kenya. E-mail: r.buruchara@cgiar.org

J Tukahirwa
World Agroforestry Centre (ICRAF), Kampala, Uganda. E-mail: j.Tukahirwa@cgiar.org

I Kashaija
National Agricultural Research Organisation (NARO), Entebbe, Uganda. E-mail: inkashaija@gmail.com

A Farrow
GeAgrofía, Wageningen, The Netherlands. E-mail: andrewfarrow72@gmail.com

C Wanjiku
International Centre for Tropical Agriculture (CIAT), Kigali, Rwanda. E-mail: w.chiuri@cgiar.org

KPC Rao
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Nairobi, Kenya. E-mail: k.p.rao@cgiar.org

W Adekunle
FARA, Accra, Ghana. E-mail: aadenkule@fara-africa.org

F Kwesiga
African Development Bank, Lusaka. E-mail: f.kwesiga@afdb.org

MJG Majaliwa
Makerere University, College of Agricultural and Environmental Sciences, Kampala, Uganda. E-mail: majaliwam@hotmail.com

SO Nyamwaro
Kenya Agricultural Research Institute (KARI), Muguga North, Kikuyu, Uganda. E-mail: snyamwaro344@gmail.com

R Kalibwani
Kyambogo University, Kampala, Uganda. E-mail: rmkalibwani@yahoo.com

MM Tenywa
Makerere University, College of Agricultural and Environmental Sciences, Kampala, Uganda. E-mail: tenywamakooma@yahoo.com

L Lunze
INERA, Kinshasa, Democratic Republic of Congo. E-mail: llunze@yahoo.com

J Mugabo
Rwanda Agricultural Board (RAB), Muzanse, Rwanda. E-mail: mugabojosa@yahoo.com

R Njeru
Agro-innovations International. E-mail: ceo.agroinnovations@gmail.com

P Sanginga
IDRC, Nairobi, Kenya. E-mail: psanginga@idrc.ca

S Mapatano
Diobass, Bukavu, Democratic Republic of Congo. E-mail: Mapatano_s@yahoo.fr

B Musana
Rwanda Agricultural Board (RAB), Muzanse, Rwanda. E-mail: bmusana@yahoo.fr

C Ngabayisonga
Rwanda Agricultural Board (RAB), Kigali, Rwanda. E-mail: c.ngaboyisonga@yahoo.com

F Murorunkwere
Rwanda Agricultural Board (RAB), Muzanse, Rwanda. E-mail: Francoise_murorunkwere@yahoo.fr

L Bahiga
Diobass, Goma, Democratic Republic of Congo. E-mail: leblancbahiga@hotmail.com

M Ramazani
Diobass, Goma, Democratic Republic of Congo. E-mail: michoramazani@yahoo.fr

B Wimba
INERA, Bukavu, Democratic Republic of Congo. E-mail: wimbabenj@yahoo.fr

P Pali
Private consultant. E-mail: pnpali@yahoo.com

J Njuki
Care International, Dar es Salaam, Tanzania. E-mail: jnjuki@care.org

S Mutabazi
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Entebbe, Uganda. E-mail: Sundaymutabazi@yahoo.co.uk

R Kamugisha
World Agroforestry Centre (ICRAF), Kampala, Uganda. E-mail: r.kamugisha@cgiar.org/ rkamu2000@yahoo.co.uk

B Fungo
National Agricultural Research Organisation (NARO), Mukono, Uganda. E-mail: bfungo1@yahoo.com/ bfungo@forest.mak.ac.ug

M Kuule
National Agricultural Research Organisation (NARO), KAZARDI, Kabale, Uganda. E-mail: kuulemathew435@googlemail.com

*Corresponding author

Abstract

With increasing recognition holding the promise of overcoming the outstanding problems faced by African agriculture, IAR4D faces the danger of being 'blurred' by past approaches and falling short of its potential to deliver the desired impacts in diverse multi-stakeholder, biophysical, socio-

economic, cultural, technological and market contexts unless its actualisation and working is clearly understood. In this paper, we present the conceptualisation and principles of and knowledge-based experiences and lessons from the implementation of the sub-Saharan Africa Challenge Programme (SSACP) in the Lake Kivu Pilot Learning Site (LKPLS). The presentation covers the formation and facilitation of IPs for the actualisation of IAR4D to evolve mechanisms for the early recognition of interlinked issues in natural resource management, productivity and value addition technologies, markets, gender and policy arrangements. These have autonomously triggered flexible, locally directed interactions to innovate options from within or outside their environment for resolving the challenges, and have moved along a new institutional and technological change trajectory. Emerging lessons point to the endowment of IP members with self-help knowledge interactions, training in IAR4D, quality of facilitation and research to be key determinants of the power behind of self-regulating mechanisms.

Keywords: IAR4D; self-organising; central processing unit; sub-Saharan Africa Challenge Programme (SSACP)

1. Introduction

Over the past four decades or so, a number of innovative approaches have been conceived to try to address the complexity of agricultural systems challenges in sub-Saharan Africa (SSA), which have been well documented in the literature (e.g. see Irz & Roe 2000). These include the Farming Systems Approach (FSR), Farmer Participatory Research (FPR), Rapid Appraisal of Agricultural Knowledge Systems (RAAKS), the Sustainable Livelihoods Approach (SLA), and Integrated Natural Resources Management (INRM) (Bunch 1986; Norman *et al*. 1994; Norman & Matlon 2000; Schiere *et al*. 2000). These field-based experiences offered more space for innovations for agricultural research and extension through the participation of local communities and by building upon the traditional or indigenous knowledge that they hold (Edquist 2001).

While these approaches have made useful contributions, the foci of some have largely addressed single or a few constraints and have focused on technological interventions, with less emphasis on the integration of sociological, market and policy aspects. As a result, these approaches have been inadequate in addressing the multiple scales and interactions, networks and feedbacks within and between physical and social subsystems (Campbell *et al*. 2001). It is becoming increasing clear that agricultural innovation is not just about adopting new technologies, but about finding adequately flexible and responsive capacity to resolve interlinked issues revolving around markets, productivity, natural resource management and policy affecting farmers' production (Adjei-Nsiah *et al*. 2008; World Bank 2008).

In view of the above, there have been discussions that have expressed the need to address the shortcomings of the previous approaches, while building on their advantages and strengths. An approach that combines elements of previous participatory approaches in a holistic manner is Agricultural Research for Development (ARD) (Spielman 2005), which was re-defined by a (stakeholder consultative) workshop of the Forum for Agricultural Research in Africa (FARA), in 2003, to cater for the integration and more active involvement of actors in different domains. This thinking renamed the approach as Integrated Agricultural Research for Development (IAR4D), with an emphasis on utilising synergies from linkages among stakeholders (FARA 2009a).

2. Conceptual Framework

Integrated Agricultural Research for Development is viewed as one of the superior evolutionary participatory approaches and involves actors who integrate technological, policy and institutional components that respond to changing market and policy conditions. The integrated components provide production technologies, agricultural marketing services, and social and institutional solutions that achieve broad and multiple objectives, including poverty alleviation, environmental protection, social and gender equality (Spielman, 2005). The strength of the IAR4D concept lies in its ability to capture policy and market aspects, in addition to fostering systemic linkages and communication between actors in diverse contexts that have a stake in the process of generating, disseminating and using knowledge for social impacts (Kaufmann 2007).

This approach is a three-phased process that is flexible, pragmatic and iterative. It guides interdisciplinary and inter-institutional teams to jointly identify complex rural development problems faced by producers, traders and rural service providers, analyse the causes and effects in the ecological, social and economic contexts in order to identify the elements of the system that are associated with the problems to be addressed, identify and analyse strategies for solving them, and formulate action plans and implement them. Hence, for IAR4D to be effective, it requires the following components (FARA 2007: 59):

- An interdisciplinary and inter-institutional research/guiding/enabling team composed of researchers and extensionists of relevant disciplines and from different institutions to handle multifaceted development challenges.
- A platform for relevant stakeholders (clients and beneficiaries) that allows for their active participation and the integration of their perspectives in the identification and evaluation of innovations within the issues posing broader challenges.
- Change in institutional policy, management and culture, with an emphasis on having a clear policy on and strategy for the implementation of IAR4D, and developing and nurturing the human resources needed and the appropriate incentives to promote IAR4D.

Central to IAR4D is the concept of innovation platforms (IPs) – forums that bring together different stakeholders (e.g. farmers, researchers, extension/advisory services, private sector or agri-businesses such as processors, traders and transporters, policy makers and civil society organisations) in agriculture to handle critical development challenges or opportunities, based on mutual interest, comparative advantage and synergies, and institutional commitments.

3. The Sub-Saharan Africa Challenge Programme – A Platform for Testing IAR4D

The Sub-Saharan Africa Challenge Programme (SSACP), a continent-wide agricultural research programme coordinated by FARA, was designed to serve as a platform for forging strong and lasting synergistic partnerships and/or alliances between agricultural research and development stakeholders in the production-to-consumption value chains. An outcome of an extensive stakeholder consultation process, the SSACP was meant to bridge the research-to-development gap by introducing, testing, refining and scaling up IAR4D (FARA 2007). Its research focus entailed catalysing institutional innovations to add value to on-going agricultural research through IAR4D (FARA 2009a).

The SSACP was initially designed as a large-scale action research and capacity-building project to test, generate and disseminate best practices through IAR4D. Three carefully selected pilot learning sites (PLSs), one in each of Africa's three sub-regions [the Kano-Katsina-Maradi (KKM) site in

Western Africa, the Zimbabwe-Mozambique-Malawi (ZMM) site in Southern Africa and the Lake Kivu Pilot Learning site (LKPLS) in Eastern and Central Africa], were used as testing grounds for the IAR4D approach. Research under the SSACP was structured and conducted in two phases: inception and implementation.

The inception phase focused on the selection of PLSs, establishing governance and management structures, publicising the programme and forming learning teams, validating priorities and entry points, and formulating a portfolio of IAR4D projects selected through a competitive grant scheme process. By the end of the inception phase, the first external review by the CGIAR Science Council (SC) was undertaken. The review looked at the research design and the type of goods – the international public goods (IPGs) and regional public goods (RPGs) that the SSACP could likely generate – and proposed that the SSACP should first address the three questions listed below by demonstrating 'a proof of concept' of IAR4D. The questions are:

a. Does the IAR4D concept work and can it generate deliverable national, regional and international public goods for the end users?
b. Does the IAR4D framework deliver more benefits to end users than conventional approaches (had the conventional R&D and extension approach had access to the same resources)?
c. How sustainable and usable is the IAR4D approach outside the test environment (i.e. issues of scaling out for broader impact)?

The SSACP research was to be conducted at two levels: the project level, where research teams (task forces) were to test the effectiveness of innovation systems approaches at the PLS to address broad entry points and contribute to the generation of knowledge by applying innovation systems; and programme wide, where observations/results from the PLS-level research were to be combined and synthesised to extract patterns across the pilot learning sites.

The second phase of the SSACP involved the implementation of the research. This was undertaken in the three PLSs, and this paper discussed the broad experiences and lessons learnt in the LKPLS, and serves as an introduction to the follow-up papers in this issue.

4. The Lake Kivu Pilot Learning Site

The LKPLS (Figure 1) covers approximately 20 000 km^2 in the triangle where northwestern Rwanda, the eastern DRC and southwestern Uganda meet. The area covers the administrative districts of Kabale, Kisoro, Ntungamo and Rukungiri in Uganda, all or parts of the provinces of Byumba, Gisenyi, Gitarama, Kibuye and Musanze in Rwanda, and the territories of Goma, Rutshuru, Masisi and Minova in eastern DRC. The human population within the LKPLS is estimated at between 10 and 12 million, with more than two thirds living below the poverty line and more than 90% deriving livelihood from smallholder agriculture and livestock farming. The terrain of the LKPLS is dominated by hills and valleys, with most slopes ranging from 12 to 50% but some as steep as 80%.

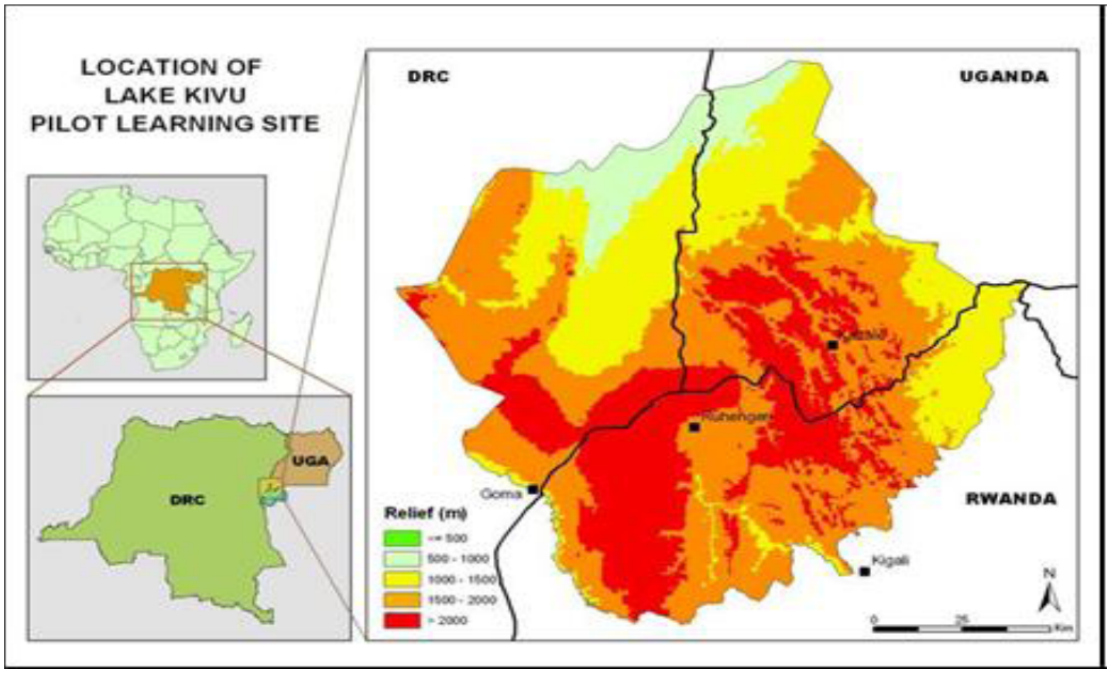

Figure 1: Location of the Lake Kivu Pilot Learning Site

The LKPLS is characterised by deep, young volcanic soils (andosols) that rapidly absorb rainfall, leading to water shortages. Various crop and livestock disorders – such as banana wilt, late blight of potatoes, nutrient (N, P) deficiency, bean root rot and East Coast fever – curtail the full expression of the genetic potential of the available crop varieties and animal breeds. In addition, there are large differences in the sophistication of seed and input supply systems. Because of the complex causes of poor yields and their far-reaching effects, and the poor market linkages, no simple intervention is expected to overcome yield limitations and uplift households from poverty.

The LKPLS area is also uniquely endowed with several globally important conservation areas, namely the Bwindi National Park (Uganda) and the Virunga Volcanoes Park, which is shared by the DRC, Rwanda and Uganda. A mixture of 'buffer strip' and 'buffer zone' approaches are presently used around the different nature reserves. The area offers strong potential for agricultural growth, but its resource base is rapidly degrading, resulting in declines in productivity over the years, largely due to mismanagement of the steep cultivated slopes and wetland valleys. The site is also characterised by a loss of soil fertility, forest cover, agro-biodiversity and genetic pools of animal, plant and microbial species, and degradation of the wetlands.

The area is home to large numbers of highly vulnerable rural poor, for whom agriculture represents the major opportunity to enhance their livelihoods. The majority of farmers live in areas with poor market access, poor infrastructure, remoteness from major cities and markets, small fragmented and degraded farmlands, deficient institutions, organisations and policies, and often with limited support from research and development organisations. Their small landholdings limit their capacity to produce large volumes of staple crops for food security and for sale in domestic and regional markets. This situation is exacerbated by limited entrepreneurial skills for adding value to staple commodities, and especially to the production and marketing of high-value products. Improved livelihood options within the site therefore are intricately connected to the expansion of market access and agro-enterprise diversification. However, the region has good potential for a number of products, which requires intensifying the production of traditional staples and diversifying into newer, high-value products that have growing domestic, urban and international specialised niche markets.

Agricultural and related development policies in SSA have either not been implemented at all, or have been implemented partially or poorly. Those that have been implemented well have often not delivered sustainable benefits (Kirsten *et al*. 2009; Markelova & Mwangi 2010). The causes of policy failure include, inter alia, unreviewed and/or irrelevant policies, a lack of implementation mechanisms/disconnect between the policy domain at national level, where policies are formulated, and limited translation into implications at village level, the formulation of by-laws, and poor policy implementation and enforcement at village level. Each of these policy-relevant institutions operates independently of the other, leading to duplication in many cases. Morgan (2010) alludes to the fact that meaningful policy innovation should include strategies that involve ideas developed at community level. In view of this, the IAR4D approach was considered a mechanism to bridge this gap through the use of the IPs at the community level, which will empower its members and especially the small-scale farmers to interpret national policies, formulate by-laws from them and enforce them within their communities and environment. IAR4D could streamline this by bringing all these actors to the same table to formulate by-laws from identified policies, and the IPs could bridge these gaps along a commodity value chain, as shown by the results of the intermediate impact of the SSACP (Nkonya *et al*., this issue).

4.1 The inception phase

The inception phase of the SSACP in the LKPLS consisted of validating the challenges and defining issues to be addressed, calling for concept notes, developing full proposals and awarding three successful grants. The latter were based on three themes to address problems along the interface issues of agricultural productivity, sustainable natural resource management, efficient markets, and appropriate policies with supportive institutional structures.

A commissioned study to validate and identify LKPLS regional issues limiting rural development (FARA 2009b) was carried out and identified six intervention domains for the improvement of the livelihood of people in the LKPLS. These included: i) technological innovations for producing more food and ensuring better nutrition, ii) diversifying agro-enterprises and expanding markets for wealth creation, iii) hillside and wetland husbandry, iv) viable buffer zones, v) building learning alliances and knowledge societies, and vi) tailoring policies.

The research portfolio in the LKPLS was based on the three projects that were selected following a competitive grants process, namely: (a) More food products and better nutrition at reduced cost and minimal degradation of the natural resource base; (b) Beneficial conservation and sustainable use of natural resources; and (c) Wealth creation through agro-enterprise diversification and improved markets. These became the basis for testing the effectiveness and impact of the IAR4D.

In this paper we highlight the key milestones in the dynamic process of ‘proof of concept’, as well as the challenges, lessons learnt and principles that can be used to improve the efficiency and effectiveness of the multi-stakeholder linkages and interactions that have a positive influence on innovation processes at the individual and institutional levels, and thus are pivotal to the IAR4D concept.

4.2 Methodology

After the inception phase, the focus was to demonstrate that using the IAR4D approach was advantageous and delivers more benefits than other participatory approaches. Consequently, a design aimed at comparing outcomes under the IAR4D approach and the conventional approach, and under non-intervention, was elaborated. The comparisons are presented by Nkonya *et al*. (in

this issue). In the IP sites where IAR4D was being implemented, research was carried out at three levels:

a. Research to generate information on and solutions for aspects that are of primary interest to IP communities and stakeholders. These included addressing constraints or responding to opportunities and, by conducting innovation research, addressing challenges at interfaces between natural resource management, productivity, markets and policy.
b. Action research at the productivity-enhancing and value-adding technology NRM market–policy interfaces, to overcome existing and emergent challenges, as well as to facilitate IPs to improve the performance of innovation systems.
c. Assessments to understand (i) the overall functioning of innovation systems, (ii) their benefits for and impacts on the system's actors, particularly smallholder farmers, and (iii) how to strengthen the effectiveness of these systems based on an analysis and synthesis of experiences across task forces and PLSs.

The establishment of innovation platforms went through a number of major steps, namely site selection, building partnership and stakeholder alliances, baseline surveys (household, NRM and market surveys, village characterisation), information gathering and facilitating the functioning of IPs and end-line surveys (Tenywa *et al*. 2011a). A total of 12 IPs were established (four in each country) and facilitated. Facilitation consisted of strengthening governance, forging partnerships, increasing information flow to support informed decision making, building capacity, establishing participatory learning, and introducing monitoring and evaluation (M&E) mechanisms. The initial assessments of the effect of the IAR4D approach were done using before (baseline)-and-after (end line) surveys.

5. Results

Selected outcomes and achievements of the implementation of activities in both the inception and implementation phases are highlighted below.

5.1 Partnership development – Research and development

One of the major milestones in the 'proof of IAR4D concept' was the formation of strategic partnerships. During the inception phase, the project grant winners in the LKPLS represented a range of stakeholders and 23 research and development institutions. The partners in each grant consisted of expertise in the three themes (NRM, productivity and markets). In the process of embracing the principles and process of IAR4D and to effectively address the themes and issues, particularly at the interface level, it became apparent that the three projects had to merge to form one integrated programme. Although this presented a major challenge, it was an important confidence- and trust-building process for the members (actors) of the three projects, considering that it required a change from competition to collaboration, and from three self-sufficient projects to one complementary and integrated programme. In this regard, each task force (TF) offered its comparative advantage, and three different work plans and budgets had to be integrated into a harmonised work plan and budget and a shared vision. Before the initiation of the implementation phase, a single, integrated LKPLS programme was developed (Table 1).

The SC review recommendation at the end of the inception phase, to first demonstrate that the IAR4D approach works in terms of its ability to deliver benefits to end users, was another milestone. From the partnership perspective this was a major shift in terms of the research objectives and activities that had already been planned. It implied a change in the research questions, design and activities to be implemented, and in the roles of some partners (different from

those conceived when the initial proposal was developed). Although the modified research agenda was developed successfully, the more complex implementation of the integrated programme also took off well. The task forces jointly implemented several activities, through pooled human, material and financial resources. These included harmonisation of the work plans, development of monitoring indicators and budgets, stakeholder analyses, baseline surveys, the formation of IPs, and timely reporting. The major achievements observed include a change in the actors' mindsets, increased willingness and flexibility to adapt, collaborate and complement each other in carrying out activities, and sharing of the diverse expertise. The integrated programme approach had a positive influence on the continuity of activities in the different countries when there was a change in leadership or of the task force or certain area of the project. This was reflected in the successful implementation of the initial activities, and was an important element of the IAR4D process, as portrayed of by actors themselves.

Another milestone in the partnership development occurred during the initial stages of the implementation phase. Much of the focus was on establishing multi-institutional and multi-stakeholder alliances and partnerships, which is the key component of IAR4D. Table 1 shows the change in partnership and stakeholder alliances in the LKPLS. The number of partners involved in the SSACP LKPLS increased over time for all categories of stakeholders, illustrating the level of interactions, research and facilitation within the PLS.

Table 1: Evolution of the partnership and stakeholders alliances in the LKPLS

Category of partners	Inception phase	Implementation phase
Research institutions	10	11
Financial institutions	0	3
Higher learning institutions	3	20
Private sector	2	8
Local government	1	4
NGOs	7	8
Farmers' associations	0	12

As discussed by Farrow *et al*. (this issue), seven sites were selected at the beginning of the project and five additional sites were selected one year later. A baseline survey was then done to capture the baseline condition of the beneficiaries and control groups [see Nkonya *et al*. (this issue)].

5.2 IP formation and functioning

Innovation platforms were initiated across the LKPLS in 12 different action sites (Figure 2). The term 'innovation platform' is used to describe the tool for facilitating and conducting action research (Figure 3) by different stakeholders (individual farmers, farmer organisations and/or rural communities, researchers, NGOs, extension departments, the private sector, and policy makers) around a common entry point or theme, and serves as a forum through which stakeholders identify and prioritise issues or constraints to be addressed or opportunities to be exploited, develop joint action plans, share roles, responsibilities and resources, exchange information, track the progress of the implementation of action plans, and monitor the process and outcomes of their interactions.

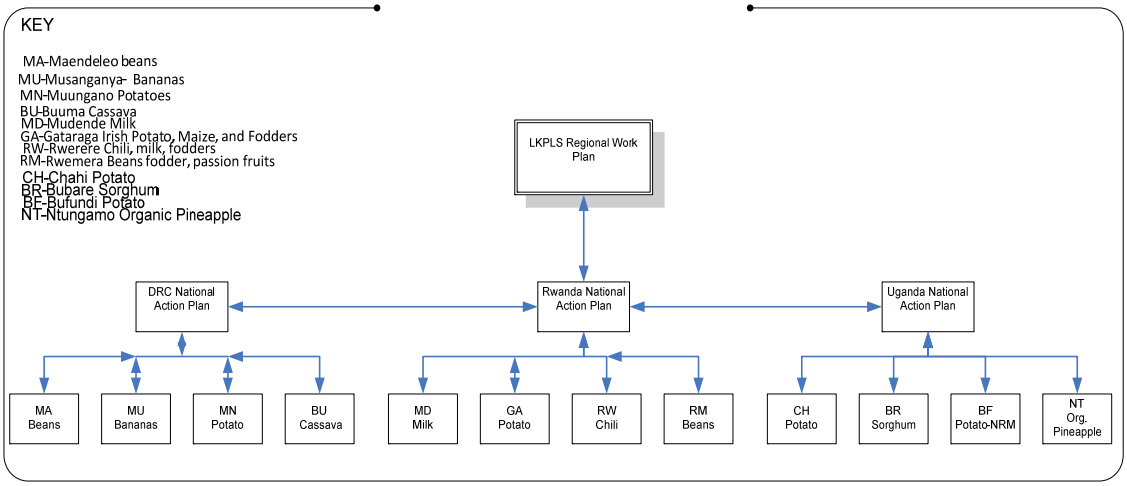

Figure 2: Fully functioning IPs established in the LKPLS

After many rounds of pre-operative consultations, broad guidelines and methodology to form and operate the IPs were developed. Seven innovation platforms were formed during the first round (in 2008) of implementing the programme. An additional five IPs were formed in 2009, giving a total of 12 IPs in the LKPLS (see Farrow *et al*., this issue, for reasons behind the increase in sites). Through extensive discussions, debates and consultations, all 12 IPs identified the major developmental challenges facing agriculture in their locations, institutions with possible roles in addressing the challenges, and potential solutions. A major lesson that was learnt was that, once the initial challenge was successfully overcome through the generation of innovations on the basis of investments from multi-stakeholder and social capital, new challenges emerged and an iterative process was put in motion.

The formation and operationalisation of IPs were carried out through a multi-phased participatory action learning approach, involving a combination of iterative, participative, reflective and integrative desk modelling and field activities. These iterative steps included (i) identification of a research and developmental challenge(s), (ii) consultative and scoping studies, (iii) visioning and stakeholder analysis, (iv) the development of action plans and (v) the implementation of the action plans (Tenywa *et al*. 2011b).

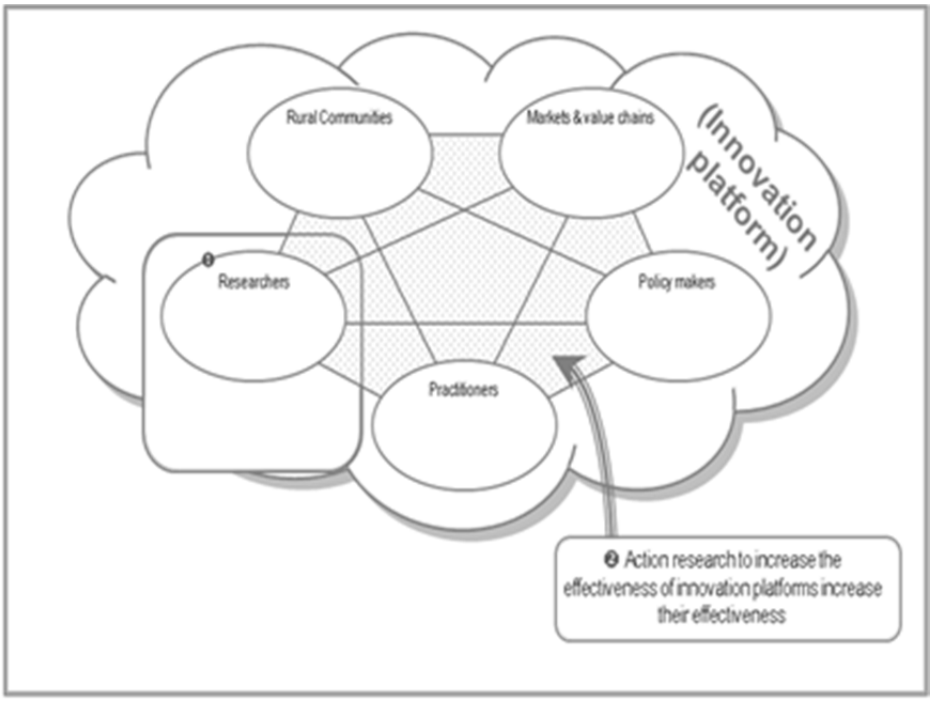

Figure 3: Depicting IP as a tool for action research and facilitation

The innovation platforms were established around identified farming enterprises to overcome the associated socio-economic and biophysical constraints in an integrated manner (Figure 4). Research and developmental challenges around the selected value chain enterprises, and their possible solutions, were also identified in a participatory manner during the second-quarter IP planning session in 2009. In addition, desk reviews, key informant interviews (KIIs), focus group discussions (FGDs), case studies, market chain analyses, institutional capacity assessments and spatial analyses were conducted in order to acquire a general understanding of the productivity and profitability challenges in the IP regions.

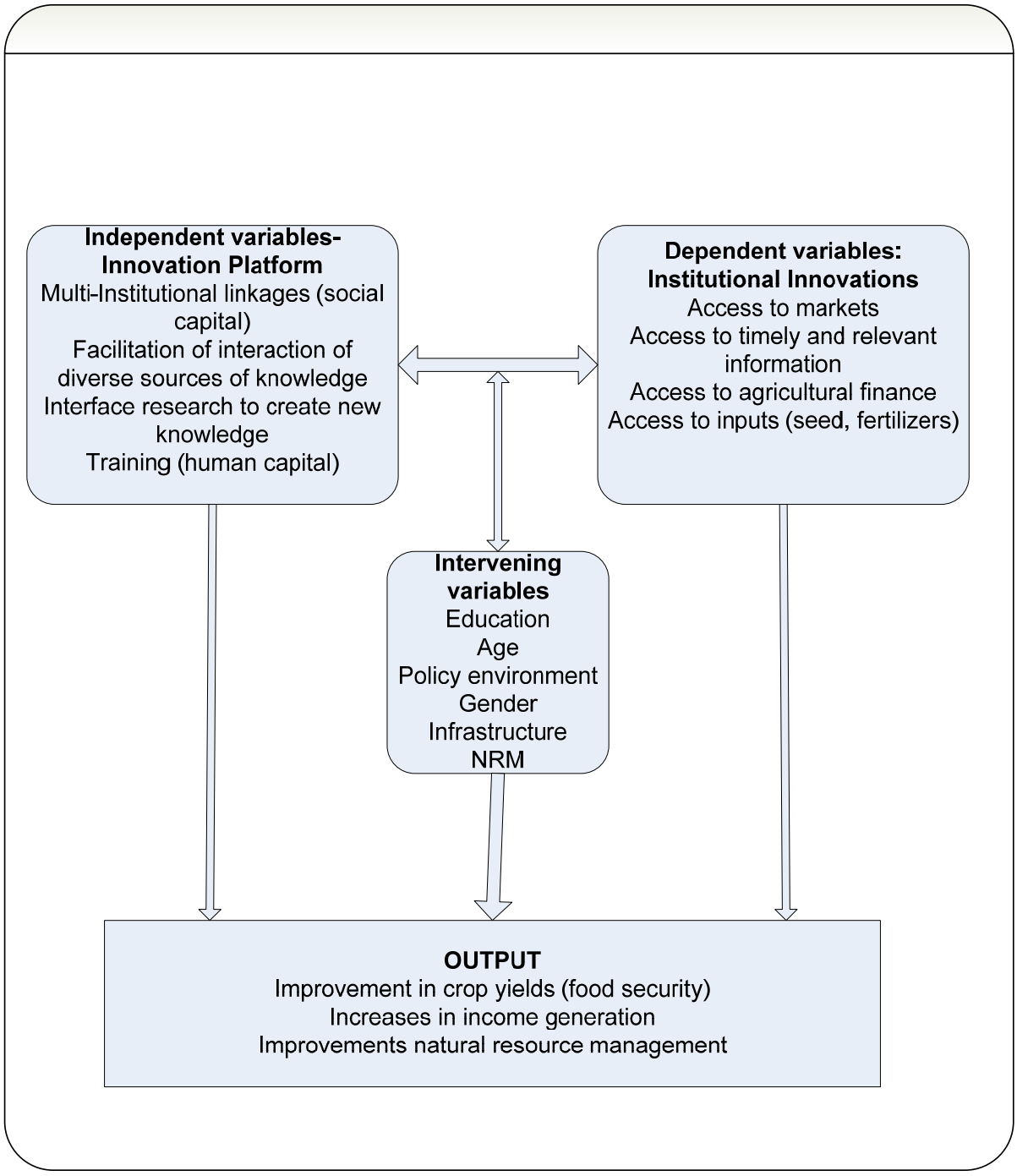

Figure 4: Conceptual framework of how IAR4D promotes the generation of institutional innovations

Consultative and scoping studies involved mobilising and building interest amongst stakeholders at the district/provincial levels. Key to these processes was getting buy-in from local leaders. The mobilisation of stakeholders was aimed at facilitating collaboration, cooperation and networking, and social capital and talent were mobilised for the creation and sharing of knowledge. The stakeholders were engaged in consultative meetings to understand the nature of R&D activities, as well as the biophysical, socio-economic, technological, policy and institutional arrangements. This step involved situation analyses to capture the current knowledge, attitudes and practices (KAP) of the stakeholders as related to the IAR4D approach.

The visioning process included: defining the desired expectations, developing an inventory of NRM-market-technology-policy interface constraints and their prioritisation, and identifying IAR4D-derived solutions to the identified constraints. During this phase, stakeholder analyses were also conducted to determine the skills, strengths and opportunities of different stakeholders, and their potential roles in addressing the identified constraints and harnessing the available opportunities. In addition, the rationale for establishing IPs, including IP functions, principles and guidelines, the critical analysis of challenges, capacity building, facilitation, teamwork/collective action and framework, and planning, monitoring and evaluation (PM&E), were articulated in the context of the SSACP.

Both research-led and market-led visioning were used in the LKPLS. Research-led visioning was used for the first seven IP sites. The stakeholders were sensitised about the agricultural problems and the potential roles they could play in resolving them. The market-led process was used in the second generation of the five IPs. It involved introducing a market opportunity to the target communities and organising the stakeholders to tap it.

Further, IP-based action plans were developed in a participatory manner and roles and responsibilities were defined at each action site (e.g. governance, capacity building, M&E, facilitation, experimentation). All the action site-based plans were integrated and harmonised at the national and LKPLS regional levels to define common elements, while forging synergies in addressing them.

The implementation of the developed action plans was also done either jointly, or in a cascading and/or parallel manner. A steering body (chairman, vice-chairman, secretary, treasurer and members representing various end-user groups from different parishes or antennas (in the DRC)) was democratically established at each site, and was empowered to make operational decisions (e.g. scheduling meetings, drawing up agendas, deploying staff) and liaise with national and regional partners. This body was also supported by subcommittees (e.g. marketing, production, NRM, M&E). The empowerment of IP stakeholders involved training on various aspects as requested by the IP members, including participatory market research, business plan development, market management, value addition, experimentation, regular visits, mentoring, exposure visits and cross-site visits.

At the different levels (national, PLS), meetings were organised and stakeholders were facilitated to respond to issues raised by the steering committee at the action sites, make strategic decisions and raise issues for the higher-level regional body. At the national level, the actions included coordination across country action sites, facilitation of common activities and enhancement of synergies. The country action site coordination also hosted nationally recruited staff (NRS), postdoctoral fellows (PDFs), and task force teams adding value to IP processes at the national and PLS levels – particularly in terms of both the research and facilitation functions of the vertical and horizontal integration of IPs.

The IP members were also involved in on-farm research to address identified interface issues. These included testing new production technologies. Alternative soil fertility-enhancing options were also assessed and included the use of manure from livestock with fodder grown along the contours and on-field boundary lines as feed for livestock, fertiliser rates, spacing, soil erosion control, and pest management. Crop performance and market preferences were assessed, particularly for potatoes, beans, bananas and cassava. Options for the rapid multiplication of the preferred planting materials were assessed, and healthy, disease-free materials were selected for further propagation by local

farmers with the support of NARS (ISAR, NARO, and INERA) and the International Potato Centre (CIP). The local seed producers were also identified for use by the wider community.

The facilitation of IPs capitalised on strengthening their governance, forging partnerships, and increasing the flow of information to support informed decision making. The governance of IPs was strengthened through their institutionalisation, the organisation of regular stakeholder and planning meetings (monthly at IP level), and participatory M&E activities. The establishment and functioning of IPs were captured using various M&E tools, for which a total of 17 tools were developed for this purpose. These tools included the IP register, activity report, type of innovation, and information flow. These documents were shared with the LKPLS team through the Monitoring and Evaluation Officer, who captured and analysed them regularly.

The IPs were also helped to access credit by forging strategic partnerships with relevant stakeholders and service providers in the region. For example, IPs were linked to and opened accounts with Equity Bank, the MECRECO micro-finance institution and Bank Populaire in Uganda, the DRC and Rwanda respectively. In addition, a communication strategy was developed and implemented to enhance information flow among and between farmers and other relevant stakeholders.

Local and regional markets and their requirements in terms of quantity and quality were identified and linked. Meanwhile, the farmers were trained in postharvest handling and, most importantly, in grading, hygiene and sanitation and the packaging of products to meet market standards. Details of each farmer group, their contacts, and expected harvest and delivery dates were maintained; agreements were entered into for the latter to serve as a production timetable. Knowledge was shared at all levels through training, meetings, electronic (mobiles and e-mails) and verbal communication, radio broadcasts, church services, demonstration plots and exchange visits. The training focused on participatory M&E, IAR4D, data management, improved production methods to enhance productivity, production and market access for increased production. This was done with a few trainer IP members (training of trainers – ToTs), who in turn trained others. A total of 47 training workshops were conducted in a period of two years. A computer decision support tool was also developed to assess the profitability of different enterprises.

5.3 Monitoring and evaluation

The result of the M&E of the IP in performing the basic expected tasks is presented in Figures 5 and 6. Most of the IP members were generally satisfied with the performance of the IPs, with an average score of 7.6 out of 10. Members scored highest (8.2) on their involvement in IP activities, followed by awareness and understanding of critical IP issues and relevance of the issues with a score of 8. The lowest score was given to conflict resolution, especially in the DRC IPs (5.5 out of 10), and information sharing within IPs, in Uganda (6.9 out of 10). In the DRC, 37.5% of the members felt that there was little mechanism for conflict resolution, therefore some members dropped out, while 25% felt that conflicts were well resolved. In Uganda and Rwanda, 42.3% and 38.7% respectively felt that there was no conflict in the IP, and 23.1% and 29% felt that the conflict, if any, was well resolved.

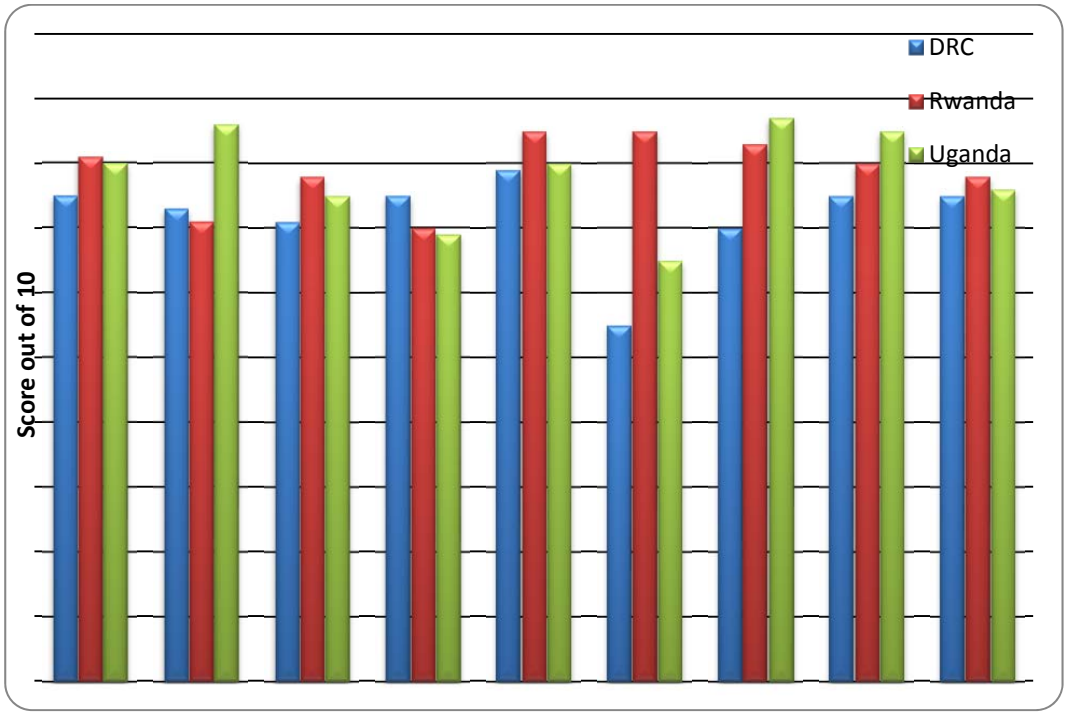

Figure 5: Performance of IPs

The IP outcomes involved the extent of the increase in knowledge of various aspects and the evaluation of the interactions, as shown in Figure 6. Generally, people's level of satisfaction with the IP outcomes was scored 7 out 10; however, this level varied from one outcome to the next. The aspects of changes in interaction with other actors (8) and change in the knowledge of approaches were given the highest score; followed by knowledge of market issues (7.1) and interaction across actors (7.3); knowledge of NRM issues (6.4); achievement of planned activities (6.2); and knowledge of policy issues (5.7). The low knowledge of policy issues is attributed to the fact that policy issues are complex and not well understood.

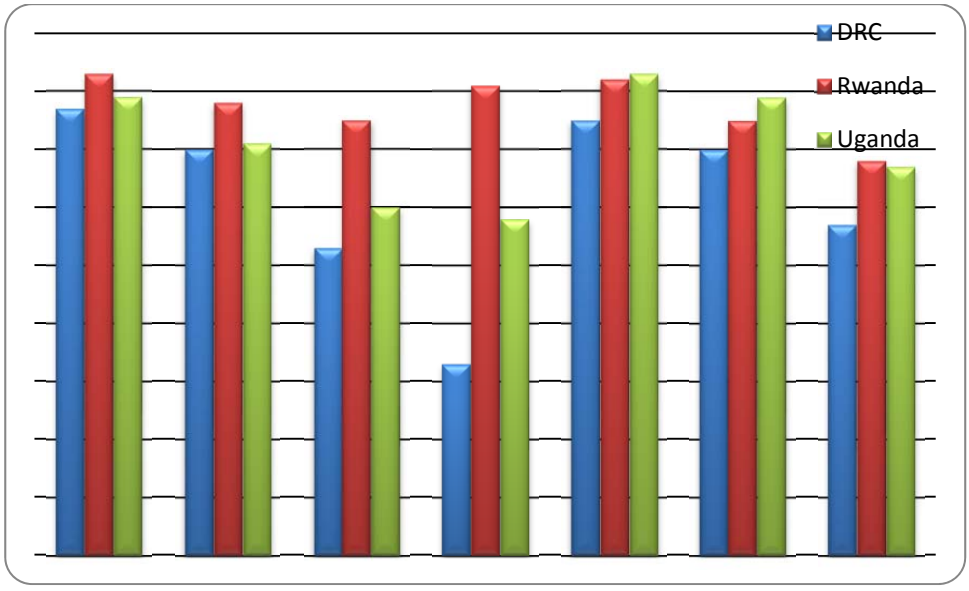

Figure 6: IP evaluation of the changes in IP outcomes per country

In addition, all IPs were linked to financial institutions. Three managed to secure loans amounting to US$10 640, with an interest rate of 2% per month for six months. The loans were used for the purchase of inputs. Up to 93.4% of the loans had been repaid, and one of the IPs had received a second loan worth US$5 000, for a period of six months.

5.4 Institutional innovations

A major outcome of the IP was the institutionalisation of the systemic process of generating innovations to solve the identified and emergent challenges. These can be categorised into linkages and partnerships, technological and market-oriented policy, and institutional arrangements.

The technological and market-oriented innovations were used to solve some of the interface challenges, with specific innovations at the IP and LKPLS levels, and some of the immediate outcomes registered for selected enterprises. Consequently, a compatible technological, disseminating system and market access system were sought to solve the complexity of smallholder agriculture. This has led, on one hand, to building more robustness into the technology (innovations) through integrated systems approaches, e.g. in pest control, soil management, crop-livestock interactions, postharvest handling and agro-forestry, among others. Although the compounded demands on the extension system are high, this has lessened the dependence on input markets and farmer purchasing power. On the other hand, the increased focus on production and postharvest technological innovations that respond to producer and consumer needs within value chains (of high-value crops) generated more income from their produce, and led to a demand for integrated soil fertility management (ISFM) solutions. However, these approaches tend to be biased against food staples and have real difficulty incorporating soil and resource management; also, their impacts on the rural poor are uncertain, with a tendency to exclude this dominant group.

The IP multi-stakeholder alliance has also built an agro-processing network that strengthens the entire commodity supply chain. Most IPs are involved in adding value to the agricultural products. In Uganda, Bubare Sorghum IP has registered the ‘MAMERA’ trade mark as a way of marketing a good-quality fermented porridge, ‘Bushera’, in the LKPLS, and there are possibilities for it to attract substantial market interest from the region and beyond (see Katcho *et al*. (this issue) for details).

Disorganised markets were one of the commonly identified IAR4D issues. The farmers did not know for whom to produce, and the quantity and quality of product and time when to produce. The major innovation has always been vertical integration, linking farmers to traders to reduce production and market risks. This often benefitted the traders and disadvantaged the farmers. An institutional arrangement along the value chain was used to structure and generate market surplus to reward farmers for the value added by actors in terms of increased prices for the produce and reduced buying price for traders. The farmers were helped to reduce market risks through market guarantees and to boost production by negotiating *win-win* agreements and signing MoUs with the traders as a tool to guide their production processes, including quantity, quality, price, packaging and terms of payment. Market surplus, calculated as the difference between the retail price (US$26 average for two weeks) and the farm gate price (US$15 average for two weeks) per 1 x 100 kg potato bag, was reduced by the cost of handling (bagging, loading, transportation and offloading) to Kampala and shared 50:50. This created a win-win condition, reducing the retail price to US$20 and increasing the farmers’ price to US$14.8s, thereby demystifying the ‘middle-man syndrome’ and increasing the profits for the farmers. This also offered an opportunity for face-to-face linkages and interactions between farmers and traders hitherto not possible because of control by middlemen.

Communication and the reduction of transaction costs were other major challenges. A multi-stakeholder real-time telephone-based conferencing innovation was developed to facilitate value chain-based linkages and interactions for the timely flow of relevant information. In this multi-stakeholder value chain, based on a closed-user, low-cost telephone group, members pay a monthly fixed fee equivalent to US$5 for communication, while calls between users are free of charge.

6. Innovation Platform – Task Force Self-regulating System

One of the main lessons learnt in the course of the IAR4D action research was that, to meaningfully respond to constraints or opportunities associated with the four interlinked components of NRM, productivity, markets and policy, a self-regulating mechanism/system involving the innovation platform partners needs to be in place and operational (Figure 7). As described above, the emphasis (in the LKPLS) was to address constraints or issues at the interfaces between the four components. This is because developing solutions at the (isolated) component level without giving consideration to their inter-linkages might only offer temporary reprieve or create a new problem. In hindsight there are past examples that illustrate this: the use of improved crop production technologies results in the desired increased productivity. However, if the necessary market linkages and postharvest technologies are not factored in good time, the price of the commodity can become depressed, leading to a situation in which "success" (in productivity) results in a "failure" (low price/markets). Overall change in one or more of the four components (productivity, NRM, markets and policy) may influence the others. The challenge then is for research and development efforts around one component (e.g. productivity) not to negatively affect another component (e.g. markets). Just as a central processing unit (CPU) monitors, regulates and harmonises the operations of several different components (or subsystems) to deliver the desired outputs and products in industrial machinery or systems, we argue, similarly, that there is a need for a "mechanism" or "process" to regulate the four different components to be able to deliver the desired outputs and impact to the end-users in an IAR4D principle-based system. For example, an increase in yields should not attract a decline in the farm gate price of products in IAR4D principle-based self-regulating systems. At the centre of such a system are individuals or actors (in the current experience IP and task force teams) who have played key roles in addressing issues (in advance or as they evolve) through both research and facilitation. This is done through monitoring, receiving feedback and then providing corrective or adjusted measures through training, and identifying new opportunities and appropriate institutions and teams to address any new problem, or bringing on board new players to address the emerging issues, ensuring a free flow of information and addressing conflicts before they happen or grow into disputes. An important element in this self-regulating process is facilitation. In the LKPLS, farmers were involved in facilitation, designing and conducting research. Facilitation was done horizontally and vertically at various levels. Our experience shows this to be important.

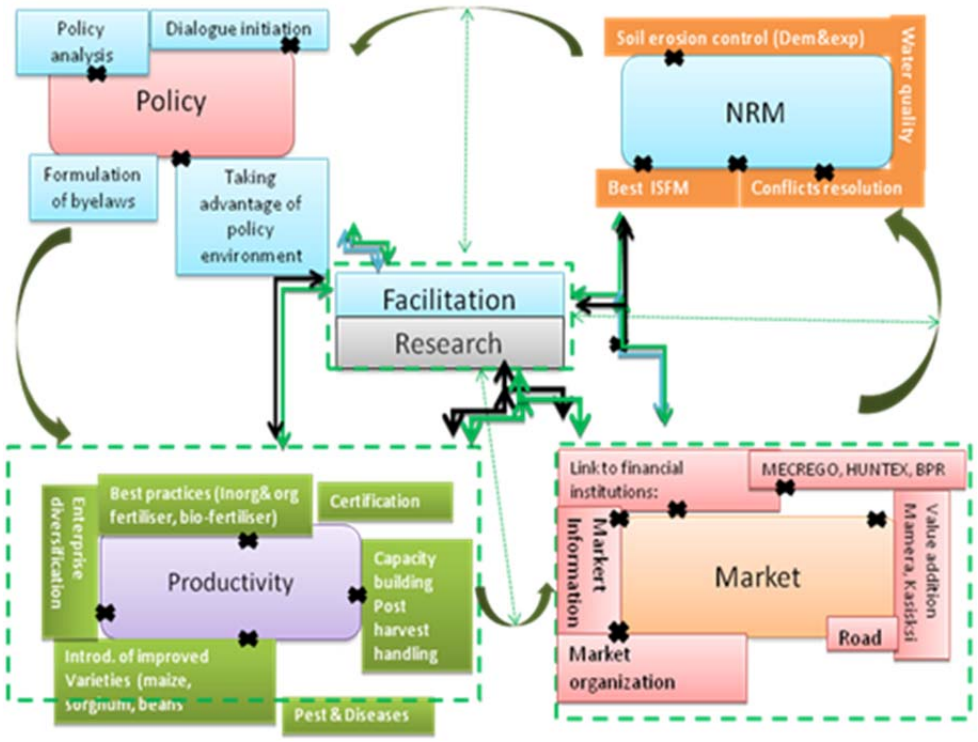

Figure 7: An IAR4D model depicting self-organisation and regulation (Source: authors)

7. Lessons Learnt

a. Market-led IP formation creates quicker win-win scenarios compared to the researcher-led approach, as it allows IP members to deliberate on their problems in relation to their vision.
b. IP formation requires inspiring champions at different levels to facilitate teamwork and trust among the different stakeholders.
c. The iterative process is useful in enhancing the capacity of stakeholders to achieve the desired goals.
d. The concept of IP is applicable to the different sites in different communities in different countries. This implies that it is replicable elsewhere. The reason for this is that the formation of IPs is a learning process and context specific, requiring changes to suit a given context, rather than being based on a blueprint.
e. The process of IP formation is shorter where local leadership is strong and is involved.
f. Creating win-win scenarios can be advantageous in attracting non-traditional actors, e.g. the private sector, and enhancing the speed of formation of IPs.
g. In these multifaceted, multi-stakeholder and multi-level partnerships, facilitation is a key element in the successful implementation of the IAR4D. Facilitation here is akin to the central processing unit (CPU) of a computer. The identification of appropriate institutions and teams to address the problem, bringing in new players to address the emerging issues, ensuring free flow of information and addressing conflicts before they happen or grow into disputes, are key elements of the facilitation process.
h. There are a number of alternative sources of income within the area, which can be integrated into the existing practices in the form of a diversification strategy to enhance people's livelihoods.
i. The increased production highlights a need for strategic measures to protect the farmers from possible price fluctuations, including selling large volumes of produce.

j. The linking of farmers with markets has created a new awareness of the need to maintain the quality of the produce, and the IPs have started highlighting the need for information and training in grading, packaging, storage and other requirements of both domestic and export markets.
k. The dynamic nature of the programme makes it essential to foster new stakeholders/ collaborations as required, with appropriate institutional linkages.

8. The Challenges of the IAR4D Approach

Even though the initial results show that a considerable impact was made and that the approach was well received by the beneficiaries, the IP approach still faces challenges relating to coordination among a diverse number of stakeholders. Researchers and other participants also occasionally carried out activities that were not their area of strength. For example, researchers spent a considerable amount of their time networking with participants and performing administrative duties of the project. The IP approach should rather involve people with networking expertise. The approach can also not be used to conduct rigorous research of which the outcomes are not well known. This means that the IAR4D cannot completely replace traditional research – some of which can only be done on-station. National agricultural research organisations should design a research model that takes advantage of both IAR4D and traditional research – while ensuring no duplication of effort.

9. The Way Forward

Based on the experiences and lessons so far from implementing the 'proof of IAR4D concept', it has become clear that the common interest value chain needs to be strengthened both vertically and horizontally, and scaled up.

Acknowledgements

We are very grateful to EU-FARA, for their support, and to all the farmers, extension workers, private sector participants, traders and traders' associations, as well as all the partners, who have contributed to the results reported here.

References

Adjei-Nsiah S, Leeuwis C, Giller KE & Kuyper TW, 2008. Action research on alternative land tenure arrangements in Wenchi, Ghana: Learning from ambiguous social dynamics and self-organized institutional innovation. Agriculture and Human Values 25(3): 389–403.

Bunch R, 1986. Encouraging farmers' experiments. In Chambers R, Pacey A & Thrupp (eds.), Farmer first: Farmer innovation and agricultural research. London: Intermediate Technology Publications.

Campbell BJA, Sayer P, Frost S, Vermeulen M, Ruiz-Perez A, Cunningham A & Prabhu R, 2001. Assessing the performance of natural resources systems. Conservation Ecology 5(2): 22. Available at http://www.consecol.org/vol5/iss2/art22/

Edquist C, 2001. The systems of innovation approach and innovation policy: An account of the state of the art. Paper read at the DRUID Conference, 12–15 June, Aalborg, Denmark.

FARA, 2007. Sub-Saharan Africa Challenge Programme, Medium Term Plan 2008–2010. FARA, Accra, Ghana.

FARA, 2009a. Integrated agricultural research for development: A concept paper prepared for Forum for Agricultural Research in Africa, Sub-Saharan Africa Challenge Programme, FARA, Accra, Ghana.

FARA (2009b). SSACP-LKPLS Baseline Survey Report. Status of Natural, Social, Financial, Human and Physical capitals in the Lake Kivu Pilot Learning Site. FARA, Accra, Ghana.
Irz XT & Roe TL, 2000. Can the world feed itself? Some insights from growth theory. Agrekon 39(4): 89–109.
Kirsten JF, Dorward AR, Omamo SW, Poulton C & Vink N, 2009. Institutions and the agrarian development challenge in Africa. Washington, IFPRI.
Markelova H & Mwangi E, 2010. Collective action for small holder market access: Evidence and implications for Africa. Review of Policy Research 27(5): 621–40.
Morgan J, 2010. Governance, policy innovation and local economic development in North Carolina. Policy Studies Journal 38(4): 679–702.
Norman D & Matlon P, 2000. Systems research and technical change. In Crawford E & Collin J (eds.), Research on agricultural systems: Accomplishments, perspectives and methods. Huntington: Nova Science Publishers.
Norman D, Siebert J, Modiakgotla E & Worman F, 1994. Farming systems research approach: A primer for Eastern and Southern Africa. Gaborone, Botswana: Farming Systems Programme.
Schiere JB, Lyklema J, Schakel J & Rickert KG, 2000. Evolution of farming systems and system philosophy. Systems Research and Behavioral Science (Special Issue: Linking People, Nature, Business and Technology) 16(4), 375–90.
Spielman DJ, 2005. Innovation systems perspectives on developing-country agriculture: A critical review. ISNAR Discussion Paper No. 2, IFPRI, Washington, DC. Available at http://www.ifpri.org/divs/isnar/dp/isnardp02.asp
Tenywa MM, Rao KPC, Tukahirwa JB, Buruchara R, Adekunle AA, Mugabe J, Wanjiku C, Mutabazi S, Fungo B, Kashaija NI, Pali P, Mapatano S, Ngaboyisonga C, Farrow A, Njuki J & Abenakyo A, 2011a. Agricultural innovation platform as a tool for development oriented research: Lessons and challenges in the formation and operationalization. Journal of Agriculture & Environmental Studies (Special Edition): Integrated Agricultural Research for Development II(1). Available at http://learningpublics.org/component/content/article/14-agricvolume2
Tenywa MM, Rao KPC, Buruchara R, Kashaija I, Majaliwa JD, Tukahirwa JB, Adekunle AA, Fatunbi AO, Mugabe J, Wanjiku C, Mutabazi S, Pali P, Mapatano S, Lunze L, Mugabo J & Ngaboyisonga C, 2011b. Institutional innovations for building impact-oriented agricultural research, knowledge and development institutions. Journal of Agriculture & Environmental Studies (Special Edition): Integrated Agricultural Research for Development. Volume II(1). Available at http://learningpublics.org/component/content/article/14-agricvolume2
World Bank, 2008. World Development Indicators. Available at http://data.worldbank.org/indicator (Accessed 7 November 2010).